

Analysis of approaches to spectrum usage fee policy across the EU, identification of general principles and recommendations for possible changes in the Czech Republic, inter alia in connection with the roll-out of 5G networks

Prepared for the Ministry of
Industry and Trade

[November 2024]



**Národní
plán
obnovy**

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List of abbreviations and explanatory notes

3G / 4G / 5G	Third / fourth / fifth generation mobile networks
AIP	Administrative Incentive Pricing (AIP) AMAmplitude Modulation (AM)
BNetzA	German regulatory authority
CCTV	CCTV systems, closed-circuit television
CGC	Complementary ground components of a satellite mobile system
CPI	Consumer Price Index (CPI)
Czech Republic	Czech Republic
CTU	Czech Telecommunications Office
DAB	Digital Audio Broadcasting
dBm	logarithmic unit of power
dBW	decibel-watt
DKK	Danish krone
VAT	Value added tax
DTT	Terrestrial broadcasting
EETT	Greek regulatory authority
ENG/OB	Electronic transmission of news and radio and television broadcasts from locations outside radio and television studios
ERP	Effective radiated power
ERTMS	European Rail Traffic Management System
EU	European Union
EUR	Euro
FM	Frequency Modulation (FM)
FWA	Fixed Wireless Access network
GBP	British pound
GNSS	Global Navigation Satellite System (GNSS)
GSM-R	Global System for Mobile Communications (for use on railways)
GSO	Geostationary orbit
GDP	Gross Domestic Product
HUF	Hungarian forint
IO	Individual measures
IoT	Internet of Things
ITU	International Telecommunication Union
CZK	Czech koruna
kHz, MHz, GHz	Kilo / Mega / Gigahertz
KPI	Key Performance Indicators (KPI)
LTE	Version 8 of UMTS, the technology preceding the 4th generation of mobile communications (Long Term Evolution of the 3GPP radio technology)
m / km	metre / kilometre
MFCN	Mobile/fixed communication network
mil. / thousand	million / thousand
MNO	Mobile network operator
MPO	Ministry of Industry and Trade
MVDS	Multipoint Video Distribution Service

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MWS	Multimedia Wireless System
NGSO	Non-geostationary orbit Nkom Norwegian Regulatory
Authority	
NRA	National regulatory authorities
NV	Government Regulation
PLN	Polish zloty
PMR	Private or corporate mobile radio networks and links
(PMSE)	Services related to the programme and special events
(PPS)	Land Mobile Service
PS	Fixed service
PTT	a method of communication via half-duplex connections, where communication is only possible in one direction at a time and, if the operator wishes to speak, they must press a button
PVRS	Radio Spectrum Utilisation Plan
RÜ	Regulatory Authority
SAF / SUF	spectrum annual fee / spectrum utilisation fee SA-NPN Standalone Non-Public Network
SEK	Swedish krona
SNG / OB	Satellite links for news reporting / Broadcasting from locations outside the studio
TDD	Time Division Duplex (TDD) TETRA Type of terrestrial radio
	system (Terrestrial Trunked Radio)
UMTS	Universal Mobile Terrestrial System for mobile communications USD US dollar
UK	United Kingdom
VO	General authorisation
VSAT	Very Small Antenna Terminal
W, kW	Watt / Kilowatt
Wi-Fi	A type of wireless technology for wireless LANs based on the IEEE 802.11 standards WLL-
PMP	Type of radio relay system
WRC-23	World Radiocommunication Conference

Executive summary

This study was undertaken with the aim of providing a comprehensive overview of approaches to the collection of fees for the use of radio frequencies across the EU and comparing these with the fees in the Czech Republic, as set out in Government Regulation No. 154/2005 Coll. on the determination of the amount and method of calculation of fees for the use of radio frequencies and numbers. The main objective was to identify potential areas for review of fee collection in the Czech Republic, based on a comparison and in-depth analysis of the Czech Telecommunications Office's (ČTÚ) fee policy.

The first part of the study describes the regulatory framework for the collection of fees under European Union legislation. It goes on to define the reasons for levying fees for the use of frequencies, citing, as the main ones, more efficient spectrum management, the recovery of the CTU's regulatory costs, and the promotion of the public interest and competition. The chapter also addresses trends and challenges in this sector, highlighting the role of 5G networks as the main current and future driver of the telecommunications sector.

Part of the document focuses on the main principles governing the collection of spectrum usage fees. Various charging models are compared in relation to the type of service or application definition. Different approaches to the funding of national telecommunications regulators are also mentioned and compared, including the role of fees in this area. There is also a discussion of methods for updating charges over time.

An important part of the report is an extensive benchmark of fee policies across thirteen European countries. The benchmark examines the general approach of the selected countries to the levying of fees for the use of spectrum; it then analyses the method of calculating fees for key services, such as fixed, terrestrial mobile and satellite services; and finally, in the appendices, it provides a detailed analysis of further information on the levying of fees in accordance with the legislation of the respective country. The benchmark was carried out for the following countries:

- Denmark
- Finland
- France
- Croatia
- Ireland
- Luxembourg
- Hungary
- Germany
- Poland
- Austria
- Slovakia
- Slovenia
- United Kingdom

The key chapter of the study focuses on specific areas that have been identified as important for the further development of the telecommunications sector, or which, based on international benchmarking or an analysis of fees in the Czech Republic, have been identified as suitable for more detailed examination with a view to potential future adjustments. The main focus was on the following topics:

- a change to the structure of licence fees for the experimental use of frequencies, with the aim of simplifying calculations and providing better coverage of short-term experiments and demonstration events;
- adjustment of the coefficients used in the calculation of fees for fixed and land mobile services to more accurately reflect market realities and increase the efficiency of spectrum allocation;
- options for setting the method of collecting fees for private networks (5G and TETRA networks/business radio)
- a potential review of the method of charging for satellite services with a view to ensuring that fees are set at an appropriate level in light of the sharp rise in the use of this type of service.

Following a more detailed examination of these areas, possible adjustments to the current approach to the collection of fees for the use of frequencies have been proposed, which the CTU should address in the near future. These include, for example, dividing experiments into two categories according to the duration of the authorisation – namely short-term and long-term; removing the unused table for calculating the fee for point-to-multipoint services; and increasing the granularity of the intervals used to determine the calculation coefficients for certain types of fixed and land mobile services.

Management Summary

This study was conducted to provide a broad overview of approaches to the collection of frequency usage fees across Europe and to compare these with the fees in the Czech Republic, as set out in Government Decree No. 154/2005 Coll., on the amount and method of calculation of fees for the use of radio frequencies and numbers. The main objective was to identify potential areas for reform of the collection of frequency usage fees in the Czech Republic, based on a comparison and a more in-depth analysis of the CTO's fee policy.

The first part of the study describes the regulatory framework for fee collection under European Union legislation. It then sets out the reasons for charging for spectrum use, emphasising in particular more efficient spectrum management, the coverage of the CTO's regulatory costs, and the promotion of the public interest and fair competition. The chapter also examines current trends and challenges in the sector, highlighting the role of 5G networks as a major driver of the telecommunications sector, both now and in the future.

Part of the document focuses on the various principles governing the collection of spectrum usage fees. Different charging models are compared according to the type of service or application definition. The study also outlines and compares various approaches to the funding of national telecommunications regulators. It also includes a discussion on how spectrum usage fees are updated over time.

An important part of this study is a comprehensive benchmark of the fee policies of thirteen European countries. The benchmark examines each country's general approach to the collection of spectrum usage fees, then discusses how fees are calculated for key services such as fixed, land mobile and satellite services, and finally, in the appendices, provides further details on the collection of fees under the respective countries' legislation. The benchmark was carried out for the following countries:

- Denmark
- Finland
- France
- Croatia
- Ireland
- Luxembourg
- Hungary
- Germany
- Poland
- Austria
- Slovakia
- Slovenia
- United Kingdom

The core chapter of the study focuses on specific areas that have been identified as important for the further development of the telecommunications sector, or which, based on benchmarking or an analysis of charges in the Czech Republic, were identified as suitable for more detailed examination and with potential for future adjustments. The main focus was on the following topics:

- changes to the collection of licence fees for the experimental use of frequencies to simplify the calculation and better accommodate short-term experiments;
- adjusting the coefficients used in the calculation of fixed and land mobile service fees to more accurately reflect market conditions and improve the efficiency of spectrum allocation;
- possible approaches to the collection of private network fees (5G and TETRA networks/business radio);
- a possible review of the way satellite services are charged, with a view to ensuring that fees are collected appropriately in light of the rapid growth of this type of service.

Following a more detailed examination of these areas, possible adjustments to the current approach to the collection of frequency usage fees were proposed, which the CTO should address in the near future. These include, for example, dividing experiments into two categories – short-term and long-term – based on licence duration, removing the calculation table for unused point-to-multipoint service fees, or increasing the granularity of the intervals used to determine the calculation factors for certain types of fixed and land mobile services.

1 Introduction

Across EU countries, there are differing approaches to spectrum usage fees, which may or may not be applied, thereby constituting an additional cost for electronic communications network operators.

The aim of the study is to identify general principles across the EU, to produce a comparative analysis of fees in the Czech Republic based on Government Regulation No. 154/2005 Coll. – the Government Regulation on the determination of the amount and method of calculation of fees for the use of radio frequencies and numbers – and to summarise possible recommendations for the Czech Republic in the context of supporting the country's further development.

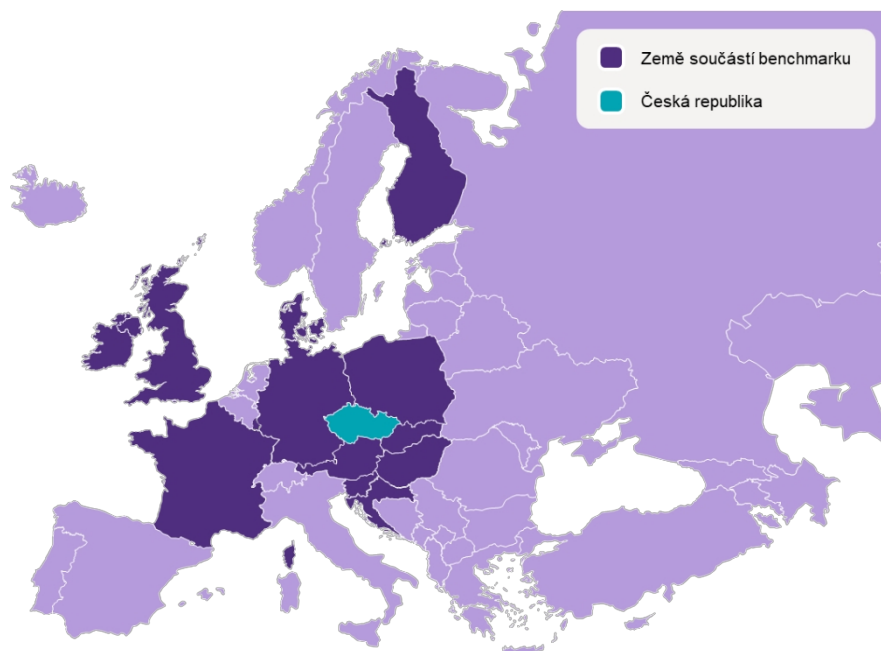
The study, which was prepared in consultation with the Czech Telecommunications Office's (ČTÚ) expert advisor, analyses the following areas:

1. *The policy on setting fees for the allocation and use of frequencies in at least 10 Member States of the European Union and in the United Kingdom. This covers at least neighbouring countries, with the aim of covering the widest possible range of approaches across the EU.*
2. *A summary of the main approaches to fee setting (based on regulatory authorities' costs or other factors), charging based on the definition of a radiocommunication service (land mobile service, fixed service, broadcasting, etc.) or according to an application-based definition (ENG/OB, two-way radios, SNG, etc.).*
3. *Where information is available on the method of setting fees (their quantification), an assessment of whether there is an ad hoc approach to such quantification or whether it is a generic, long-term method of determining fees.*
4. *An analysis of whether there are regular principles for updating or revising fee policy across a benchmark of 10 EU countries and the UK.*
5. *For the purposes of specific frequency bands, as agreed by the Client (the CTU's technical guarantor), an analysis of the impact of the fees applied to these frequency bands and relevant services (future bands for further 5G development, satellite services and others).*
6. *Quantification of fee levels in the Czech Republic for 2023 and an approximate conversion based on the currently applicable rules of at least five Member States of the European Union, including adjustments to comparable values.*
7. *A final summary of approaches to fee policy, their possible applications and an assessment of the advantages and disadvantages of individual models in the context of the Czech Republic and the development of services, including a proposal for possible changes for the Czech Republic with a view to supporting the development of new, modern services, including investment and support for 5G network coverage.*

The study included 13 European Union countries (including all neighbouring countries of the Czech Republic) and the United Kingdom, which represent a representative combination not only in terms of geographical location and population size, but also in terms of the diversity of approaches to charging for spectrum usage rights:

Figure 1: Countries included in the benchmark

- Denmark
- Finland
- France
- Croatia
- Ireland
- Luxembourg
- Hungary
- Germany
- Poland
- Austria
- Slovakia
- Slovenia
- United Kingdom



2 The regulatory framework and broader context of fee policy in the EU

The following chapter describes the European legislative framework, the general concept of spectrum usage fees and, in broad terms, trends in spectrum development within the current telecommunications market.

2.1 Legal and regulatory context in the EU

Regulation of the telecommunications sector at European level is aimed at ensuring the effective functioning of the single market, protecting consumers, and promoting competition and technological development.

European regulation generally helps to reduce regulatory differences between Member States, making it easier for service providers to offer their products and services across borders. This leads to greater market integration and improved access to services for consumers across the EU. Common regulation also ensures uniform rules and standards, which facilitate the operation of telecoms companies (the networks themselves) in different Member States and help to reduce the administrative burden and legal uncertainty. Furthermore, regulation at European level helps prevent dominant operators from abusing their market power, thereby helping to maintain a competitive environment and ensure affordable prices and innovation. Moreover, a harmonised regulatory environment fosters innovation and leads to higher service quality and a wider range of choices for consumers.

The following legislation is key to the functioning and development of the telecommunications sector within the European Union:

- Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services (repealed with effect from 21 December 2020 after 18 years in force);
- Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the costs of deploying high-speed electronic communications networks;
- Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code;
- Directive 2002/22/EC of the European Parliament and of the Council of 7 March 2002 on universal service and users' rights relating to electronic communications networks and services;
- Regulation (EU) 2022/612 of the European Parliament and of the Council of 6 April 2022 on roaming on public mobile communications networks within the Union.

Of particular relevance to this study is Directive (EU) 2018/1972 of the European Parliament and of the Council (the European Electronic Communications Code).¹ Article 42 of that Directive addresses the issue of fees for rights to use radio spectrum and for rights to install equipment. This Directive allows Member States to authorise the competent authority to impose fees for rights to use radio spectrum. Member States must ensure that such fees are objectively justified, transparent, non-discriminatory and proportionate to their intended purpose.

Fees must be set at a level that ensures the efficient allocation and use of radio spectrum, inter alia by:

- a) setting reserve prices as minimum fees for rights to use radio spectrum, taking into account the value of those rights if they were used for alternative purposes;
- b) taking into account the costs associated with the conditions to which these rights are subject;
- c) apply, to the greatest extent possible, payment methods that are directly linked to the availability of radio spectrum for use.

These fees are often referred to as market-based or reflecting the economic value of the spectrum. They are frequently calculated using formulae that apply higher coefficients to lower bands, which may be perceived as 'scarcer'. Countries that levy annual fees usually allocate them to the national budget (although they may be collected by the national regulatory authority).

The same Directive also regulates the issue of administrative charges. Article 16 sets out the rules for imposing charges on undertakings operating networks or providing electronic communications services. The Directive further imposes obligations which must

¹<https://eur-lex.europa.eu/legal-content/CS/TXT/PDF/?uri=CELEX:32018L1972>

these entities must fulfil. Last but not least, it mentions the possibility of waiving administrative charges for undertakings with a very limited market share or geographical scope.

2.2 Fee policy and its significance for the development of electronic communications

Fees for the use of radio frequencies and administrative charges levied by national regulatory authorities in the field of radiocommunications serve several key purposes, such as the efficient management of the spectrum, covering the costs of regulation and administration, and promoting the public interest and competition.

Fees serve to regulate access and ensure a better allocation of resources. Radio frequencies are a limited and valuable resource; it is therefore necessary to manage them effectively in order to prevent spectrum hoarding and to ensure fair and justified access to them. Fees encourage organisations to use frequencies efficiently and effectively in order to minimise waste and make the most efficient use of the available spectrum. The introduction of fees can also encourage investment in more modern technologies that use the spectrum more efficiently. Higher fees for older technologies encourage providers to switch to more advanced systems that manage spectrum more efficiently.

The fees are also used to cover the costs incurred by regulators in managing the spectrum, including licensing, monitoring, enforcement and the resolution of disputes between spectrum users. The fees also contribute to the funding of the technical infrastructure required for effective spectrum management, such as systems for monitoring frequency usage and detecting unauthorised transmissions.

Frequency usage fees can be structured to support services in the public interest (e.g. public service radio broadcasting) whilst also allowing commercial operators access to scarce spectrum. It is important to structure fees in such a way that they do not create barriers to entry for new market players. The aim is to foster a competitive environment with high-quality services and lower prices for end-users.

The collection of fees is therefore a tool through which regulators ensure the efficient and fair use of radio frequencies, finance their activities and support technological and economic development in the field of electronic communications, including market dynamics, whilst ensuring service continuity.

2.3 Current trends and challenges in the spectrum sector, including the development of 5G networks

The development of fifth-generation (5G) networks is bringing a range of innovative technologies and services to the market, which are significantly changing the way in which the radio spectrum is used. However, these changes give rise to a need not only to reassess and adapt spectrum management policy – that is, the allocation of spectrum for innovative applications and services – but also to adjust the policy on frequency usage fees, which should reflect current market needs and challenges.

5G technology, particularly in its application for industrial enterprises, for example, requires a substantially larger amount of spectrum than previous generations of mobile networks. At the same time, this demand for bandwidth may also grow for mobile services (terrestrial mobile services). Whilst the number of end devices (mobile phones, etc.) remains relatively stable, emerging applications and services, such as the Internet of Things (IoT), autonomous vehicles and telemedicine, are dramatically increasing the demand for fast and reliable data transmission.

Although telecommunications service providers are investing significant resources in acquiring the spectrum required to operate 5G networks, consumers are unwilling to pay higher prices for these services or for improvements in their quality. This puts pressure on providers to strike a balance between the need to invest in new technologies and the ability to offer services at prices that are acceptable to customers.

In view of these circumstances, it is essential that the policy on spectrum usage fees is flexible and adapts to changing market conditions. Traditional models based on fees for the use of a specific spectrum band may not be sufficiently effective in the context of 5G. Instead, alternative approaches could be considered, such as charges per individual end-user device utilising the signal, or models that would allow for a gradual increase in payments in line with a company's growth and its spectrum usage requirements. These alternative models are strictly tied to specific anticipated applications or uses, which are not always easy to predict several years in advance.

Some countries are already experimenting with new approaches whereby operators pay fees based on the number of devices connected to the network rather than for the spectrum itself. This model may be particularly attractive to new market entrants with a specific usage model who do not immediately have the resources to acquire large nationwide spectrum blocks. By starting with lower costs and gradually increasing their payments as their services and the number of connected devices grow, they can respond more flexibly to market needs and the development of new technologies.

3 Key principles for setting spectrum usage fees

3.1 Basic classification of European models for financing NRAs and national radio spectrum administrations

In Europe, there are several different models for financing national regulatory authorities, which influence the way spectrum usage fees are calculated. Another source of revenue for regulators is typically the cost of spectrum acquisition, i.e. auctions or the renewal of access to frequencies in a specific band (in the Czech Republic, through radio frequency allocations).

Figure 2: Basic classification of funding models for NRAs and national radio spectrum management authorities

 Model motivační výše poplatků	 Státně financovaný model	 Nákladový model s alokací nákladů	 Model poplatků bez alokace nákladů	 Hybridní model poplatků
• Poplatky za kmitočty mají odrážet ekonomickou hodnotu spektra • Primárním cílem není získat zpět administrativní náklady, ale podpořit efektivní využívání spektra (motivační ceny) • Model je typicky doplněn ročními „regulačními“ poplatky (% z výnosů, pokrytí, počet uživatelů...)	• Poplatky za kmitočty odrážejí různé ekonomické, sociální a politické aspekty, nejen „tržní hodnotu“ spektra nebo administrativní náklady • Poplatky jsou převáděny přímo do státního rozpočtu; náklady na správu spektra resp. provoz NRA jsou hrazeny ze státního rozpočtu • Model bývá doplněn „regulačními“ poplatky	• Poplatky za kmitočty odrážejí náklady na správu daného spektra • Náklady jsou přepočítávány a měněny na roční bázi • Model bývá doplněn „regulačními“ poplatky	• Celková výše poplatku za kmitočty odráží celkové náklady na správu spektra - nikoli náklady spojené s konkrétní službou popř. kmitočtovým pásmem • Za některé licence je tedy účtováno více než jsou jejich skutečné vzniklé náklady, jiným je naopak účtováno méně	• Model je postaven na kombinaci poplatků za kmitočty (bez ohledu na skutečné náklady) a regulačních poplatků • Model je využíván jak ve formě financování přes státní rozpočet, tak pro přímé financování NRA
Velká Británie	Kypr, Česká republika, Francie, Malta, Polsko	Nizozemsko, Švédsko	Maďarsko, Finsko	Chorvatsko, Irsko, Lotyšsko, Portugalsko

In some cases, fees are also collected into special funds, from which the money is then used to support further development or for the purposes of planned events. An example in the Czech Republic is the radio communications account under Act No. 127/2005 Coll. and Government Regulation No. 153/2005. As defined in the Act, these funds are used, for example, generally to cover costs incurred by holders of authorisations to use radio frequencies, or by the Ministry of Defence when using radio frequencies for military purposes, which have been incurred efficiently and effectively as a result of changes in the use of the radio spectrum. Furthermore, they are used to address the consequences of resolving technical incompatibilities that do not result from a failure to comply with the conditions set out in the authorisation to use radio frequencies, in the general authorisation or in the radio spectrum utilisation plan.²

A relatively common fee is one calculated as a percentage of the frequency user's turnover. This usually amounts to tenths of a per cent of the total turnover from services utilising radio frequencies. One potential issue is the blanket application of charges to all entities, which may pose a problem for those using only a minimal amount of spectrum; on the other hand, however, the fees collected reflect the entity's actual market power.

²<https://www.zakonyprolidi.cz/cs/2005-127#cast1>

3.2 Principles, objectives and methods for setting fees

When setting fees, regulators should be guided by the following principles³, which by their very nature involve tensions between them, and it is necessary to strike an appropriate balance between these approaches:

- Allocating spectrum towards uses with the highest added value, to ensure that maximum benefits for society are achieved;
- Greater access to spectrum, facilitated by the lowest possible costs and the least restrictive approaches to spectrum management;
- Promoting regulatory certainty, whilst also allowing flexibility in spectrum use;
- Striking a balance between the negative effects of interference and the benefits gained from greater spectrum utilisation (by more entities);
- Fees based on objective factors and equal and fair treatment for all licence holders within a given frequency band;
- Clearly defining the method for calculating fees following consultation with stakeholders, and subsequently publishing this;
- Setting fees with regard to parameters such as bandwidth, frequency band or coverage, so that they are administratively simple and balanced against the efficient use of spectrum;
- Reviewing fees at appropriate intervals to reflect changes in key economic indicators (KPIs) or technological advances leading to increased demand for a particular band;
- Introducing mechanisms to identify and, where necessary, prevent excessive spectrum hoarding that restricts competition;
- A balance between the financial approach and other key aspects – regulatory (competition) and social (universal service).

At the same time, regulators should pursue the following objectives when setting fee levels:

- Spectrum prices should promote the efficient use of spectrum. As an important natural resource, the price of spectrum should be sufficiently high to ensure that it is valued and utilised appropriately. The use of spectrum brings significant benefits to the economy, and these benefits should be maximised;
- The costs associated with the management and regulation of radio frequencies (including monitoring and enforcement) should be borne by those entities that benefit from spectrum management activities. The 'user pays' principle should apply to all spectrum users – both public and private;
- Spectrum can be used to support important social and cultural objectives, and spectrum pricing should therefore facilitate the achievement of these objectives.

Spectrum (radio frequency) prices are determined either by an administrative method, a market-based method, or a combination of both.

- **Administrative** methods include administrative incentive pricing (AIP) and spectrum fee formulas that cover the regulator's costs of spectrum management (cost-based).
- **Market-based** methods for setting spectrum prices typically involve market interactions, such as spectrum auctions and spectrum trading on the secondary market.

Regulators must take various issues into account when deciding on the method, the financial basis, the amount and the timing of fee payments for a particular frequency band, type of use or type of user. These issues include:

- The fiscal context (the need to meet budgetary requirements);
- Specific relevant principles and objectives for certain types of spectrum fees;
- The funding of regulators' activities;
- Demand for and supply of spectrum;
- Technological changes;
- The type and duration of spectrum licences and renewal options.

3.3 Method of calculating fees

Administrative spectrum allocation typically involves the imposition of spectrum management fees and spectrum usage fees. These fees may take the form of simple charges or more complex formulas. The simplest general formula for determining administrative spectrum fees to cover costs, using a model based on direct and indirect costs, is as follows⁴:

$$\text{Poplatek za spektrum} = (\text{spectrum management costs (direct and indirect)} / (\text{amount of spectrum allocated to the user}))$$

³ Adapted from *Guidelines for the Review of Spectrum Pricing Methodologies and the preparation of Spectrum Fees Schedules*, István Bozsóki, ITU/BDT/IEE/TND

⁴ Ibid.

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This equation essentially allocates the total costs associated with spectrum management – both direct (e.g. administrative and regulatory costs) and indirect (e.g. long-term investments, infrastructure) – according to the amount of spectrum allocated to a specific user. The aim is to allocate spectrum management costs proportionally based on how much spectrum a user occupies or controls. This method ensures that each user bears a fair share of the management costs in proportion to the amount of spectrum allocated to them.

In a more comprehensive approach, the price of spectrum is formulated from several separate components, based on various criteria such as the amount of spectrum used, the number of channels or connections used, the degree of congestion, the efficiency of radio equipment, transmitter power/coverage, geographical location and so on.

$$P = V/M \times (K_f K_S)/K_m \times C(S) \times K(p)$$

where

P = the cost of spectrum

V = the volume of space or geometric area occupied

M = usable output obtained from the radio equipment in question, for example the number of channels to be provided or users to be served

K_f = a coefficient reflecting the specific characteristics of the frequency range used

K_S = a coefficient taking into account the region/location of the radio station's installation

K_m = a coefficient reflecting the societal benefits of the radio system

C_s = annual spectrum management costs

K_p = a coefficient reflecting the level of demand for access to spectrum in a given band

The main models for setting fees for the use of radio frequencies are described below.

Radio spectrum usage fees may be set according to several different models, each of which takes into account specific aspects of the management of this limited resource. In practice, these different models may be combined to better reflect the specific conditions and regulatory objectives in individual countries.

Simple fees are set at a fixed rate for specific spectrum bands, and licence holders pay fixed amounts for their use. This model is administratively straightforward but less flexible in response to dynamic market changes.

The spectrum management cost recovery model focuses on covering the costs associated with the regulation, monitoring and management of spectrum. In this case, the fee is set to offset the regulatory authorities' expenditure, thereby ensuring sustainable funding for their activities.

Incentive factors are used to encourage licence holders to use the spectrum more efficiently. For example, those who use the spectrum more efficiently may be eligible for reduced fees. This approach promotes technological innovation and the optimisation of radio frequency usage.

Fees based on opportunity costs reflect the value of the spectrum in terms of potential alternative uses. Licence holders thus pay an amount corresponding to the economic value the spectrum could have if used for another purpose, which provides an incentive for its optimal use.

The fee model based on users' gross revenue is derived from the financial performance of licence holders. The fee is set as a percentage of their gross revenue, which allows for a more flexible response to changes in the sector's profitability, but at the same time increases the administrative burden of collection.

The following table provides an overview of the advantages and disadvantages of these possible approaches to setting fees for the use of radio spectrum⁵:

⁵ Adapted from the same source

Table 1: Advantages and disadvantages of individual models

Method	Advantages	Disadvantages
Simple charges	- Can be applied to all spectrum users (public/private). - Can be introduced without creating a model for calculating charges and setting different rates based on different radio communication services. - Easy to implement and replaces some or all of the costs of issuing a licence.	- The fee does not directly reflect the regulator's costs of managing the spectrum or the value that the user attaches to the spectrum. - If used in isolation, it does not promote technical or economic efficiency in spectrum use.
Spectrum management cost recovery	Spectrum users can be certain that they are paying only the costs associated with the regulator's spectrum management activities. Taxes collected from the general public are not used to fund spectrum management activities	- The mere introduction of this system does not promote technical or economic efficiency in spectrum use. - The process of allocating the direct and indirect costs of the spectrum management authority through fee and tariff calculation models can be highly complex. - Due to legal constraints (e.g. statutory limits on fee levels, international obligations), it may be the case that not all of the spectrum management regulator's activities can be funded.
Incentives	- Promotes the efficient use of spectrum. - Covers part or all of the costs of issuing a licence, although this is not the objective of such a fee.	- It may require considerable effort to align with market values. - May not be suitable for all services.
Fee based on opportunity costs	- A good approximation of the market value of spectrum (takes into account the value of alternative uses of the spectrum or the potential loss of revenue that would arise if the spectrum were allocated to another purpose or user). - Promotes the efficient use of spectrum.	- Requires a significant amount of data and analysis. - Applicable only to a limited part of the spectrum (only users and uses competing for the relevant frequency band are taken into account).
A fee based on users' gross revenue	- Links the cost of spectrum to the value of the commercial activities that utilise it. - Simple to calculate.	- Can only be applied to users whose revenues are directly linked to spectrum usage. - Does not promote spectrum efficiency if revenues are not proportional to the amount of spectrum used. - May be perceived as an additional tax; enshrining it in legislation may be complicated.

3.4 Charging based on the definition of a radiocommunication service or an application-specific definition

Charging methods are based either on the nature of the service provided using the spectrum or on the specific manner in which the frequency band is utilised. These methods include an approach based on the definition **of a radiocommunication service** and an approach based on **an application-specific definition**. Each of these approaches has a different rationale, fee structure and its own advantages and disadvantages.

3.4.1 Charging based on the definition of a radiocommunication service

Charging based on the definition of a radiocommunication service is based on the classification of services defined by the International Telecommunication Union (ITU), according to the nature and type of service provided via the radio spectrum. This approach is based on the premise that different radiocommunication services have varying demands in terms of bandwidth, protection against interference and technical requirements.

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The main services, categorised according to their specific use and spectrum access requirements, include:

- **Land mobile services:** Radio services used for mobile communications (e.g. GSM, LTE and TETRA mobile networks).
- **Fixed services:** Links where the communication points are fixed in position, e.g. fixed microwave links.
- **Satellite services:** Links providing transmission between satellites or between satellites and ground stations.
- **Amateur services:** Radio bands for hobby and educational purposes, e.g. amateur (ham) radio.
- **Aeronautical and maritime services:** Links intended for communication in aviation and maritime transport.

Each of these categories has specific fees that reflect its technical requirements, the availability of the frequency band, the administrative complexity of processing the application, and the required protection against interference.

Advantages of charging based on radio communication service:

- This approach is used for its simplicity and predictability. It is relatively easy to implement and maintains fee stability, as changes to the spectrum allocated to these services are not frequent.
- Charging by service takes account of different spectrum requirements. Each service has its own technical requirements, which are reflected in the fee structure. For example, land mobile services with lower bandwidth are generally charged at lower rates than more demanding services, such as satellite services.
- Supporting the public interest is important. Regulators may offer preferential fees for services of public importance, such as aviation or maritime services.

Disadvantages of charging based on radio communication service:

- The main disadvantage is the limited flexibility in setting fees. These are therefore only to a limited extent aligned with the economic value of a specific use of the spectrum, which can lead to an inefficient allocation of spectrum.
- Furthermore, the reduced support for market mechanisms is often highlighted. Fees are not based on market demand and value, which may discourage new technologies or applications with higher economic value if they fall into the same category as lower-value spectrum uses.

3.4.2 Charging based on application definition

Charging based on application definition sets fees according to the specific use of the radio spectrum in individual bands. This approach takes into account the economic value of different applications and responds to demand for specific spectrum uses, such as mobile broadband, television or Wi-Fi.

Under this approach, charges are typically structured according to the following common applications:

- **Mobile broadband:** This includes frequencies used by mobile operators for high-speed internet (e.g. 4G, 5G).
- **Public Wi-Fi and access points:** Fees for spectrum used for public and wireless access points in densely populated urban areas.
- **Television and radio broadcasting:** Fees for frequencies used to broadcast public service and commercial television or radio programmes.
- **Microwave links and other fixed transmission systems:** E.g. microwave links used for backbone connections in telecommunications or other sectors.

Advantages of charging based on application definition:

- This approach allows for a more accurate estimation of the value of the spectrum. It better reflects the economic value of a specific application and responds to demand, thereby encouraging efficient use.
- Another advantage is better adaptation to technological progress. This approach allows for a better response to dynamically changing demand and new technologies, such as 5G or the IoT (Internet of Things), thereby promoting innovation.

Disadvantages of charging based on application definition:

- For the regulator, the administration of charges under this model is often more complex. Setting charges for different applications can be complicated and requires regular updates based on market developments.
- There is a risk of the public interest being disadvantaged. Some applications which do not have high market value but are in the public interest (e.g. security systems) may be penalised by higher charges or squeezed out by commercial applications.

3.4.3 Hybrid model

Charging based on radio communication services promotes stability and simplicity, whilst charging based on application definition offers flexibility and better reflects market conditions. The choice of approach depends on the regulator's objectives, administrative preferences and the need to support innovation and the efficient use of spectrum.

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A combination of both approaches offers a balanced framework that promotes both economic efficiency and stability, whilst respecting the technical and economic aspects of spectrum use. Regulators often adopt hybrid models that allow them to effectively capitalise on the advantages of both methods and take into account both technological and economic developments.

One example is the allocation of spectrum for mobile broadband applications through auctions, which reflects its market value. For other, less competitive services, such as fixed radio links or satellite communications, charges are instead set at a fixed rate based on the technical requirements of those services.

Advantages of the hybrid model

The hybrid model promotes the efficient allocation of spectrum, fosters innovation and ensures fairness for users. However, one drawback may be the complexity of administration for the regulator, due to the greater number of different approaches to calculating fees. Another issue is that confusion often arises for applicants, as it can be difficult in some cases to estimate the fee amount due to the chaotic nature of the hybrid model.

3.5 Setting fees and the principles for updating them

Fee policies encompass various models for setting fee levels, which can generally be divided into ad hoc and generic approaches. These approaches differ in terms of their flexibility and impact on the market, which in turn influences the need for regular updates.

3.5.1 Ad hoc approach

The ad hoc approach to setting radio spectrum usage fees is a model that allows for flexible and immediate adjustment of fee levels based on current market and technological conditions. This approach is characterised by its ability to respond quickly to changes and to adapt fees in line with emerging needs or innovations in the market. For example, with the advent of new technologies such as 5G networks, regulators can flexibly adjust fee levels according to the specific requirements of the technology, market demand, or even the economic and social benefits derived from the use of a particular spectrum.

The flexible nature of ad hoc approaches often leads to an increased need for fee reviews, as it is necessary to respond continuously to market and technological innovations. However, this flexibility also requires a strong administrative framework, as fee changes can be implemented almost immediately in line with current market conditions. The frequency of fee reviews and the need for them are therefore increasing, which can be organisationally demanding but ensures that fees reflect current economic realities and technological requirements. Frequent reviews under ad hoc approaches are common, for example, in dynamic markets or in the context of technological innovations, where the stability of long-term fees is insufficient due to the rapid pace of change.

The practical application of ad hoc approaches is often seen in new telecommunications services, where there is a need to quickly adapt the conditions for spectrum use to the current market situation. One such example is 5G networks, which require spectrum with unique characteristics and capacities. Regulators can adjust fees for 5G bands according to demand, meaning that the price for using a specific frequency depends on its current economic significance and the complexity of its implementation. This approach also enables rapid adaptation to advanced technologies, such as the Internet of Things (IoT) or autonomous vehicles, where differing demands on capacity and connection speed must be taken into account.

This flexibility enables regulators to respond more effectively to current economic and technological needs, thereby keeping the fee policy up to date and relevant, which in turn supports innovation and the development of electronic communications. Typically, however, it is linked to the setting of 'boundaries' to ensure market stability and certainty, particularly for larger MNOs, where even a small increase can amount to millions in absolute terms.

3.5.2 Generic approach

A generic approach to setting fees for the use of radio spectrum is characterised by stability and predictability, which are ensured by long-term principles according to which fees are fixed. This model is particularly suitable for sectors where demand and technology are expected to remain stable, enabling service providers to plan investments and strategic decisions in the knowledge that the fee policy will not change significantly in the foreseeable future. A stable fee framework offers benefits both to service operators themselves and to regulators, who can focus on overall efficiency and the long-term allocation of spectrum without the need for frequent intervention.

A generic approach also affects the need for frequent reviews and updates of fees. As fees are based on universal parameters that do not change significantly over time, the need for regular reviews is minimal. However, this approach may encounter problems in the event of rapid technological or market developments. For example, if a new technology emerges or there is a significant change in demand, the existing fee framework may not be able to respond quickly enough, which could result in the fee policy lagging behind the current market situation. This lack of flexibility can be particularly problematic in sectors where rapid technological progress or significant fluctuations in demand for spectrum are expected.

The generic model is applied primarily in areas where technology and demand remain relatively stable, which minimises the need for frequent changes to fees. A typical example is the allocation of spectrum for satellite communications, where demand is stable over the long term and technologies evolve more slowly than, for example, in mobile networks. In satellite communications, spectrum is usually

allocated for long periods, which enables providers and investors to plan on the basis of fixed costs and ensures stability across the entire sector. Generic fees are also used in sectors where it is difficult to predict short-term changes, such as certain areas of fixed-line telecommunications or services reserved for the public sector, such as security and defence, where spectrum requirements are predetermined for a horizon of several decades and rarely change.

The generic approach thus provides a stable and predictable framework that is particularly suited to sectors where long-term planning without frequent changes is desirable. However, this model requires caution in areas where unexpected technological innovations or market fluctuations might occur, which could cause the current fee policy to lag behind the dynamic needs of the market.

3.5.3 Summary and trends

Based on an analysis carried out across European countries, it can be concluded that the methods used to calculate fees in individual countries remain essentially consistent, and changes to the established approach are rare. Fee levels are updated using specific formulas; whilst the underlying principle generally remains unchanged, the specific values of various coefficients are adjusted once every 2–3 years. In some countries, such as Ireland or, in certain cases, the United Kingdom, the consumer price index is key to determining fee levels, with fees being adjusted for inflation at regular annual intervals. Another approach is taken, for example, in Germany, where the relevant regulatory authority sets fees retrospectively on the basis of the actual costs associated with spectrum management. This calculation process usually takes several years (approximately three years), which means that the actual level of fees is not known until some time later.

In most countries, these fees should reflect the costs associated with spectrum management whilst ensuring its optimal use. According to the International Telecommunication Union (ITU), fees are divided into spectrum management fees – which relate to licensing, spectrum management and monitoring activities, and are mostly calculated on a cost-recovery basis – and spectrum usage fees, which are based on the economic value of the spectrum and usually take the form of a ‘rent’.

It follows from the above that any changes to the structure of fee calculations usually respond to new technologies, such as the roll-out of 5G networks, or, more generally, to changes in the use of the frequency spectrum. Some countries (e.g. Ireland or the United Kingdom) set the level of annual fees for a longer time horizon and subsequently publish this information in relevant documents, including the methodology used. The regulatory authority therefore seeks to determine the value of a specific portion of the spectrum earmarked for auction and to set corresponding annual fees for the entire duration of the licence.

Current trends include the increasingly frequent use of market mechanisms, such as auctions, for spectrum allocation and the adjustment of fees in line with the spectrum’s real value. This includes, for example, the introduction of fees for new technologies and applications, such as 5G, and the adjustment of fees in line with the competitive environment. Some countries within and outside the EU, for example, are introducing dynamic approaches, whereby fee levels depend on demand for spectrum and the economic benefits of a particular application.

Review of fee policy

Some countries regularly review the level of fees, taking into account technological progress, market conditions and inflation. In Ireland and France, fees are adjusted annually in line with the consumer price index. In Denmark, the level of fees for the use of radio spectrum is set annually in the Finance Act and published as an implementing regulation on the website of the SDFI – Agency for Data Supply and Infrastructure. In Finland, fees have been reviewed every two years since 2020. For example, in the United Kingdom, the regulator reviews annual fees based on the current market value of the spectrum and economic conditions. In the Czech Republic, fees are reviewed less frequently. In this context, it is important to consider whether the processes for issuing licences and collecting fees are separate. Where a licence is issued with a precise indication of the fee amount, updating the fee is more complex. In the case of the Czech Republic, it is necessary to notify each licence holder individually when fee levels are adjusted, which is a procedurally and financially demanding process given the need to comply with the Administrative Code.

3.6 Key differences in approaches to setting fees

The main differences between EU countries in setting annual fees for the use of the radio spectrum can be divided into several key areas that influence the level and structure of the fees:

Fee structure

Each country has its own methodology, including formulae for setting annual fees for the use of spectrum, whereby fees may be determined, for example, on the basis of:

- the bandwidth used by the operator in question;
- the type of service supported by the spectrum (mobile services, FWA, radio and television broadcasting, satellite services, etc.);
- geographical coverage, with fees generally being higher in larger or more densely populated areas.

Type of spectrum and its use

Fees vary in particular depending on whether the bands in question are low-frequency bands (e.g. below 1 GHz), which have better range, or higher-frequency bands with poorer territorial coverage but greater capacity. In the case of higher-frequency bands, fees are usually lower, as these frequencies require a denser network infrastructure to ensure full coverage.

Preferential treatment for regional or specialised operators

This concerns preferential terms for regional operators or operators offering coverage services in remote areas.

Support for the public interest

Some countries set lower fees for spectrum used for public purposes (e.g. public service television broadcasting) or for services considered critical, such as emergency communications.

Long-term contracts and fee stability

Annual fees are often set so that they change only minimally over long periods, thereby providing operators with certainty and stability for investment planning.

3.7 Approaches to fee policy in the EU

In the vast majority of EU countries, annual fees are levied for the use of spectrum under mobile operators' licences. As mentioned above, the European Electronic Communications Code allows Member States to authorise (under Article 42) the relevant regulatory authority to impose fees for rights to use radio spectrum. Member States must ensure that such fees are objectively justified, transparent, non-discriminatory and proportionate to their intended purpose. These fees are often described as market-oriented or as reflecting the economic value of the spectrum. They are often calculated using formulae that apply higher coefficients to lower, more valuable bands. Furthermore, under Article 16, this Code permits the levying of spectrum usage fees to cover the costs of spectrum management. These costs are based on the administrative costs of the national regulatory authority or other body responsible for spectrum management. In practice, in some countries it is difficult to draw a clear distinction between the two types of fees. Finland, Germany, the Netherlands, Sweden and Switzerland have fees that specifically cover the costs of spectrum management, although their approaches vary considerably.

There are significant differences in the setting of spectrum usage fees across European countries, for several reasons. Each country sets its own rules for the allocation and management of spectrum, taking into account both national legislation and European directives and recommendations. Whilst the EU provides certain recommendations regarding spectrum management, individual Member States have relative freedom in how they implement these rules. The EU's legal framework for electronic communications sets out rules designed, in particular, to prevent excessive charges and to promote competitiveness. Conversely, a common feature of the various approaches is that they are generally based on national telecommunications legislation (or similar legislation) and on related measures and regulations of so-called lower legal force, such as decrees, regulations and other equivalents. Similarly, in most countries at least two types of fees are applied: an administrative fee for the allocation of frequencies and a (recurring) monthly, quarterly or annual fee for the use of the radio spectrum. An overview of the methods of fee collection in individual countries can be found in Chapter 4 or, in greater detail, in the annexes to this document.

4 Benchmarking of fee policies in selected EU countries and the UK

Different countries in Europe adopt varying approaches to setting the level of fees for the use of radio spectrum. The following chapter provides an overview of fee policies within the European Union and the UK.

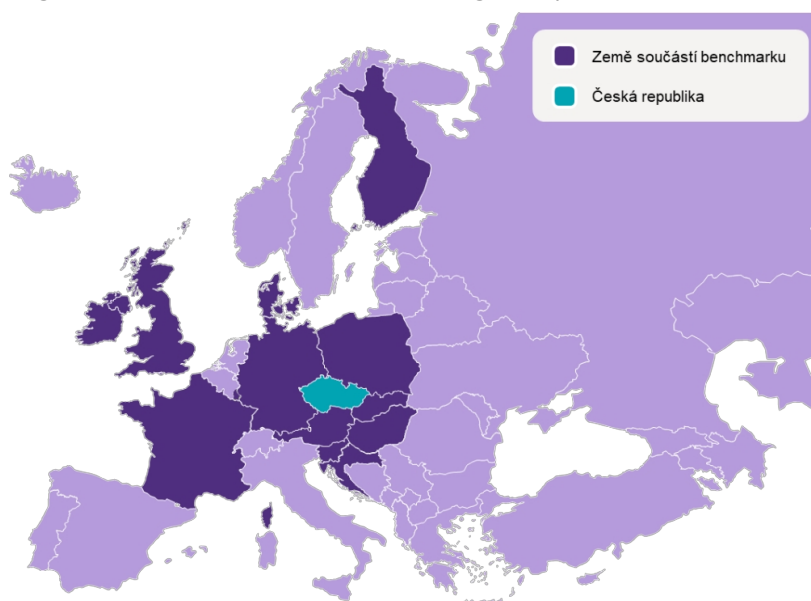
Countries with different methods of levying spectrum usage fees were selected for the benchmark. The comparison focuses both on the general approach to formulating fee policy and on a detailed description of how fee amounts are calculated and coefficients are selected. The aim is to highlight potentially attractive approaches to the collection of these fees, whilst also drawing attention to the considerable variability and flexibility in defining the method of their calculation based on the current needs of the state.

This chapter of the study summarises the most important findings regarding the fee policies of the selected countries; a detailed overview of how individual countries collect fees for the use of radio frequencies can be found in the appendices at the end of the document.

Table 2: Country benchmark

Country	Regulator	Website link
Denmark	ENS (SDFI)	https://ens.dk/e
Finland	FICORA (TRAFICOM)	https://www.traficom.fi/fi/
France	ARCEP	https://www.arcep.fr/
Croatia	HAKOM	https://www.hakom.hr
Ireland	ComReg	https://www.comreg.ie/
Luxembourg	ILR	https://web.ilr.lu/FR/ILR
Hungary	NMHH	https://nmhh.hu/
Germany	BNetzA	https://www.bundesnetzagentur.de/EN/Home/home_node.html
Poland	UKE	https://uke.gov.pl/
Austria	RTR	https://www.rtr.at/TKP/startseite.de.html
Slovakia	TU SR	https://www.teleoff.gov.sk/
Slovenia	AKOS	https://www.akos-rs.si/
United Kingdom	Ofcom	https://www.ofcom.org.uk/

Figure 3: Countries in which the benchmarking of fee policies was carried out



4.1 Denmark⁶

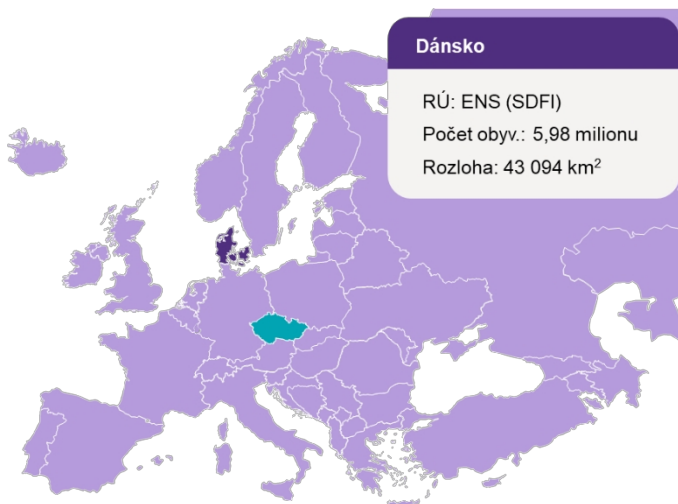
The Danish Energy Agency (under the Ministry of Climate, Energy and Utilities) collects spectrum fees in accordance with Section 50 of the Radio Spectrum Act, see Consolidated Act No. 151 of 27 January 2021.

Holders of licences to use frequencies must pay an annual frequency fee. The frequency fee consists of a fixed user fee and a variable component. The fixed user fee is DKK 600 per licence, regardless of the frequency band. The variable fee depends on the fee category to which the licence belongs, the frequencies for which the licence was issued and the bandwidth allocated. The fee schedule for the current year is always published on the regulator's website.

Fees are collected annually for all licences and for new licences. They are collected in advance during the calendar year in which the licence is valid.

Licences are divided into nine fee groups.

- 1) Mobile and fixed services
- 2) Fee for a specific transmission position
- 3) Terrestrial use with multiple connected devices within a defined area or from a specific location
- 4) An application that is not coordinated with other users
- 5) Digital terrestrial television (DTT)
- 6) Digital audio broadcasting (DAB)
- 7) National and regional FM broadcasting
- 8) Local FM broadcasting
- 9) Experimental purposes



4.1.1 Mobile (and fixed) services

This fee category covers licences for the use of frequencies issued on a national basis or for geographically defined areas (area-wide use) for use by mobile systems (or fixed services). The fee is based on a national licence. If the licence is not national, the fee for the frequencies is adjusted in proportion to the area of the geographical region for which the licence was issued. The fee per frequency is as follows:

Table 3: Fee in Danish kroner (DKK) per MHz for a nationwide network

Frequency band (MHz)	Fee in DKK
0 – 470	56,405
470 – 1,000	112,811
1,000 – 3,000	56,405
3,000 – 9,500	5,640
9,500 – 33,400	564
33,400 – 57,000	282
Over 57,000	94

4.1.2 Terrestrial use with multiple connected devices within a defined area or from a specific location (Mobile service, geographically restricted)

This fee category covers licences for the use of frequencies allocated in 25 kHz-spaced channels for use from a specific transmission site or within a geographically defined area (terrestrial use), to which a specific number of mobile units are connected for frequency utilisation. The fee amount is based on a 25 kHz channel at a specific transmission site. Where a licence has been issued for multiple transmission sites in 25 kHz channels or for multiple 25 kHz channels at a single transmission site, the amount of the frequency fee is adjusted according to the number of transmission sites and the number of 25 kHz channels.

⁶<https://www.klimadatastyrelsen.dk/digital-infrastruktur/frekvenser/frekvenstilladelser->

The fee amount for fee group 3 also depends on whether fewer or more than 30 mobile devices are associated with the licence. The frequency fee for fee group 3 is as follows:

Table 4: Fees per 25 kHz per transmission position

Frequency band (MHz)	Fee for up to 30 mobile devices (DKK)	Fee for 30 or more mobile devices (DKK)
0 – 470	52	208
470 – 1,000	52	208
1,000 – 3,000	26	104
3,000 – 9,500	3	12
9,500 – 33,400	3	12
Over 33,400	3	12

4.1.3 Fee for a specific transmission site (fixed point-to-point/point-to-multipoint service)

This fee category covers authorisation to use frequencies for transmission from a specific transmission site. The fee is calculated on the basis of a single transmission site. If authorisation has been granted for multiple transmission sites, the frequency fee is adjusted according to the number of transmission sites. The frequency fee in fee group 2 is as follows:

Table 5: Fee per MHz per transmission site (DKK)

Frequency band (MHz)	Fee (DKK)
0 – 470	5,531
470 – 1,000	5,531
1,000 – 3,000	2,766
3,000 – 9,500	227
9,500 – 21,000	11
21,000 – 33,400	6
33,400 – 57,000	3
Over 57,000	1

4.1.4 Terrestrial use with multiple connected devices within a defined area or from a specific location (Mobile service, geographically restricted)

This fee category covers licences for the use of frequencies allocated in 25 kHz channels for use from a specific transmission site or within a geographically defined area (terrestrial use), to which a specific number of mobile units are connected for frequency utilisation. The fee amount is based on a 25 kHz channel at a specific transmission site. If a licence has been issued for multiple transmission sites in 25 kHz channels or for multiple 25 kHz channels at a single transmission site, the frequency fee is adjusted according to the number of transmission sites and the number of 25 kHz channels.

The fee for fee group 3 also depends on whether fewer or more than 30 mobile devices are associated with the licence. The frequency fee for fee group 3 is as follows:

Table 6: Fees per 25 kHz for a transmission slot

Frequency band (MHz)	Fee for up to 30 mobile devices (DKK)	Fee for 30 or more mobile devices (DKK)
0 – 470	52	208
470 – 1,000	52	208
1,000 – 3,000	26	104
3,000 – 9,500	3	12
9,500 – 33,400	3	12
Over 33,400	3	12

4.1.5 Applications not coordinated with other users (e.g. satellite service)

This fee category covers authorisations to use frequencies issued for a frequency or frequency band where such use is not specifically coordinated with other users of the same frequency or within the same frequency band. The fee is calculated on the basis of each individual authorisation issued.

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The fee for a frequency is as follows:

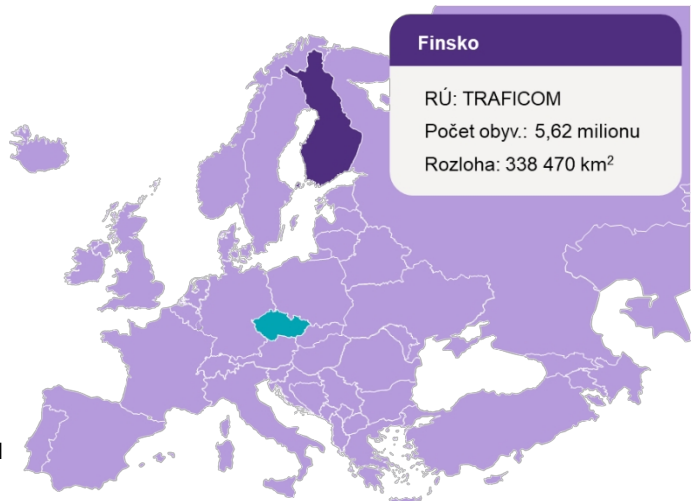
Table 7: Fee for individual authorisations issued (DKK)

Frequency band (MHz)	Fee (DKK)
0 – 470	1,593
470 – 1,000	3,186
1,000 – 3,000	1,593
3,000 – 9,500	159
9,500 – 33,400	16
Over 33,400	8

4.2 Finland ⁷

Spectrum management in Finland was for a long time the responsibility of the regulator FICORA. At the start of 2019, this authority, together with other institutions, was merged into a single body called TRAFICOM, whose full name is the Finnish Transport and Communications Agency. TRAFICOM is also responsible for collecting fees for the use of radio frequencies.⁸ Since 2020, the fees have been reviewed every two years (the current version is valid from 1 January 2024 to 31 December 2025).

The method of collecting the fees is currently set out in Decree 1169/2023 of the Ministry of Transport and Communications on administrative fees for radio frequencies and other fees collected by the Finnish Transport and Communications Agency, published on 21 December 2023.



The fee is charged for the following:

- 1) the right to own and use a radio transmitter or licensed radio transmitters of a radio network, radio system or radio station (radio licence);
- 2) the allocation of radio frequencies;
- 2a) protection of a receiving radio station against interference; and
- 3) the management of frequencies related to the country's military defence.

TRAFICOM collects fees for all radio licences and frequency allocations it grants. The pricing of different frequency bands is used as a tool to steer users towards frequencies with less traffic.

The amount of the spectrum usage fee is based on three parameters, namely availability, usability and the number of frequencies included in the licence. A fee is also charged for frequency reservations.

When setting the frequency fee for radio transmitters, radio networks, radio systems or radio stations, the Finnish Transport and Communications Agency takes into account the following general principles for determining the fee, as set out below:

- 1) the number of frequencies allocated or reserved for use, the nature of the right of use and the width of the reference band;
- 2) the frequency band designated or reserved for use;
- 3) the population in the area covered by the radio system with a right of use, as well as the population in the area with a right of use;
- 4) the group of radio equipment to which the transmitter belongs.

When determining the fee for the possession and use of certain radio transmitters, radio networks or radio systems, the Finnish Transport and Communications Agency shall also take into account the number of radio transmitters in use or the type of operation on the frequencies designated for use.

For short-term licences, the fee is charged according to the period of use. However, the fee amounts to at least 25 per cent of the annual frequency fee and is always at least EUR 18.

Telecommunications companies with a turnover exceeding EUR 300,000 are also required by law to pay a fee of 0.135 per cent of their relevant turnover. This fee, known as the 'Information Society Fee', is intended to support the creation of the so-called information society – that is, a digital and technologically advanced Finnish society capable of making effective use of information technology.⁹

4.2.1 General fees for the use of frequencies

The fee for the use of frequencies is generally calculated using the following formula:¹⁰

$$\text{Fee} = C_1 * C_{inh} * C_{6b} * B_0 * S * P$$

This formula is not the same for every category of radio equipment. Each category of equipment substitutes variables into the calculation based on the table below. This then determines the amount of the fee depending on the values of the coefficients.

⁷<https://www.finlex.fi/fi/laki/alkup/2023/20231169>

⁸https://www.epra.org/news_items/finnish-regulator-to-change-name-and-merge-with-traffic-safety-authority

⁹<https://www.finlex.fi/fi/laki/ajantasa/2014/20140917>

¹⁰<https://www.traficom.fi/en/communications/communications-networks/frequency-fees-guide-spectrum-use>

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Table 8: Schematic showing the substitution of variables into the formula for calculating fees by category of radio equipment

Radio equipment category	C1	Cmode	Cinh	C6b	B0	S	P
Transmitters: television	x		x		x	x	x
Transmitters: radio broadcasting	x		x		x	x	x
Public mobile networks	x		x		x	x	x
Ground component for the 2 GHz satellite system	x		x		x	x	x
Network of Public Authorities (VIRVE)	x		x		x	x	x
GSM-R radio system for railways	x		x		x	x	x
Radio systems in a fixed wireless access network	x		x		x	x	x
Radio stations on ships and in aeroplanes		x				x	x
Aeronautical mobile radio stations		x				x	x
Personal Locator Beacon (PLB)	x		x		x	x	x
Amateur radio transmitters with increased transmission power					x	x	x
Tracking systems for research purposes with a radiated power of less than 1 mW	x		x		x	x	x
Systems for remote control, telemetry and data transmission	x		x		x	x	x
Amateur radio transmitters						x	x
Other amateur radio stations requiring a special licence					x	x	x
Transmitters with radio microphones	x		x	x	x	x	x
Private Mobile Radio (PMR)	x		x	x	x	x	x
Radio control transmitters	x		x	x	x	x	x
Paging networks	x		x	x	x	x	x
Maritime radio systems other than shipboard radio stations	x			x	x	x	x
Radio transmitters operating below 960 MHz and radio links for the transmission of audio programmes	x		x		x	x	x
Fixed high-frequency transmitters	x		x		x	x	x
Air-to-ground radio systems	x			x	x	x	x
Radio probe systems	x		x		x	x	x
Ground stations in the fixed satellite service	x		x		x	x	x
Radio transmitters operating above 960 MHz	x		x		x	x	x
Radio transmitters on all spacecraft sent into space						x	x
Radar stations other than those on ships or aircraft	x		x		x	x	x

It is clear from the table above that mobile, fixed and satellite services all use the same calculation formula:

$$\text{Charge} = C1 \cdot C_{inh} \cdot B0 \cdot S \cdot P$$

Where:

- C1 = frequency band coefficient,
- C_{inh} = population coefficient,
- C6b = system coefficient,
- B0 = relative bandwidth,
- S = basic fee coefficient
- P = basic fee (1,295.5 EUR)

The values of these coefficients vary according to various parameters and can be found in the tables in the appendix.

The coefficients for other types of services and their values are also described in greater detail in the annex for further reference.

4.3 France¹¹

Under the law, fees are divided into:

- State fee for the provision of radio frequencies
- Fees for the administration of frequencies (set by order of the Minister responsible for electronic communications)
- Fees payable by operators of publicly accessible terrestrial mobile networks

The following are exempt from paying state fees: emergency medical services provided by public hospitals, fire and rescue services, civil protection networks included in a list drawn up on the basis of a regulation issued by the Minister of the Interior and the Minister for the Budget, and radio service providers.

State fees for the provision of radio frequencies distinguish between the following services:

- Fixed point-to-point service
- Fixed local radio loop/point-to-multipoint links
- Fixed or mobile satellite services
- Mobile service of independent networks
- Other services

The 2007 decree itself, which sets the levels of charges, has been amended twenty times since it came into force; in some years it was amended more than once (specifically in 2009, 2016, 2023 and 2024).

Fees for certain services are indexed to the consumer price index, using the 2007 base year for calculation. For most services, the fees consist of a fixed and a variable component.

Fees for the provision of frequencies are calculated as the product of various coefficients. A list of these is given in the table below.

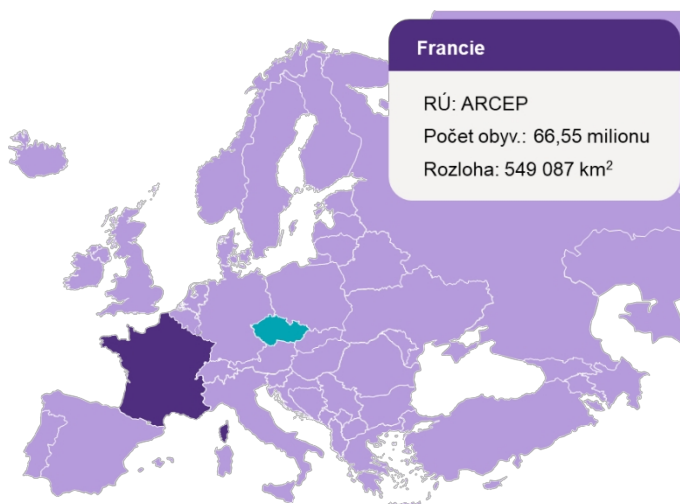
Table 9: Coefficients for calculating fees for the use of frequencies

Name of coefficient	Meaning
l	allocated frequency band width
bf	frequency band
lb	step size for point-to-point fixed services
es	spectral efficiency for fixed point-to-point service
a	authorisation to use frequencies on the basis of an allocation
c	the area covered by the authorisation to use frequencies
k1, k2, k3, k4, k5, k6	reference values
N	number of complementary ground-based elements of mobile satellite systems installed in metropolitan France

The values of the coefficients bf, lb, es, a, k1, k2, k3, k4, k5, k6 and N are set by order of the Minister responsible for electronic communications.¹² Details of the coefficients are set out in the Annex.

4.3.1 Fixed service

The fixed service is divided into point-to-point and point-to-multipoint connections.



¹¹<https://www.legifrance.gouv.fr/loda/id/JORFTEXT000000619224/>

¹²<https://www.legifrance.gouv.fr/loda/id/JORFTEXT000000791516>

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Table 10: Coefficients used to calculate fees for the use of frequencies for the fixed service

Point-to-point links (microwave links) in networks open to the public or operating independently	Calculation of the price
allocation of a point-to-point fixed service	$I \times bf \times lb \times es \times k1$
bundled point-to-point fixed services ¹³	$I \times bf \times a \times c \times k1$
Point-to-multipoint connections (Radio local loop)	Price calculation
Allocation of a fixed radio local loop ¹⁴	$I \times bf \times c \times k2$

For point-to-point connections, indexation is applied in line with the consumer price index, with 2007 as the base year.

For the allocation of a fixed loop service outside metropolitan France, the annual fee for the provision of the service is set at EUR 23 per MHz. For the territorial collectivity of Saint-Pierre-et-Miquelon and the department of Mayotte, this amount is EUR 7.7 per MHz.

4.3.2 Satellite service

Satellite service:

Table 11: Coefficients used to calculate fees for the use of frequencies for the satellite service

Satellite service	Calculation of the fee
Allocation of a ground station to the fixed or mobile satellite service	$I \times bf \times k3$
Satellite fixed service	$I \times k3 \times a$
Satellite mobile public service	$I \times k^3 \times a$
Allocation of terrestrial elements complementing satellite-based mobile systems for public services	$I \times k5 \times N$

For satellite services, indexation is applied in accordance with the consumer price index, with 2007 as the base year.

4.3.3 Mobile service

For the mobile service, indexation applies in line with the consumer price index, with 2007 as the base year.

Fees for the mobile service are specified for the following bands

- Mobile service in bands below 470 MHz
- Mobile service in the 2570–2620 MHz TDD band

For greater clarity, the exact amounts of the fees are set out in the relevant annex.

4.3.4 Publicly accessible terrestrial mobile networks

This section covers fees payable by operators of publicly accessible terrestrial mobile networks.

The fees for the bands listed in the table below consist of a fixed and a variable component. The variable component is the same for all these bands, namely 1 per cent of total turnover recorded as at 31 December of the year for which the frequencies are used. The amount of the fixed component is set out in the table below:

Table 12: Amount of the fixed component of the fee payable by operators of publicly accessible terrestrial mobile networks

Frequency band	Amount of the fixed component (EUR)
700 MHz	fee determined on the basis of a competitive licence allocation process
800 MHz	fee determined on the basis of a competitive licence allocation process
900 MHz	1,068 per allocated duplex kHz ¹⁵
1.8 GHz	571 per allocated duplex kHz ¹⁶
2.1 GHz	571 per allocated duplex kHz ¹⁷
2.6 GHz	fee determined on the basis of the licence allocation tender process
3.5 GHz	fee determined on the basis of the competitive licence allocation process

¹³ The coefficient c is equal to the ratio between the area covered by the allocation and the total area of metropolitan France

¹⁴ The coefficient c is equal to the ratio of the area covered by the allocation to the total area of metropolitan France

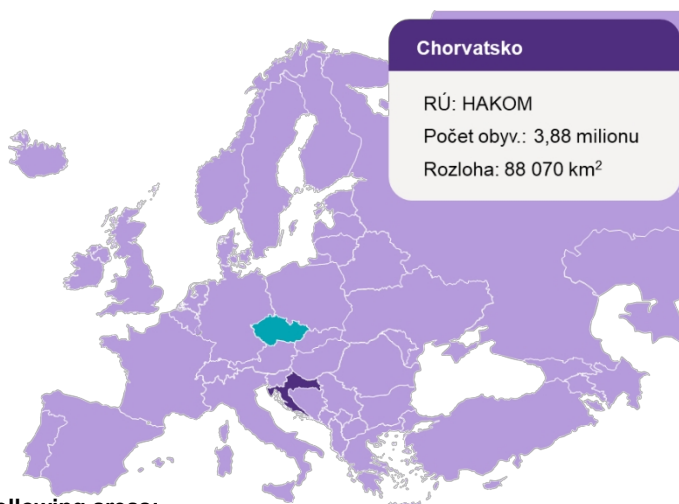
¹⁵ calculated in proportion to the population of the areas covered by the licence

¹⁶ calculated in proportion to the population of the areas covered by the licence

¹⁷ calculated in proportion to the population of the areas covered by the authorisation

4.4 Croatia

The amount of the fees is governed by two key documents: (1) the Compendium of Regulations on the Payment of Fees for the Right to Use Addresses, Numbers and the Radio Frequency Spectrum NN 151/22¹⁸ and its amendment NN 37/23¹⁹ issued by the Croatian Ministry of Maritime Affairs, Transport and Infrastructure pursuant to the Electronic Communications Act of 2022²⁰ and (2) the Rules on the Payment of Fees for the Fulfilment of Obligations by the Croatian Regulatory Agency for Network Activities of 2022²¹ and its 2023 amendment²² issued by the Regulatory Authority Council. Part of the fees is therefore paid into the state budget and is intended to ensure the efficient use of frequencies, whilst the other part is allocated to the Regulatory Authority to cover the costs of spectrum management.



The compendium of regulations distinguishes between the following areas:

- Direct point-to-point links
- Satellite service
- Private networks
- Public electronic communications networks
- User-to-user communication systems (paging)
- Point-to-multipoint networks
- Aviation, maritime, radar, radio navigation and inland waterway services
- Terrestrial broadcasting services
- Other services

In Croatia, a fee of 0.2 per cent is levied on the total annual gross revenue generated by licence holders and telecommunications service providers in the previous year from the provision of telecommunications services and activities.

4.4.1 Public electronic communications networks (mobile services)

Fees payable to the state budget:

The total amount of the annual fee for the use of the radio spectrum in a public electronic communications network consists of the annual fee for the use of unpaired radio spectrum and the annual fee for the licence to use the radio spectrum.

The amount of the annual fee for the use of unpaired radio spectrum with a bandwidth of 1 MHz, for the radio frequency band and population coverage specified in the licence for the use of the radio frequency band, is calculated using the following formula:

$$(5 \times a \times b \times c)$$

Where:

- **a:** unit price for the use of radio spectrum – 66 EUR
- **b:** coverage coefficient (see Annex)
- **c:** population coverage coefficient (see Annex)

If the applicant is allocated radio spectrum with a bandwidth other than 1 MHz, the fee shall be reduced or increased proportionally.

No annual fee for the use of frequencies is payable under this chapter for radio spectrum allocated in the 1900 MHz – 1920 MHz radio frequency band.

The licence holder shall pay an annual licence fee for the use of the radio frequency spectrum amounting to 0.5 per cent of the total annual gross revenue generated by the operation of electronic communications networks and services on the market via the allocated

¹⁸https://narodne-novine.nn.hr/clanci/sluzbeni/2022_12_151_2359.html

¹⁹https://narodne-novine.nn.hr/clanci/sluzbeni/2023_03_37_638.html

²⁰https://narodne-novine.nn.hr/clanci/sluzbeni/2022_07_76_1116.html

²¹https://narodne-novine.nn.hr/clanci/sluzbeni/2022_12_154_2430.html

²²https://narodne-novine.nn.hr/clanci/sluzbeni/2023_07_72_1195.html

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of the radio frequency spectrum for public electronic communications networks, in the previous calendar year. No annual fee is payable for the first year of the licence's validity.

Fees payable to the regulatory authority:

The fee for the use of the radio spectrum for a public electronic communications network, with the exception of point-to-multipoint networks, is determined according to the allocated radio spectrum and the area for which the licence was granted. For areas with a population of over 1,000,000, the following table applies:

Table 13: Fee for the use of radio spectrum for a public electronic communications network for areas with a population of over 1,000,000:

Frequency range f of the allocated radio spectrum for public electronic communications networks (MHz)	Annual fee per allocated MHz (EUR)
$f < 3,400$	8,388.08
$3,400 \leq f < 3,800$	2,621.28
$3,800 \leq f$	597.25

For areas with fewer than 1,000,000 inhabitants, the following table applies:

Table 14: Radio spectrum usage fee for public electronic communications networks in areas with fewer than 1,000,000 inhabitants:

F (MHz)	Annual fee per MHz (EUR)		
	The city of Zagreb or an area with a population of between 500,001 and 1,000,000 inhabitants	Area with a population of between 300,001 and 500,000	Areas with up to 300,000 inhabitants
$f < 3,400$	268.76	117.46	50.43
$3,400 \leq f < 3,800$	84.28	37.16	15.93
$3800 \leq f$	21.24	9.29	3.98

If the applicant or licence holder is allocated radio spectrum with a bandwidth other than 1 MHz, the fee is adjusted proportionally.

No annual fee is payable for the use of unpaired radio spectrum for allocated radio spectrum in the 1900 MHz – 1920 MHz frequency band.

4.4.2 Direct point-to-point links without portable terminal stations (fixed service)

Fees payable to the state budget:

Possible uses of point-to-point links without portable terminal stations **include, amongst others, microwave links in the radio frequency range above 1 GHz.**

The amount of the annual fee for the use of unpaired radio frequency spectrum with a bandwidth of 1 MHz, for the route length and radio frequency band specified in the licence for the use of radio frequency spectrum, is calculated according to **the following formula:**

$$(0.16 \times a \times b \times \max(1, \min(5, c/d)))$$

Where:

- a:** unit price for the use of the radio spectrum – 66 EUR
- b:** coverage coefficient

If a radio station utilises paired radio spectrum from bands with different frequency band congestion coefficients b , where it is necessary to coordinate operations with other radio stations or radio communications services in both frequency bands, the frequency band congestion coefficient b for the band with the higher utilisation coefficient shall apply.

c: minimum path length expressed in kilometres for the frequency band as per the table (see Annex)

(An exception applies to links using modulation schemes with at least 64 states and a data rate of at least 70 Mbit/s; the minimum path length in the 1.71 GHz–10 GHz radio frequency band is 20 km.)

d: the path length expressed in kilometres and determined by the geographical coordinates of the end points as specified in the licence for the use of the radio spectrum.

The **maximum / minimum (x, y)** function returns the largest / smallest value of these two arguments

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If the applicant is allocated radio spectrum with a bandwidth other than 1 MHz, the fee shall be reduced or increased proportionally.

If an applicant or licence holder utilises a total of 82.5 MHz or more of contiguous radio frequency bandwidth on a single microwave link within the same radio band, using both horizontal and vertical polarisation in each individual frequency channel, they shall pay 50 per cent of the fee.

For the use of the radio frequency band above 1 GHz in directional point-to-point links, for which authorisation is granted via a simplified procedure, provided that this is stipulated in the radio spectrum allocation plan for this frequency band, 10 per cent of the fee specified in the preceding paragraphs shall be payable.

For the use of the radio frequency band above 1 GHz in a direct point-to-point link, where one point is located in the territory of another state, 50 per cent of the amount specified in the paragraph above.

Fees payable to the regulatory authority:

For the use of the radio frequency spectrum above 1 GHz in point-to-point directional links (with or without portable terminal stations) and ENG/OB, which utilise a spectrum bandwidth greater than 2 MHz, the fee is EUR 106.18.

No fee is payable for the use of the radio frequency spectrum above 1 GHz in point-to-point links (with or without portable terminal stations) and ENG/OB, which utilise a spectrum bandwidth of 2 MHz or less.

For the use of the radio frequency band above 1 GHz in directional point-to-point links, for which authorisation is granted via a simplified procedure, provided that this is stipulated in the radio spectrum allocation plan for this frequency band, the fee is EUR 26.54.

4.4.3 Direct point-to-point links with portable terminal stations (fixed service)

Fees payable to the state budget:

Possible uses of point-to-point links with portable terminal stations operated as fixed stations include, amongst other things, portable microwave links and electronic newsgathering and outside broadcasting (ENG/OB) in the radio frequency range above 1 GHz.

The amount of the annual fee for the use of an unpaired radio frequency band with a bandwidth of 1 MHz, for the radio frequency band and geographical area specified in the licence for the use of the radio frequency spectrum, shall be calculated according to the following formula:

$$(0.75 \times a \times b \times c)$$

Where:

- **a:** unit price for the use of the radio spectrum – 66 EUR
- **b:** coverage coefficient
- **c:** territorial coverage coefficient, where:
 - c = 4 for an area covering up to 10 neighbouring regional (county) administrative units
 - c = 20 for an area covering 11 or more neighbouring regional (county) self-governing units or the whole of Croatia

If the applicant is allocated radio spectrum with a bandwidth other than 1 MHz, the fee shall be reduced or increased proportionally.

For the use of the radio frequency spectrum for electronic news gathering and outside broadcasting (ENG/OB), 10 per cent of the fee calculated as set out above shall be payable.

Fees payable to the regulatory authority:

A fee of EUR 13.27 is set for the use of the radio frequency spectrum in links for ENG/OB applications in frequency ranges below 1 GHz. This applies to mobile point-to-point links or cameras for ENG/OB, and mobile point-to-point links for ENG/OB used exclusively for the transmission of audio.

4.4.4 Point-to-multipoint networks (fixed service)

Fee payable to the state budget:

Possible uses of the radio frequency band in a point-to-multipoint network include, amongst others, radiocommunication services in technology-neutral frequency bands, broadband wireless access and the multi-venue distribution service (MVDS).

The amount of the annual fee for the use of unpaired radio spectrum with a bandwidth of 1 MHz, for the radio frequency band and population coverage specified in the licence for the use of radio spectrum, is calculated using the formula:

$$(0.5 \times a \times b \times c) \times (1 + d)$$

Where:

- **a:** unit price for the use of radio spectrum – 66 EUR
- **b:** coverage coefficient
- **c:** population coverage coefficient – see definition above
- **d:** coefficient equal to:
 - 0.2 for the first year of the licence to use the radio frequency spectrum
 - 0.4 for the second year
 - 0.6 for the third year
 - 0.8 for the fourth year
 - 1 for each subsequent year of the licence's validity for the use of the radio frequency spectrum.

If the applicant is allocated radio spectrum with a bandwidth other than 1 MHz, the fee shall be reduced or increased proportionally.

Where the same radio spectrum is allocated to an applicant or licence holder in overlapping or adjacent geographical areas, the fee shall be calculated for the entire geographical area.

Where the same radio spectrum is allocated to an applicant or licence holder in non-overlapping or non-adjacent geographical areas, the fee shall be calculated as the sum of the fees for the individual geographical areas.

Fee payable to the regulatory authority:

The fee for a point-to-multipoint network is determined according to the allocated radio frequency spectrum and the area for which the licence is granted:

Table 15: Fee for the use of point-to-multipoint networks:

Annual fee per MHz (EUR) based on population				
Area with ≥ 2,000,000 inhabitants	Area with 1,000,001 – 2,000,000 inhabitants	The city of Zagreb or an area with a population of 500,001–1,000,000 inhabitants	An area with a population of 300,001–500,000	Region with up to 300,000 inhabitants
477.80	179.18	106.18	46.45	19.91

4.4.5 Satellite service

Fees payable to the state budget:

The amount of the annual fee for the use of unpaired and paired radio spectrum utilised by a ground station in the satellite service with a bandwidth of 1 MHz, for the radio band specified in the licence for the use of radio spectrum, shall be calculated according to the following formula:

$$(a \times b)$$

Where:

- **a:** unit price for the use of radio spectrum – 66 EUR
- **b:** coverage coefficient

If the applicant is allocated radio frequency spectrum with a bandwidth other than 1 MHz, the amount of the fee shall be reduced or increased proportionally.

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For the use of unpaired and paired radio frequency bands used by a fixed radio station on Earth, which is used for communication with satellites and/or aircraft (complementary ground component (CGC) of a mobile satellite network) with a bandwidth of 1 MHz, a fee of 150 per cent of the amount calculated using the formula above shall be payable for the radio frequency band specified in the licence for the use of the radio frequency spectrum.

The amount of the annual fee for the use of unpaired and paired radio frequency bands used by fixed radio stations on Earth, which form part of the same system, use the same radio frequency band and communicate with the same satellite, is calculated depending on the number of radio stations in the system in the Republic of Croatia according to the following formulae:

- $0.1 \times$ the amount derived from the formula in this chapter for the second to the tenth radio station in the system
- $0.01 \times$ the amount derived from the formula in this chapter for the eleventh to twentieth radio station in the system
- no fee is payable for any further radio stations in the system

For the use of a paired radio frequency band used by radio stations in the satellite service on Earth, where protection of the radio station's reception against interference from radio stations of the same or other radiocommunication services with which the radio station shares the radio frequency band is required, 200 per cent of the fee determined by the formula above shall be paid.

Fees payable to the regulatory authority:

For satellite connections, the fee for the use of the radio frequency spectrum is EUR 199.08.

The fee for the use of the radio spectrum for a fixed terrestrial radio station used for communication with satellites and/or aircraft (complementary ground component (CGC) of a satellite mobile network) is EUR 199.08.

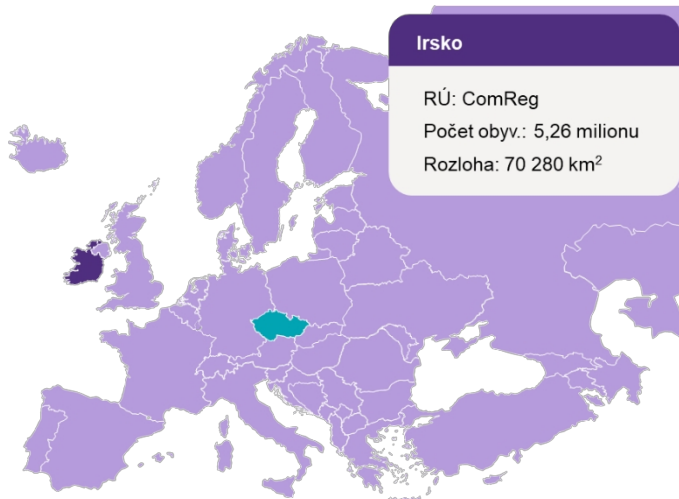
The one-off fee for licensed space activities is EUR 331.81.

4.5 Ireland²³

For most services, there is a separate statutory instrument setting out the amounts of the individual fees. Some of these fees are subject to indexation. The Fees Act is updated from time to time.

No fee is payable upon notification. The annual fee (0.2 % of the relevant turnover) is payable only if the operator's relevant turnover (i.e. relating to the service or network) in Ireland for the relevant financial year amounts to EUR 500,000 or more.²⁴

The regulatory authority divides licences into 21 categories, including, for example, mobile services, satellite stations and fixed radio links.



4.5.1 Mobile service

4.5.1.1 Third-generation network licences²⁵

The fee for a provisional third-generation licence for the 2.1 GHz Band A or a provisional licence for liberalised use of the 2.1 GHz Band A is EUR 725,415 per 2 x 5 MHz block; for the 2.1 GHz Band B, this amount is EUR 120,508 per 2 x 5 MHz.

4.5.1.2 Liberalised use and related licences in the 700 MHz Duplex, 2.1 GHz, 2.3 GHz and 2.6 GHz bands²⁶

Four types of licence are issued in this category:

- Licences for liberalised use
- Spectrum leasing licences
- Preparatory licence (€100)
- Transitional licence for the 2.3 GHz band

The fee for a licence for liberalised use is the sum of the spectrum access fee (SAF – payable by the successful bidder at the end of the award process and prior to the licence being granted) and the spectrum usage fees (SUF) for the duration of the licence.

Annual SUF before CPI adjustment for each block of liberalised spectrum.

The CPI adjustment for the SUF is calculated using 14 February 2022 as the base date for the CPI (i.e. CPI = 100). When calculating the CPI adjustment for the SUF, the Commission will use the most up-to-date CPI data available at that time.

SUF – Spectrum usage fees are set at the following amounts, which are subsequently adjusted in line with the CPI (Consumer Price Index)

Table 16: Fee amounts by frequency band

Band (MHz)	Width of a single block	Annual fee per spectrum block (in EUR before CPI adjustment)
703–733 paired with 758–788	2 x 5 MHz	998 931
1,920 – 1,980 paired with 2,110 – 2,170	2 x 5 MHz	525 753
2,300 – 2,390	5 MHz	52,575
2390 – 2400	10 MHz	52,575
2500–2570 paired with 2620–2690	2 x 5 MHz	105 151
2570 – 2575	5 MHz	5,000
2615 – 2620	5 MHz	5,000
2,575 – 2,615	5 MHz	52,575

²³<https://www.comreg.ie/about/legislation/statutory-instruments/>

²⁴<https://www.irishstatutebook.ie/eli/2003/si/346/made/en/print>

²⁵<https://www.comreg.ie/media/2021/05/S.I-2021.0265.pdf>

²⁶<https://www.irishstatutebook.ie/eli/2021/si/264/made/en/print>

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The results of the 2018 spectrum allocation competition in the 26 GHz band state that the total annual fees for the use of the frequency band should amount to EUR 3,750,000 over the ten-year licence period.²⁷

Annual fee for point-to-multipoint radio links under a transitional licence for the 2.3 GHz band

Calculation according to the formula:

$$\text{Fee} = A \times (B/100)$$

Where:

A is EUR 4,000, being the relevant annual fee for point-to-multipoint radio links operated in the 1 GHz $\geq$ F > 17 GHz band and with a bandwidth of 3.5 MHz or less;

B is the consumer price index relevant for the period from the base date in September 2009 (where CPI = 100) to the date of issue of the 2021 Regulation on Wireless Telegraphy (liberalised use and related licences in the 700 MHz Duplex, 2.1 GHz, 2.3 GHz and 2.6 GHz bands).

The annual spectrum usage fee for a licence for liberalised use is the sum of the annual spectrum usage fees, before CPI adjustment, associated with each block of liberalised spectrum specified in the licence, and the CPI adjustment for each block of liberalised spectrum specified in the licence.

4.5.1.3 Liberalised use and preparatory licences in the 800 MHz, 900 MHz and 1800 MHz bands²⁸

In 2011, the Irish regulatory authority set a minimum price for rights to use the 800, 900 and 1800 MHz bands. The licence fees were structured to include an upfront fee for access to the spectrum and ongoing fees for spectrum usage, with the minimum price to be divided between the two types of payment on a 50/50 basis. Furthermore, the regulator proposed that the ongoing fees for spectrum usage be indexed to inflation based on the consumer price index. The prices in the table below are given in millions of euros.

Table 17: Fee amounts by frequency band

Frequency band	Annual fee per frequency block (in millions of EUR)
800 MHz	1.08
900 MHz	1.08
1800 MHz	0.54

A frequency block is defined as a paired spectrum block with a

width of 5 MHz. The fee for a provisional licence is EUR 100.

4.5.1.4 Fees for the use of frequencies in the 3.6 GHz band²⁹

Annual fees per operator are based on the results of the 2017 tender for the allocation of spectrum in the 3.6 GHz band. These fees will be further indexed in line with the CPI. Their breakdown by individual operators can be found in the table below.

Table 18: Annual fee for use of the 3.6 GHz band, broken down by specific operators

Operator	Airspan	Imagine	Meteor	Three	Vodafone
Annual fee (EUR)	2,078,550	1,640,520	4,163,610	5,059,200	4,765,320

Prices for the 3.6 GHz band consist of a reservation fee and an annual fee; they are divided into types A and B, and their price depends on which of the nine regions the frequency block is located in. The amount of this fee per frequency block, before adjustment for the CPI, ranges from 248 to

²⁷https://www.comreg.ie/media/dlm_uploads/2018/06/ComReg1853.pdf

²⁸<https://www.irishstatutebook.ie/eli/2012/si/251/made/en/print>

²⁹https://www.comreg.ie/media/dlm_uploads/2017/06/ComReg-1746.pdf

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EUR 35,600 (detailed fee amounts are available in the annex). Type A block is an unpaired 25 MHz block in the 3410–3435 MHz frequency band; Type B block is an unpaired 5 MHz block in the 3475–3800 MHz frequency band.

Annual fees for fixed wireless local access (FWALA) in the 3.6 GHz band³⁰

Table 19: Annual fees (EUR) for fixed wireless access (FWALA) in the 3.6 GHz band

BW (paired channel)	Annual fee for a Band Transition Protected Licence	Annual fee for an unprotected licence (Band Transition Unprotected Licence)
Up to 7 MHz	1,500	1,783
7–14 MHz	2,000	2,378
14–28 MHz	2,800	3,329

4.5.2 Fixed service³¹

Licensing of fixed radio links

Table 20: Schedule of initial annual licence fees for point-to-point fixed radio links until 30 September 2024 (in EUR)

Frequency band	Bandwidth (BW) ≤ 3.5 MHz	3.5 MHz < BW ≤ 20 MHz	20 MHz < BW ≤ 40 MHz	BW > 40 MHz
F < 1 GHz	750	N/A	N/A	N/A
1 GHz < F ≤ 17 GHz	1,000	1,100	1,200	1,500
17 GHz < F ≤ 37 GHz	750	825	900	1,125
37 GHz < F ≤ 39.5 GHz	550	605	660	825
F > 39.5 GHz	100	110	120	150

Table 21: Schedule of initial annual licence fees for fixed point-to-point radio links on routes with high utilisation or in areas with significant congestion until 30 September 2024 (in EUR)

Frequency band	Bandwidth (BW) ≤ 3.5 MHz	3.5 MHz < BW ≤ 20 MHz	20 MHz < BW ≤ 40 MHz	BW > 40 MHz
F < 1 GHz	900	N/A	N/A	N/A
1 GHz < F ≤ 17 GHz	1,200	1,320	1,440	1,800
17 GHz < F ≤ 37 GHz	900	990	1,080	1,350
37 GHz < F ≤ 39.5 GHz	660	726	792	990
F > 39.5 GHz	120	132	144	180

The initial fee for a fixed point-to-multipoint radio link is four times the annual fees for a fixed point-to-point radio link.

From 1 October 2024 to 30 September 2026, the annual licence fee for point-to-point fixed radio link licences shall be calculated using the following formula:

$$splatný poplatek = \sum_{t=1}^n \left(\frac{n-t}{n} \right) \text{ basic fee} + \left(\frac{t}{n} \right) \text{ roční poplatek}$$

Where:

- t = the number of years from 1 October 2023, i.e. t=1 from 1 October 2024 and t=2 from 1 October 2025.
- n = represents the duration in years from 1 October 2023 to 30 September 2026, i.e. n=3.

The basic fees are those set out in the tables above. The annual fees are licence fees calculated in accordance with the tables in the Annex.

³⁰<https://www.irishstatutebook.ie/eli/2016/si/532/made/en/print>

³¹<https://www.comreg.ie/media/2023/12/ComReg-23112.pdf>

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From 1 October 2026, the annual fee for a fixed point-to-point radio link shall be equal to the fee for that fixed point-to-point radio link in the base year 2023, multiplied by the consumer price index. Tables showing the base fees are set out in the annexes below.

Fees for fixed radio links in a point-to-multipoint system shall be equal to the sum of the annual fees that would be payable for each equivalent fixed point-to-point link within the point-to-multipoint system up to the eighth link, plus 25 per cent for each link beyond the eighth link in the point-to-multipoint system.

The fee for a fixed radio link is increased by:

- 200 per cent if the fixed radio link is an overloaded fixed radio link, and/or
- 20 per cent if the fixed radio link is a fixed link with high route utilisation.

Temporary licence fees are applied in all periods on a pro rata basis to the relevant fees payable, using the number of months for which the licence is granted.

4.5.3 Satellite service

Teleport fee³²

Total bandwidth utilised (MHz)	Licence fee for 5 years (EUR)
BW < 0.5	25,000
$0.5 \leq \text{BW} < 2$	31,250
$2 \leq \text{BW} < 11$	37,500
$11 \leq \text{BW} < 40$	43,750
$40 \leq \text{BW} \leq 80$	50,000
BW > 80, per MHz of bandwidth or part thereof	625

Satellite earth station licence³³

Exclusive band fee

EUR 100 for the first 10 satellite earth stations (SES) and EUR 25 for each additional station (SES).

Fee for a non-exclusive band

Band (GHz)	Bandwidth (BW) (MHz)	eIRP < 50 dBW	$50 \text{ dBW} \leq \text{eIRP} \leq 75 \text{ dBW}$	eIRP > 75 dBW
3–10	BW < 0.5	1000	1250	1500
	$0.5 \leq \text{BW} < 2$	1250	1500	1750
	$2 \leq \text{BW} < 11$	1500	1750	2000
	$11 \leq \text{BW} < 40$	1,750	2000	2250
	$40 \leq \text{BW} \leq 80$	2000	2250	2500
	BW > 80	$2000 + (\text{BW} - 80) \times 25$	$2250 + (\text{BW} - 80) \times 25$	$2500 + (\text{BW} - 80) \times 25$
10–15	BW < 0.5	500	750	1,000
	$0.5 \leq \text{BW} < 2$	750	1,000	1250
	$2 \leq \text{BW} < 11$	1000	1250	1500
	$11 \leq \text{BW} < 40$	1250	1500	1750
	$40 \leq \text{BW} < 80$	1500	1750	2000
	BW > 80	$1500 + (\text{BW} - 80) \times 25$	$1750 + (\text{BW} - 80) \times 25$	$2000 + (\text{BW} - 80) \times 25$
15–20	BW < 0.5	125	375	625
	$0.5 \leq \text{BW} < 2$	375	625	875
	$2 \leq \text{BW} < 11$	625	875	1125

³²<https://www.comreg.ie/ga/tionsclaiocht/speictream-raidio/ceadunu/cuardaigh-cineal-ceadunais/satellite/>

³³<https://www.comreg.ie/media/2024/03/SI-96-of-2024.pdf>

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	$11 \leq BW < 40$	875	1125	1375
	$40 \leq BW < 80$	1125	1375	1625
	$BW > 80$	$1125 + (BW - 80) \times 25$	$1375 + (BW - 80) \times 25$	$1625 + (BW - 80) \times 25$
20–30	$BW < 0.5$	100	350	600
	$0.5 \leq BW < 2$	350	600	850
	$2 \leq BW < 11$	600	850	1100
	$11 \leq BW < 40$	850	1,100	1350
	$40 \leq BW < 80$	1100	1350	1600
	$BW > 80$	$1100 + (BW - 80) \times 25$	$1350 + (BW - 80) \times 25$	$1625 + (BW - 80) \times 25$
>30	$BW < 0.5$	50	300	550
	$0.5 \leq BW < 2$	300	550	800
	$2 \leq BW < 11$	550	800	1050
	$11 \leq BW < 40$	800	1050	1300
	$BW > 80$	$800 + (BW - 80) \times 25$	$1050 + (BW - 80) \times 25$	$1300 + (BW - 80) \times 25$

4.6 Luxembourg ³⁴

Every company is subject to an annual administrative fee, which is based on its turnover. For 2024, the fee has been set at 0.65 per cent of the company's turnover.³⁵

Luxembourg's fee policy was established by the regulation of 21 February 2013 and subsequently amended by amendments in 2016 and 2018.

Fees payable under this regulation are due annually and are levied for the entire calendar year.

The fees are defined according to the type of service:

- Fixed service
- Public terrestrial communications network (mobile service)
- Mobile aeronautical service
- Mobile maritime service
- Amateur radio service
- Experimental licence
- Satellite service
- Radio positioning equipment

For the provision of spectrum in the frequency band allocated for railway networks or for a private/professional mobile network with shared frequency usage or a network with shared resources, the fee is set as follows:

- The fee for the frequency made available is set at EUR 9 per kHz of available bandwidth.

For the provision of spectrum for a private/professional mobile network with non-shared frequency use, the fee is set as follows:

- The fee for the allocated frequency is set at EUR 18 per kHz of allocated bandwidth.

4.6.1 Fixed service

For the provision of spectrum for **point-to-point** fixed service links, the fee is set as follows:

$$\text{Fee (EUR)} = B * F_b * F_m * R_b$$

This calculation applies to a one-way link. In the case of a return link, twice the one-way fee is charged, taking into account the relevant technical parameters. However, for either a one-way or return link, the final fee must not be less than 150 EUR or more than 2,000 EUR.

This charge also applies to connections that originate abroad and terminate within the Grand Duchy.

Table 22: Definitions of the coefficients in the fixed-service formula

Coefficient	Definition of the coefficient
B	Line bandwidth in MHz
F _b	Band factor
F _m	Modulation factor
R _b	Basic fee in EUR/MHz (40 EUR/MHz)

³⁴ <https://web.ilr.lu/FR/Particuliers/Frequences-radioelectriques/Legislation>

<https://smc.gouvernement.lu/fr/legislation/communications-electroniques.html>

<https://legilux.public.lu/filestore/eli/etat/leg/memorial/2013/a45/fr/pdf/eli-etat-leg-memorial-2013-a45-fr-pdf.pdf>

⁽³⁵⁾ <https://legilux.public.lu/eli/etat/leg/rilr/2023/11/17/a766/jo>

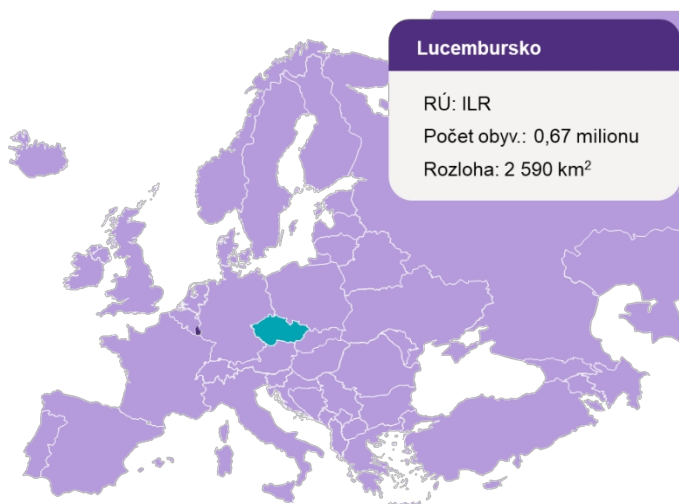


Table 23: Value of the Fb coefficient by frequency band

Band	Fb coefficient
F < 4.2 GHz	1.00
4.2 GHz ≤ F < 7.075 GHz	0.59
7.075 GHz ≤ F < 8.5 GHz	0.49
8.5 GHz ≤ F < 12.75 GHz	0.33
12.75 GHz ≤ F < 19.7 GHz	0.21
19.7 GHz ≤ F < 26.5 GHz	0.16
26.5 GHz ≤ F < 37 GHz	0.11
37 GHz ≤ F	0.08

Uplink, feeder links, remote control and space monitoring

- For this type of link, the fee is set at EUR 5,000 per station, regardless of the number and type of links passing through that station.
- In this specific case, a station is defined as a transmitter or a set of transmitters at a fixed location, i.e. not used whilst in motion, and connected to the same antenna.

4.6.2 Public terrestrial communications network (mobile service)

Table 24: Annual fee for a public land-based communications network by frequency band

Band (MHz)	Annual fee (EUR/MHz)
703–733 paired with 758–788	18,750
791 – 821 paired with 832 – 862	
880 – 915 paired with 925 – 960	
1,710 – 1,785 paired with 1,805 – 1,880*	18,750 (until 31 December 2020)
	9,000 (from 1 January 2021)
1,920–1,980 paired with 2,110–2,170*	8,000 (from 1 January 2021)
2,500–2,690	4,000
3,400 – 3,800	2,000

4.6.3 Satellite service

For the provision of spectrum for supplementary earth stations of the satellite mobile service (hereinafter referred to as 'CGC stations'), a fee is set at:

- EUR 2,000 per station, provided that the operator's total number of authorised stations is less than or equal to 10;
- EUR 6,000 for each additional station.

A CGC station is defined as a set of transmitters constituting an independent technical installation located at a defined geographical location. If the licence comes into effect during the course of the year, the calculation is adjusted on a pro rata basis.

In addition to the station fee, charges are also payable for the processing of applications for satellite services in accordance with the rules set out in the table below.

When communicating with the ITU, administrative fees are payable for various initiated processes as set out in the table below. The amount is the sum of a fixed and a variable fee. These amounts are charged regardless of the outcome of the initiated procedure.

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Table 25: Administrative fees by process initiated and network type

Type of administration	Network type	Fixed fee (EUR)	Variable fee
Publications	Geostationary	550	$N \times 10$ EUR
	Non-geostationary	150	$N * 10$ EUR
Coordination	Geostationary	1,750	$N * 10$ EUR
	Non-geostationary	350	$N * 10$ EUR
Notifications	Geostationary	1,750	$N * 10$ EUR
	Non-geostationary	350	$N * 10$ EUR
Planning	Geostationary	1,500	$N * 10$ EUR

N = Nsat * Nfr

- Nsat = number of satellites to be processed
- Nfr = number of allocated frequency bands per satellite

4.7 Hungary ³⁶

In Hungary, three types of fees are levied. Recurring radio spectrum fees include a radio spectrum reservation fee, a radio spectrum usage fee and a band fee.

1. The radio spectrum reservation fee is a one-off fee set by the authority in the frequency allocation decision.
2. The radio spectrum usage fee is a fee payable periodically for the duration of the radio licence and is set by the authority in the radio licence.
3. The frequency band fee is a periodic fee payable at regular intervals (a fee set for frequency bands falling within block management).

Under the Act, fees are further divided into three categories according to type of service:

- Fees for broadcasting services
- Fees for the mobile service
- Fees for the fixed service

The radio spectrum fee is payable on the basis of an invoice sent after the decision setting the fee has become final or after the contract has come into force, within the payment deadline stated on the invoice. Where there is an obligation to pay the fee on a regular basis, invoicing is carried out monthly. If the amount of the fee payable for radio services in a given month is less than 50,000 HUF net, the invoice for the radio spectrum fee must be issued quarterly. For the purposes of the obligation to pay fees, any month that has commenced is considered a full month.

Fees are regularly updated by decrees of the Hungarian National Media and Communications Authority. Since 2011, the original decree has been updated fifteen times.

1 CZK = 16 HUF

4.7.1 Radio spectrum fee for the mobile service

4.7.1.1 One-off fees for the allocation of frequencies

Fees for the allocation of radio spectrum for the land, inland and aeronautical mobile services and for the fixed service with frequencies above 30 MHz and below 960 MHz.

Table 26: Radio spectrum fee for mobile and fixed service networks with frequency allocation without site allocation (HUF)

Geographical coverage	Micro	Local	Small	Large	Regional	National
Area in km ²	≤1	≤300	≤2,500	≤20,000	≤75,000	>75,000
Radio spectrum fee (HUF)	10,000	30,000	50,000	100,000	250,000	500,000

In the case of exclusive use of the radio spectrum for networks comprising only mobile stations and mobile stations operating outside the coverage area of fixed stations, the radio spectrum allocation fee is 50 per cent of the fee set out in the table above, and the radio spectrum usage fee is 20,000 HUF per month per mobile station. In the case of shared use of the radio spectrum, no radio spectrum allocation fee is required; the radio spectrum usage fee is 1,000 HUF per month per station. No radio spectrum usage fee is payable for reserve stations.

Table 27: Radio spectrum subscription fees for mobile and fixed networks with site-specific frequency allocations (HUF)

Frequency band (F) in MHz	Maximum effective radiated power				
	ERP > 250 W	250 W ≥ ERP > 25 W	25 W ≥ ERP > 1 W	1 W ≥ ERP > 0.1 W	ERP ≤ 0.1 W
26 < F ≤ 47	68,000	40,000	15,000	7,500	4,500
47 < F ≤ 108	48,000	29,000	9,000	5,000	3,000

³⁶<https://njt.hu/jogszabaly/2011-1-20-3H>

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108 < F ≤ 240	60,000	36,000	12,000	6,500	4,000
240 < F ≤ 380	53,000	31,000	10,000	5,500	3,500
380 < F ≤ 790	48,000	29,000	9,000	5,000	3,000
790 < F ≤ 960	40,000	24,000	8,000	4,000	2,500
960 < F ≤ 10,000	25,000	15,000	5,000	2,500	1,500

Where there are multiple frequencies within the same frequency band, the fee must be multiplied by the number of frequencies. If the frequencies authorised for the network fall within different frequency bands, the procedure set out below must be repeated for each frequency, and the resulting radio spectrum allocation fees must be added together.

4.7.1.2 Recurring fees for the use of frequencies

Radio spectrum usage fees for the land, inland waterway and aeronautical mobile services, and for the fixed service, with frequencies higher than 30 MHz and lower than 960 MHz

Table 28: Unit fees for the use of radio spectrum per 1 kHz bandwidth in networks with frequencies allocated for a given area (HUF/kHz/month)

Frequency band (F) in MHz	Area of use					
	Micro ≤1 km ²	Local ≤300 km ²	Small ≤2,500 km ²	Large ≤20,000 km ²	Regional ≤75,000 km ²	National > 75,000 km ²
26 < F ≤ 47	25	120	180	420	2,700	4,800
47 < F ≤ 108	15	80	120	280	1,800	3,200
108 < F ≤ 240	15	80	120	280	1,800	3,200
240 < F ≤ 380	10	40	60	140	900	1,600
380 < F ≤ 790	5	20	30	70	450	800
790 < F ≤ 960	3	15	22	50	300	450
960 < F ≤ 10,000	2	10	15	40	250	350

Table 29: Radio spectrum usage fees by category for stations and equipment of mobile service networks

Categories of stations and equipment	HUF / device / month
Mobile stations	100
Fixed stations	5,000
Stations with fixed and variable locations	3,000
Spare equipment	100

4.7.1.3 Frequency usage fee

Table 30: Unit fees in the 26–47 MHz frequency band for the use of the radio spectrum per 1 kHz bandwidth (in HUF/month):

Average effective radiated power (ERP)	Average effective antenna height (h)							
	h ≤ 10 m	10 m < h ≤ 30 m	30 m < h ≤ 50 m	50 m < h ≤ 100 m	100 m < h ≤ 250 m	250 m < h ≤ 350 m	350 m < h ≤ 500 m	500 m < h
ERP ≤ 0.1 W	14	42	84	168	252	518	742	1,960
0.1 W < ERP ≤ 0.5 W	28	70	140	280	420	840	1,190	3,150
0.5 W < ERP ≤ 3 W	42	119	210	350	700	1,190	2,030	5,460
3 W < ERP ≤ 10 W	84	182	350	630	1,540	2,730	3,920	7,840
10 W < ERP ≤ 100 W	140	308	700	1,540	3,360	5,460	6,230	14,000
ERP > 100 W	280	560	1,120	2,520	5,460	9,100	10,080	22,400

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Table 31: Unit charges in the 47–108 MHz frequency band for the use of radio spectrum per 1 kHz bandwidth (in HUF/month)

Average effective radiated power (ERP)	Average effective antenna height (h)							
	$h \leq 10$ m	$10 \text{ m} < h \leq 30$ m	$30 \text{ m} < h \leq 50$ m	$50 \text{ m} < h \leq 100$ m	$100 \text{ m} < h \leq 250$ m	$250 \text{ m} < h \leq 350$ m	$350 \text{ m} < h \leq 500$ m	$500 \text{ m} < h$
$\text{ERP} \leq 0.1$ W	6	18	36	72	108	222	318	840
$0.1 \text{ W} < \text{ERP} \leq 0.5$ W	12	30	60	120	180	360	510	1,350
$0.5 \text{ W} < \text{ERP} \leq 3$ W	18	51	90	150	300	510	870	2,340
$3 \text{ W} < \text{ERP} \leq 10$ W	36	78	150	270	660	1,170	1,680	3,360
$10 \text{ W} < \text{ERP} \leq 100$ W	60	132	300	660	1,440	2,340	2,670	6,000
$\text{ERP} > 100$ W	120	240	480	1,080	2,340	3,900	4,320	9,600

Table 32: Unit fees in the 108–240 MHz frequency band for the use of radio spectrum per 1 kHz bandwidth (in HUF/month)

Average effective radiated power (ERP)	Average effective antenna height (h)							
	$h \leq 10$ m	$10 \text{ m} < h \leq 30$ m	$30 \text{ m} < h \leq 50$ m	$50 \text{ m} < h \leq 100$ m	$100 \text{ m} < h \leq 250$ m	$250 \text{ m} < h \leq 350$ m	$350 \text{ m} < h \leq 500$ m	$500 \text{ m} < h$
$\text{ERP} \leq 0.1$ W	10	30	60	120	180	370	530	1,400
$0.1 \text{ W} < \text{ERP} \leq 0.5$ W	20	50	100	200	300	600	850	2,250
$0.5 \text{ W} < \text{ERP} \leq 3$ W	30	85	150	250	500	850	1,450	3,900
$3 \text{ W} < \text{ERP} \leq 10$ W	60	130	250	450	1,100	1,950	2,800	5,600
$10 \text{ W} < \text{ERP} \leq 100$ W	100	220	500	1,100	2,400	3,900	4,450	10,000
$\text{ERP} > 100$ W	200	400	800	1,800	3,900	6,500	7,200	16,000

Table 33: Unit charges in the 240–380 MHz frequency band for the use of radio spectrum per 1 kHz of bandwidth (in HUF/month):

Average effective radiated power (ERP)	Average effective antenna height (h)							
	$h \leq 10$ m	$10 \text{ m} < h \leq 30$ m	$30 \text{ m} < h \leq 50$ m	$50 \text{ m} < h \leq 100$ m	$100 \text{ m} < h \leq 250$ m	$250 \text{ m} < h \leq 350$ m	$350 \text{ m} < h \leq 500$ m	$500 \text{ m} < h$
$\text{ERP} \leq 0.1$ W	8	22	43	87	130	267	382	1,008
$0.1 \text{ W} < \text{ERP} \leq 0.5$ W	15	36	72	144	216	432	612	1,620
$0.5 \text{ W} < \text{ERP} \leq 3$ W	22	61	108	180	360	612	1,044	2,808
$3 \text{ W} < \text{ERP} \leq 10$ W	43	94	180	324	792	1,404	2,016	4,032
$10 \text{ W} < \text{ERP} \leq 100$ W	72	158	360	792	1,728	2,808	3,204	7,200
$\text{ERP} > 100$ W	144	288	576	1,296	2,808	4,680	5,184	11,520

Table 34: Unit fees for the use of radio spectrum in the 380–790 MHz frequency band per 1 kHz of bandwidth (in HUF/month)

Average effective radiated power (ERP)	Average effective antenna height (h)							
	$h \leq 10$ m	$10 \text{ m} < h \leq 30$ m	$30 \text{ m} < h \leq 50$ m	$50 \text{ m} < h \leq 100$ m	$100 \text{ m} < h \leq 250$ m	$250 \text{ m} < h \leq 350$ m	$350 \text{ m} < h \leq 500$ m	$500 \text{ m} < h$
$\text{ERP} \leq 0.1$ W	6	17	34	67	101	207	297	784
$0.1 \text{ W} < \text{ERP} \leq 0.5$ W	11	28	56	112	168	336	476	1,260
$0.5 \text{ W} < \text{ERP} \leq 3$ W	17	48	84	140	280	476	812	2,184
$3 \text{ W} < \text{ERP} \leq 10$ W	34	73	140	252	616	1,092	1,568	3,136

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10 W < ERP ≤ 100 W	56	123	280	616	1,344	2,184	2,492	5,600
ERP > 100 W	112	224	448	1,008	2,184	3,640	4,032	8,960

Table 35: Unit charges in the 790–960 MHz frequency band for the use of radio spectrum per 1 kHz of bandwidth (in HUF/month)

Average effective radiated power (ERP)	Average effective antenna height (h)							
	h ≤ 10 m	10 m < h ≤ 30 m	30 m < h ≤ 50 m	50 m < h ≤ 100 m	100 m < h ≤ 250 m	250 m < h ≤ 350 m	350 m < h ≤ 500 m	500 m < h
ERP ≤ 0.1 W	4	12	24	48	72	148	212	560
0.1 W < ERP ≤ 0.5 W	8	20	40	80	120	240	340	900
0.5 W < ERP ≤ 3 W	12	34	60	100	200	340	580	1,560
3 W < ERP ≤ 10 W	24	52	100	180	440	780	1,120	2,240
10 W < ERP ≤ 100 W	40	88	200	440	960	1,560	1,780	4,000
ERP > 100 W	80	160	320	720	1,560	2,600	2,880	6,400

Table 36: Unit fees for the use of radio spectrum in the 960–10,000 MHz frequency band per 1 kHz bandwidth (in HUF/month)

Average effective radiated power (ERP)	Average effective antenna height (h)							
	h ≤ 10 m	10 m < h ≤ 30 m	30 m < h ≤ 50 m	50 m < h ≤ 100 m	100 m < h ≤ 250 m	250 m < h ≤ 350 m	350 m < h ≤ 500 m	500 m < h
ERP ≤ 0.1 W	3	10	19	38	58	118	170	448
0.1 W < ERP ≤ 0.5 W	6	16	32	64	96	192	272	720
0.5 W < ERP ≤ 3 W	10	27	48	80	160	272	464	1,248
3 W < ERP ≤ 10 W	19	42	80	144	352	624	896	1,792
10 W < ERP ≤ 100 W	32	70	160	352	768	1,248	1,424	3,200
ERP > 100 W	64	128	256	576	1,248	2,080	2,304	5,120

Radio spectrum fee for maritime, special-purpose inland waterway and aeronautical mobile stations

The licence holder is not required to pay a radio spectrum allocation fee for on-board telecommunications stations, coastal stations and ship stations of the maritime mobile service, nor for the inland mobile service licensed on its frequencies, nor for aeronautical and airborne stations of the aeronautical mobile service. The fee for the use of the radio spectrum is **1,000 HUF per station per month**.

4.7.2 Fixed service

No radio spectrum allocation fee is payable for stations with a fixed or variable location that are operated as part of the mobile service and whose frequency bandwidth is less than 30 MHz. The rate of the radio spectrum usage fee is then 1,000 HUF per station per month.

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Radio spectrum usage fees for stations and equipment in the fixed service operating at frequencies above 30 MHz and below 960 MHz

Table 37: Radio spectrum usage fees for stations and equipment in the fixed service operating at frequencies above 30 MHz and below 960 MHz

Categories of stations and equipment	Frequency band (MHz)		
	30 < F ≤ 440	440 < F ≤ 450	450 < F < 960
Fixed and mobile stations, with the exception of stations with a star point	5000	100	5000
Stations with a star point (including collection stations)	5,000	1,000	5,000
Spare equipment	100	100	100

Where there are multiple authorised stations or devices, the radio spectrum usage fee determined on the basis of the point must be multiplied by the number of stations or devices belonging to the same category, and the resulting radio spectrum usage fees must be added together.

Radio spectrum usage fees for point-to-point and point-to-multipoint systems in the frequency band above 960 MHz

For radio and television news stations and radio and television programme broadcasting systems with a licence valid for less than one month, the rate of the radio spectrum usage fee is 4,000 HUF per station.

Table 38: Unit fees for the use of radio spectrum for point-to-point stations and point-to-multipoint stations with a star node, per 1 kHz of bandwidth (Ft/kHz/month)

Frequency band	Point-to-point links	Omnidirectional stations for point-to-multipoint links
960 MHz < F ≤ 10 GHz	0.672	2.8
10 GHz < F ≤ 13.25 GHz	0.336	1.4
13.25 GHz < F ≤ 21.2 GHz	0.267	1.12
21.2 GHz < F ≤ 30 GHz	0.202	0.84
30 GHz < F ≤ 55 GHz	0.161	0.67
55 GHz < F	0.08	0.335

The unit fee for the use of the radio spectrum as specified in this point must be multiplied by the sum of the channel spacing of the frequencies authorised for the station, expressed in kHz.

4.7.3 Satellite service

Radio spectrum fee for earth stations of satellite services

For central earth stations of satellite services, space telecommunications HUB stations, coastal earth stations, control stations, CGC aeronautical stations and transmitting stations, the authorised person is not required to pay the radio spectrum subscription fee, and the radio spectrum usage fee is calculated in accordance with the following table set out in Annex 8 to the Regulation:

Table 39: Radio spectrum fees for earth stations providing satellite services, by frequency band

Frequency band	Fee (HUF/kHz/month)
960 MHz < F ≤ 10 GHz	0.5
10 GHz < F ≤ 15.4 GHz	0.25
F > 15.4 GHz	0.13

The unit fee for the use of the radio spectrum specified in this point must be multiplied by the sum of the channel spacing of the frequencies authorised for the station, expressed in kHz.

Fee for the use of radio spectrum by terminal equipment of satellite services

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Fee for the use of radio spectrum by ground stations (terminal equipment) of fixed satellite services which are also licensed for transmission from Earth to space:

a) per VSAT terminal: 1,000 HUF per unit per month;

b) per SNG terminal: 10,000 HUF per unit per month.

The fee for the use of the radio spectrum is 250 HUF per unit per month for terminal equipment of terrestrial and maritime satellite mobile services.

4.8 Germany

In the Federal Republic of Germany, fees are divided into one-off fees (fees for frequency allocation) and annual fees (fees for frequency use). Frequency allocation fees are levied in accordance with the Federal Network Agency's specific regulation on fees – frequency allocation (BNetzA BNetzA-FreqZut)³⁷. Fees for the use of frequencies are governed by three Acts, namely the Act on the Electromagnetic Compatibility of Equipment (EMVG)³⁸, the Telecommunications Act (TKG)³⁹ and the Radio Equipment Act (FuAG)⁴⁰.

These annual contributions serve to finance certain tasks and services carried out and provided by the BNetzA on the basis of statutory provisions.

Tasks and services under the Telecommunications Act (TKG) include spectrum planning, spectrum coordination, harmonisation and standardisation. Tasks under the Electromagnetic Compatibility of Equipment Act (EMVG) and the Radio Equipment Act (FuAG) include ensuring electromagnetic compatibility and measures relating to equipment inspections.⁴¹

The annual contribution is determined retrospectively for each reference unit, usually with a delay of several years. It is calculated as the actual costs incurred in administering the service for the relevant assessment year, divided by the total number of reference units.

Of the personnel and material costs to be covered by the contributions, the Federal Government pays 20 per cent as a contribution towards the public interest in the interference-free and efficient use of frequencies under the Telecommunications Act (TKG), 35 per cent as a contribution towards the public interest in ensuring the electromagnetic compatibility of equipment under the Electromagnetic Compatibility Act (EMVG); and 50 per cent as a deduction to compensate for the public interest in ensuring radio equipment under the Radio Equipment Act (FuAG).

Under the Act, services are divided into:

- Public mobile radio
- Broadcasting service
- Fixed radio services/radio with standard frequency and time signal
- Non-public land mobile radio
- Aeronautical radio service
- Amateur radio service
- Radiotelephone services for the maritime mobile service and inland waterways
- Non-navigational positioning radio service
- Other radio applications
- Railway radiocommunication service
- Trunked radio system
- Satellite broadcasting service
- Wireless network access

4.8.1 Mobile service

Fees for public mobile radio

Table 40: Charges for public mobile radio:

Service	Unit	Annual fee (EUR)	
		TKG	EMVG
Paging	Frequency	0.00	0.00
UMTS	Per 100 kHz bandwidth or part thereof	0.00	0.00

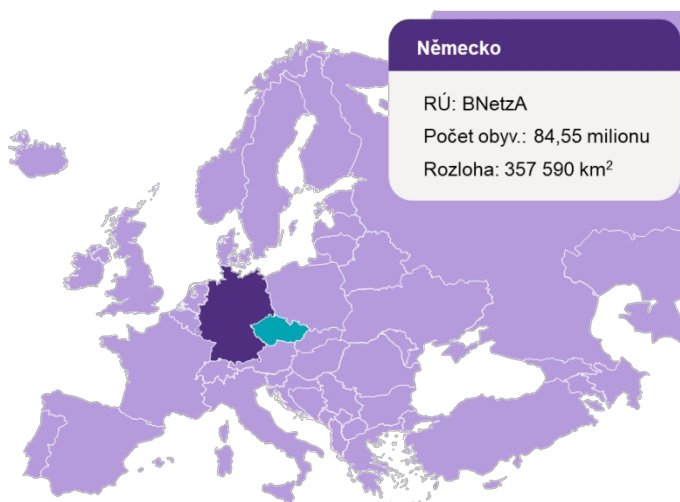
³⁷<https://www.gesetze-im-internet.de/bnetzafreqzutgebv/>

³⁸https://www.gesetze-im-internet.de/emvg_2016/

³⁹https://www.gesetze-im-internet.de/tkg_2021/

⁴⁰<https://www.gesetze-im-internet.de/fuag/>

⁴¹https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Telekommunikation/Unternehmen_Institutionen/Frequenzen/GebruhenBeitraege/InfoKostenforderung_EN.pdf?__blob=publicationFile&v=1



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Charges for wireless network access

Table 41: Charges for wireless network access:

Bandwidth	Unit	Annual fee (EUR)	
		TKG	EMVG
450 MHz	12.5 kHz	0.00	0.00
700 MHz	100 kHz	0.90	9.49
800 MHz	100 kHz	219.14	171.57
900 MHz	100 kHz	677.83	146.52
1.5 GHz	100 kHz	0.90	0.00
1.8 GHz	100 kHz	99.22	23.99
2.0 GHz	100 kHz	10.41	21.00
2.6 GHz	100 kHz	42.04	0.46
3.4 GHz to 3.7 GHz	100 kHz	0.90	0.91
3.5 GHz and 3.7 GHz	100 kHz	0.00	0.00
3.7 GHz to 3.8 GHz	100 kHz	0.00	0.00
26 GHz	100 kHz	0.00	0.00

BNetzA has also, in accordance with the frequency plan, set **a fee for local broadband applications for spectrum in the 3.7–3.8 GHz and 24.25–27.5 MHz bands**. Details of this fee are set out in the chapter on 5G private networks.

4.8.2 Fixed service

Fees for fixed radio services/radio with standard frequency and time signal

Table 42: Fees for fixed radio services/radio with standard frequency and time signal:

Service	Unit	Annual fee (EUR)	
		TKG	EMVG
Point-to-point directional radio	Transmitter radio system	3.62	0.00
WLL-PMP radio link	Transmitter radio system	0.00	0.00
Spectral allocation for directional radio links	Transmitter radio system	0.00	0.00
Fixed radio service below 30 MHz, standard frequency and radio time signal	Frequency	18.09	0.74
Point-to-multipoint radio transmissions (excluding WLL-PMP radio transmissions)	Transmitter radio system	0.00	0.00

4.8.3 Satellite service

Fees for satellite radio services

Table 43: Fees for satellite radio services:

Service	Unit	Annual fee (EUR)	
		TKG	EMVG
Coordinated satellite radio link	Frequency	0.00	0.00
Satellite radio link without coordination	Frequency	0.00	0.00
Satellite radio network	Frequency	0.00	0.00
Orbital systems (following the transfer of usage rights)	Satellite system	23.14	0.00
SNG – Satellite links for the transmission of news reports	Allocation	5.67	0.00

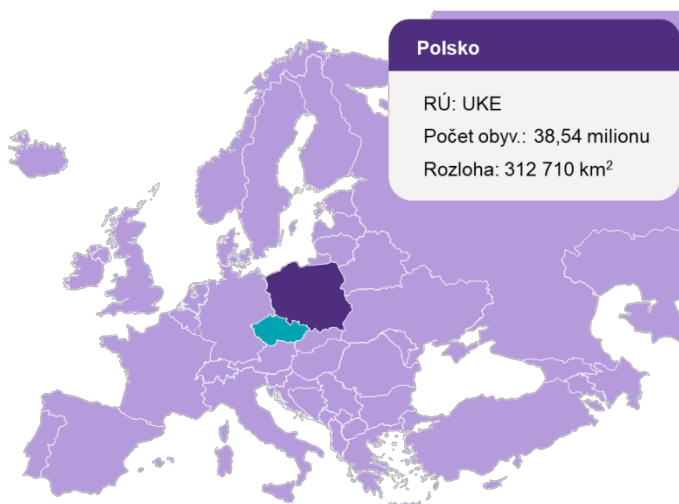
4.9 Poland

In Poland, there is an annual fee based on turnover, which currently stands at 0.05 per cent. This fee is set individually each year by the Ministry for Digitalisation.⁴²

The 2013 Regulation on Annual Fees for the Right to Use Frequencies sets out the amounts, deadlines and method of payment of annual fees for the right to use frequencies by entities that have been granted the right to use a frequency.⁴³

In Poland, the amount of annual spectrum fees is broken down according to the following services:

- satellite and radiolocation services
- terrestrial mobile service
- fixed service
- terrestrial broadcasting service
- aeronautical service, maritime and inland waterway service



The annual fee is payable in quarterly instalments amounting to one quarter of the annual fee, by 15 April, 15 July, 15 October and 31 December of the relevant year.

Fees are payable into the current account of the Office for Electronic Communications.

The annual fee is reduced by 50% if the frequencies are used exclusively for:

- 1) the provision of emergency assistance to save human life and protect health by medical services and mountain, water and mine rescue services;
- 2) the conduct of operations by organisational units whose statutory duty is to plan, carry out and participate in operations to prevent and mitigate the consequences of natural disasters and catastrophes;
- 3) radio communication systems used in maritime and inland navigation by the maritime and inland navigation authorities and the maritime search and rescue service in the field of navigation safety and coastal protection;
- 4) the performance of tasks relating to rail transport within the framework of the European Rail Traffic Management System (ERTMS);
- 5) the broadcasting or distribution of radio or television programmes that do not contain commercial communications.
- 6) Specific activities in the energy sector, ensuring the security of energy supply

4.9.1 Satellite service

The fee for the right to use frequencies by a single satellite station in systems utilising satellite telecommunications infrastructure is set as follows:

⁴²<https://sip.lex.pl/akty-prawne/mp-monitor-polski/wysokosc-wskaznika-rocznej-oplaty-telekomunikacyjnej-w-2024-r-21895297>

⁴³<https://sip.lex.pl/akty-prawne/dzu-dziennik-ustaw/roczne-oplaty-za-prawo-do-dysponowania-czestotliwoscia-18051738>

Table 44: Fee amounts by type of satellite and radar service

Service	Fee (PLN)
Fixed satellite service (Earth–space)	12,000
Fixed satellite service (space–Earth)	20,000
Satellite Earth Observation Service	1,200
satellite meteorological service	3,000
Satellite radio navigation service	1,200
space operations service	3,000
Space Research Service	3,000
Satellite broadcasting service	40,000
Satellite mobile service (Earth–space)	12,000
satellite mobile service (space–Earth)	40,000

In the satellite mobile service sector, the fee for the use of frequencies with a total bandwidth of 1 MHz utilised by supplementary ground components of mobile satellite systems, where such frequencies are used within the boundaries of a single municipality or a smaller area, is PLN 250.

Where the area of use exceeds that of a single municipality, the fee is calculated as the product of 250 PLN and the number of municipalities in which the frequencies are used. If this product exceeds the maximum value specified below for a specific band, the calculation is adjusted as follows:

Table 45: Calculation of the fee for satellite and radar services by frequency band

Band	Max. value	Equation (if the product exceeds the maximum)
<1 900 MHz	PLN 200,000	$\text{PLN } 200,000 + \text{PLN } 100,000 \times (n / N_{\text{max}})$
1,900 – 2,300 MHz	PLN 70,000	$\text{PLN } 70,000 + \text{PLN } 45,000 \times (n / N_{\text{max}})$
2300 – 2690 MHz	PLN 70,000	$\text{PLN } 70,000 + \text{PLN } 30,000 \times (n / N_{\text{max}})$
2,690 – 3,400 MHz	PLN 50,000	$\text{PLN } 50,000 + \text{PLN } 12,000 \times (n / N_{\text{max}})$

n = the number of municipalities covered by the right to use the frequencies

N_{max} = the total number of municipalities in Poland.

4.9.2 Land mobile service

The fee for the use of frequencies with a total bandwidth of **1 kHz** within the territory of a single municipality or fewer, in the range **up to 470 MHz**, which are used by radio equipment operating on radio channels with a bandwidth of less than 200 kHz, ranges from 0.8 PLN to 96 PLN, depending on the size of the municipality.

The amount of the fee referred to in the previous paragraph, where the area covers more than one municipality, is calculated as the sum of the fees for the individual municipalities. If this sum exceeds PLN 40 in the case of frequencies being used throughout the entire area solely by mobile stations, or PLN 300 in other cases of frequency use, the fee for the right to use the frequencies listed above the table is calculated using the following formula:

- where the frequencies are used solely by mobile stations: **40 PLN + 16 PLN × (n / N_{max})**,
- in other cases: **300 PLN + 100 PLN × (n / N_{max})**

The fee for the use of frequencies with a total bandwidth of **1 MHz** in the range up to **470 MHz**, which are used by radio equipment operating on radio channels with a bandwidth of 200 kHz or more, where such frequencies are used within the territory of a single municipality or a smaller area, is 130 PLN.

The amount of the fee for the use of the frequencies referred to in the previous paragraph, used within an area larger than that of a single municipality, is calculated as the product of the fee of 130 PLN and the number of municipalities within whose territory these frequencies are used. If this product exceeds PLN 100,000, the fee is calculated using the following formula:

$$\text{PLN } 100,000 + \text{PLN } 60,000 \times (n / N_{\text{max}})$$

The fee for the right to use frequencies with a total bandwidth of **1 kHz** within the territory of a single municipality or less, in the range **from above 470 MHz to 3,400 MHz**, which are used by radio equipment utilising radio channels with a width of less than 200 kHz, ranges from 0.08 PLN to 9.6 PLN, depending on the size of the municipality.

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The fee for the use of frequencies with a total bandwidth of **1 MHz** in the range **from 470 MHz to 3,400 MHz**, used by radio equipment operating on radio channels with a bandwidth of 200 kHz or more, where such frequencies are used within the territory of a single municipality or a smaller area, is 250 PLN.

The amount of the fee for the use of the frequencies referred to in the previous paragraph, which are used within an area larger than that of a single municipality, is calculated as the product of the fee of 250 PLN and the number of municipalities within whose territory these frequencies are used. If this product exceeds the maximum amount, it is calculated as follows:

Table 46: Alternative calculation of the fee in the 470–3400 MHz band where the maximum amount is exceeded

Band	Calculation
470 MHz to 960 MHz	200,000 PLN + 100,000 PLN × (n / Nmax)
960 MHz to 1,900 MHz	PLN 200,000 + PLN 100,000 × (n / Nmax)
1,900 MHz to 2,300 MHz	PLN 70,000 + PLN 45,000 × (n / Nmax)
2,300 MHz to 2,690 MHz	PLN 70,000 + PLN 30,000 × (n / Nmax)
2,690 MHz to 3,400 MHz	PLN 50,000 + PLN 12,000 × (n / Nmax)

The fee for the use of frequencies with a total bandwidth of **1 MHz** within the territory of a single municipality or a smaller area in the band **above 3,400 MHz** ranges from 10 PLN to 250 PLN, depending on the size of the municipality

The amount of the fee for the use of the frequencies referred to in the previous paragraph, which are used within an area larger than that of a single municipality, is calculated as the sum of the fees for the individual municipalities set out in the table above. If this amount exceeds 50,000 PLN, the fee for the right to use the frequencies referred to in the previous paragraph is calculated using the following formula:

$$50,000 \text{ PLN} + 12,000 \text{ PLN} \times (n/N_{\text{max}})$$

The fee for the use of frequencies with a total bandwidth of **1 MHz** for a **wireless reporting system** is PLN 400.

4.9.3 Fixed service

The fee for the right to use frequencies with a total bandwidth of **1 kHz** in the frequency band **below 30 MHz** is PLN 1,000.

The fee for the right to use frequencies with a total bandwidth of **1 kHz** used in point-to-multipoint and multipoint-to-multipoint systems within the territory of a single municipality or smaller area is:

Table 47: Fixed service fee in PLN per 1 kHz

Band	Rural municipality (PLN)	Urban-rural municipality (PLN)	Municipality (excluding towns with county rights) (PLN)	A town with district rights (PLN)
30 MHz – 470 MHz	0.01	0.025	0.125	0.250
470 MHz – 3,400 MHz	0.01	0.025	0.125	0.250
3,400 MHz – 4,200 MHz	10	25	125	250
4,200 MHz – 39,500 MHz	5	12.5	62.5	125
Above 39,500 MHz	1	2.5	12.5	25

For the bands specified in the table, the fee for the right to use frequencies throughout the country is calculated as the product of the total number of municipalities in the country and the relevant fees.

The fee for the right to use frequencies with a total bandwidth of **1 kHz** in a single point-to-point radio link in the range **from 30 MHz to 1 GHz** is 2 PLN.

The fee for the right to use frequencies with a total bandwidth of **1 MHz** in a single point-to-point radio link in the range **above 1 GHz** is set out in the following table.

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Table 48: Fee per 1 MHz in the range above 1 GHz for point-to-point links

Frequency band f [GHz]	Fee per 1 MHz [PLN]
1	2
$1 < f < 7.11$	450
$7.11 \leq f < 10.70$	270
$10.70 \leq f \leq 11.70$	360
$11.70 < f < 22.00$	180
$22.00 \leq f < 26.50$	90
$26.50 \leq f < 39.50$	36
$39.50 \leq f < 57.00$	18
$f \leq 57.00$	1

The fee for the right to use frequencies within a single frequency band of a point-to-point radio link, where one station is located within the territory of a town with district-level rights, is 150 per cent of the fee specified in the two paragraphs immediately above the table.

The fee for the right to use frequencies in a single band of a point-to-point radio link, where both stations are situated within the territory of a town with district-level rights, is 200 per cent of the fee set out in the two paragraphs immediately above the table.

4.10 Austria

The costs of frequency allocation and use consist of one-off fees or charges and of ongoing fees, which must be paid for the duration of frequency use.

One-off costs

Where frequencies are allocated through a tender procedure organised by the regulatory authority (the Telecommunications Supervisory Commission at the RTR), allocation fees must be paid. These fees may, for example, be determined in a competitive tender (auction). In all other cases, allocation fees must be paid.

Ongoing fees

In addition to the fees arising in connection with the allocation of frequencies, the holder of the allocations must also pay ongoing fees (fees for the use of frequencies). These fees, like the allocation fees mentioned above, are set by the regulator on the basis of the **Telecommunications Fees Regulation** (Telekommunikationsgebührenverordnung – TKGv).⁴⁴

Fee structure

Under this regulation, fees in Austria are divided into the following groups:

- Frequency usage fees for the fixed radio service and the mobile terrestrial radio service
- Fees for the use of frequencies for combined radio systems
- Fees for the use of frequencies for telephone networks
 - a) Fees for the use of frequencies for digital broadband wireless mobile or fixed communications networks (excluding point-to-point systems)
 - b) Fees for the use of frequencies for digital data radio networks in the frequency range from 29.7 MHz to 450 MHz
- Fees for the use of frequencies for satellite radio systems
- Fees for the use of frequencies for radar systems
- Licence fees for the establishment and operation of radio systems for all other radio services

Annual fees are payable on a pro rata basis per calendar month. The full monthly fee is payable for any part of a calendar month that has commenced.

4.10.1 Fixed radio service and mobile radio service

Fees for the use of frequencies for the fixed radio service and the mobile terrestrial radio service

Monthly fee per radio transmitter and channel unit, where an exclusive frequency has been allocated for the mobile and fixed radio services used exclusively for private/internal purposes with authorised transmitter power.

Table 49: Fees for the use of frequencies for the fixed radio service and the land mobile radio service

Power	Duplex, semi-duplex (EUR/month)	Simplex (EUR/month)
Up to 1 W	3.63	2.18
Up to 6 W	7.99	4.36
Up to 25 W	10.90	5.81
Up to 150 W	22.53	11.63
Up to 1 kW		22.53
Over 1 kW		44.33

The fee per route is capped at a maximum of 131.54 EUR. The channel unit is

determined according to the frequency band as follows:

⁴⁴<https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=10012777>

Table 50: Channel units:

Band (MHz)	Channel unit
< 29.7	10 kHz
29.7 – 960	25 kHz
960 – 2,690	250 kHz
2,690 – 9,800	500 kHz
9,800 – 15,350	750 kHz
15,350 – 43,500	1,000 kHz
43,500 – 57,000	10,000 kHz
> 57,000	100 MHz

If the allocated frequency bandwidth exceeds the above values, each multiple of the excess and each commenced multiple of the excess shall be treated as a further channel unit for the purposes of calculating fees. Where the operation of a radio transmitter is authorised on multiple frequencies, with different services or different bandwidths, the highest amount from the first table shall be payable. The monthly fee for community-allocated frequencies is 50 per cent of the original amount. The monthly fee for commercially used frequencies is 300 per cent of the original amount from the first table.

Fees for the use of frequencies for digital broadband wireless mobile or fixed communications networks (excluding point-to-point systems)

Table 51: Monthly licence fee for the establishment and operation of public communications networks used to provide digital broadband wireless communications services (EUR)

Frequency band	Bandwidth (kHz)	Area of use		
		Local area of operation (max. 500,000 inhabitants)	Nationwide use	Other area of use
450–870 MHz	200	116.28	581.38	348.83
870–2,500 MHz	400	116.28	581.38	348.83
2,500–3,800 MHz	1,000	58.14	581.38	116.28

Where the licence is used exclusively for internal or private purposes, the fee is only one-third of the amount stated above.

4.10.2 Satellite radio systems

Monthly fees for the use of frequencies for satellite radio systems

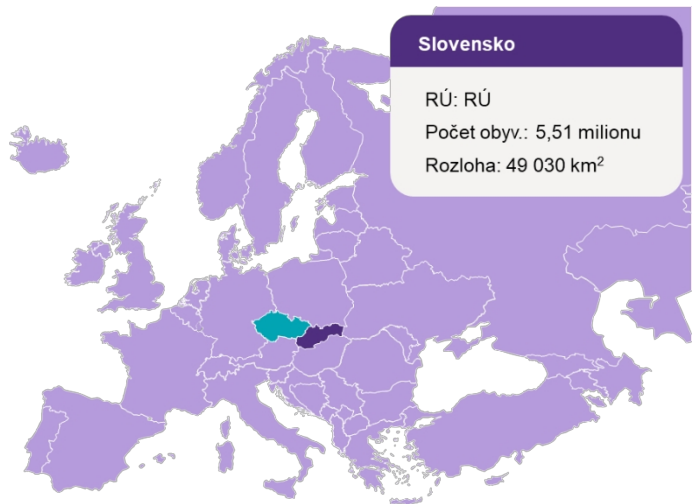
Table 52: Monthly fees for the use of frequencies for satellite radio systems

Transmitter power	Fee (EUR)
Up to 1 W	14.53
Up to 6 W	36.34
Up to 30 W	50.87
Up to 150 W	109.01
Up to 1,000 W	327.03
Over 1,000 W	654.06

4.11 Slovakia

The Regulatory Authority (Office for the Regulation of Electronic Communications and Postal Services) publishes the rates of fees for the use of the radio spectrum in its gazette⁴⁵, which is governed by Section 47(3) of Act No. 452/2021 Z. z. on Electronic Communications⁴⁶. In its gazette, the Authority classifies services as follows:

- Land mobile service (nationwide radio networks and campus networks, fixed stations, mobile stations and shared frequencies, public electronic communications networks)
- Fixed service (point-to-point up to 1 GHz, point-to-multipoint up to 1 GHz, point-to-point above 1 GHz, point-to-multipoint from 1 to 11 GHz, point-to-multipoint above 11 GHz)
- Satellite service (mobile service – supplementary ground station, mobile satellite service, mobile service – nationwide radio networks, fixed satellite service)
- Radio and television service – terrestrial broadcasting
- Other radiocommunication services



The amount of individual fees varies according to the formulae set out in the gazette. These formulae use coefficients, which are also explained in the aforementioned gazette and below in the text.

The Authority has set an administrative fee at 0.08 per cent of the previous year's turnover, subject to a minimum of EUR 150, even if the undertaking had no turnover.⁴⁷

For stations belonging to healthcare facilities, emergency services intended to save human lives, fire brigades and the municipal police, a fee of 50 per cent is payable.

Changes to the fees, published in the Regulatory Authority's Gazette, have occurred five times since 2012, namely in 2012, 2017, 2021 and 2022 (in the latter year, there were two changes).

4.11.1 Land-based mobile service (mobile service)

Table 53: Monthly fees for land mobile services

Type of fee	Formula
Nationwide radio networks and campus networks	$1/12 \times S1 \times Y1 \times 1/KF \times Km$
Fixed stations, mobile stations and shared frequencies	$K2 \times Kp \times KK \times Km$
Mass electronic communications networks	$2/3 \times Y1 \times K4 \times Km$

Where shared frequencies are allocated, the fee is 50 per cent of the original amount

4.11.2 Fixed service

Table 54: Monthly charges for fixed-line services

Type of charge	Formula
Point-to-point service up to 1 GHz	$KK \times KV \times Km$
Point-to-multipoint service up to 1 GHz	$2/3 \times Y1 \times P \times Km$
Point-to-point service above 1 GHz	$Y3 \times K5 \times Km \times (1 + P1/10)$
Point-to-multipoint service from 1 to 11 GHz	$1/12 \times Y3 \times P2 \times ES \times K5 \times K6 \times Km$
Point-to-multipoint service above 11 GHz	$1/60 \times Y3 \times P2 \times ES \times K5 \times K6 \times Km$
Terrestrial fixed service stations for unidirectional propagation of unmodified television and radio programmes	$1/12 \times X1 \times K6 \times Km$

⁴⁵https://www.teleoff.gov.sk/files/urad/odbory-oddelenia/odbor-spravy-frekvencneho-spektra/sprava-frekvencii-regulacia/sadzobnik-uhrad/51975_vestnik-c06_2022.pdf

⁴⁶<https://www.slov-lex.sk/pravne-predpisy/SK/ZZ/2021/452/>

⁴⁷https://www.teleoff.gov.sk/files/urad/odbory-oddelenia/odbor-spravy-frekvencneho-spektra/sprava-frekvencii-regulacia/vseobecne-povolenia/vseobecne-povolenie-1_2023-zneni-1_2024.pdf

4.11.3 Satellite service

Table 55: Monthly charges for the satellite service

Type of fee	Formula
Mobile satellite service	$Y3 \times ED \times Km$
Supplementary earth station for the mobile satellite service	$1/12 \times Y3 \times P2 \times ES \times K5 \times K6 \times Km$
Nationwide radio network for the mobile satellite service	$5/6 \times Y1 \times Km$
Fixed-satellite service	$Y3 \times KD \times Km$

Formula coefficients (a detailed breakdown of the formulas with values is included in the annex)

Table 56: Coefficients used to calculate frequency usage fees

Name of coefficient	Description of coefficient
ED	Coefficient for the period for which the frequency is allocated to a mobile station in the satellite service (5 = daily payment, 50 = monthly payment, 350 = annual payment)
ES	$X \times Z \Rightarrow$ Number of sector antennas $\times$ Value for the sector
K2	Service area coefficient, based on the radius of the area
K4	Territorial allocation coefficient $\Rightarrow$ whole of Slovakia = 1, regions 0.06–0.3 depending on size (for multiple regions, the coefficients are added together)
K5	Frequency band coefficient
K6	Attractiveness coefficient based on population coverage
KD	Coefficient for a satellite service earth station (25 = frequency band width up to and including 4 MHz, 22 = band width greater than 4 MHz)
KF	Frequency band coefficient – $KF = \text{frequency band in GHz}$ (e.g. 900 MHz band $\rightarrow KF=0.9$)
KK	Frequency channel width coefficient (1 for a frequency channel of 12.5 kHz – 25 kHz; 0.5 for a frequency channel up to 12.5 kHz)
Km	Modification coefficient = 0.3
KP	Number of radio stations coefficient
KV	Radio station output power coefficient, based on the radio station's output power
P	Output power of the device's final stage in watts (if the value of P is less than 1, the value 1 is used)
P1	Output power of the device's final stage in dBm (if the value of P1 is less than 0, the value 0 is used)
P2	Output power of the device's final stage in dBm (if P2 is less than 1, the value 1 is used)
S1	Rate per 1 kHz of allocated frequency bandwidth: 35 EUR for public networks 3.50 EUR for non-public networks 1 EUR for networks built within enclosed premises
X1	Output power coefficient of the device's final stage, based on output power per channel
Y1	Frequency range in kHz
Y3	Frequency range in MHz

4.12 Slovenia⁴⁸

At present, fees for the use of radio frequencies in Slovenia are governed by two laws – the General Act on the Method of Calculating Payments for the Use of Radio Frequencies (Official Gazette of the Republic of Slovenia, No. 163/22 of 27 December 2022) and the General Act Amending that Act (Official Gazette of the Republic of Slovenia, No. 130/23 of 21 December 2023).

Payments stipulated by these general laws are expressed in terms of points. The amount of the payment is calculated as the product of the number of points and the value of a point for that type of payment. The value of a point is set by the agency in a schedule of rates for a specific year. For 2024, the value of one point is set at EUR 0.66.⁴⁹

The payment is made in a single instalment. If the payer is assessed a payment totalling more than 1,000 points for a single type of service, they may settle this obligation in two equal instalments, the first within 30 days of receipt of the decision and the second by 5 September of that year at the latest.

The amount of the fee depends on the classification into the following groups:

1. Fixed number of points
2. Radio frequencies for broadcasting
3. Analogue broadcasting
4. Digital broadcasting
5. Other radio frequencies
6. Special cases of use

Individual operators are also required to pay 0.1 per cent of their annual turnover from the provision of public communications networks and public communications services.⁵⁰

4.12.1 Fixed number of points

For radio frequencies, a fee of **60 points** is set:

- for the maritime mobile service;
- for the aeronautical mobile service;
- for the aeronautical mobile service;
- aerial radionavigation stations;
- maritime radio navigation stations;
- base stations of the local one-way paging system.

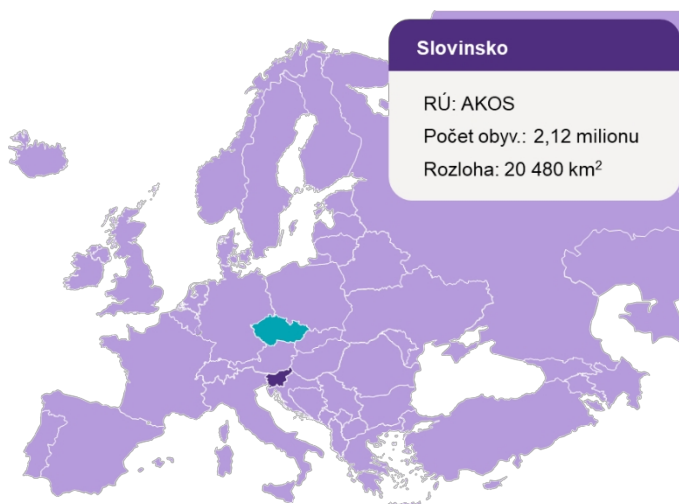
A fee of **700 points** is set for the radio frequencies of a medium-wave transmitter.

A fee of **600 points** is set for radio frequencies and for each ground station in a satellite system (satellite communications), as well as for SNG/OB.

A one-off fee of **60 points** is set for the issue, amendment or renewal of an amateur radio licence.

Notwithstanding the provisions of the previous paragraph, a one-off fee of **30 points** is set for the issue, amendment or renewal of an amateur radio licence for those call sign sequences which amateur radio organisations or amateur radio clubs use to identify amateur radio stations and which form part of the amateur radio support infrastructure.

No fees are payable for radio frequencies for receivers.



⁴⁸https://pisrs.si/pregledPredpisa?id=AKT_1303

⁴⁹ <https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina/2023-01-3896/tarifa-2024-on-the-value-of-the-fee-based-on-the-notice-regarding-the-fee-for-the-use-of-radio-frequencies-and-the-fee-for-the-use-of-identification-elements>

⁵⁰<https://pisrs.si/pregledPredpisa?id=ZAKO8611>

4.12.2 Other radio frequencies (Mobile service, fixed service, fixed-satellite service and mobile-satellite service)

(1) Number of points for other radio frequencies not mentioned above: **B x C x E points**.

- C = total bandwidth of allocated radio frequencies / 25 kHz
- B = depends on the radio frequency band used:

Table 57: Value of factor B according to frequency range

Radio frequency range	Value of factor B
$X \leq 470$ MHz	10
470 MHz < $X \leq 960$ MHz	2
960 MHz < $X \leq 2,300$ MHz	1
2,300 MHz < $X \leq 3,400$ MHz	0.6
3,400 MHz < $X \leq 5,000$ MHz	0.5
5,000 MHz < $X \leq 10,000$ MHz	0.4
10,000 MHz < $X \leq 17,700$ MHz	0.3
17,700 MHz < $X \leq 23,600$ MHz	0.2
23,600 MHz < $X \leq 40,000$ MHz	0.1
40,000 MHz < $X \leq 71,000$ MHz	0.01
$X > 71,000$ MHz	0.001

- E = depends on geographical coverage as shown in the table below

Table 58: Value of factor E depending on geographical coverage

Geographical coverage	Value of factor E
The whole territory of the Republic of Slovenia	50
Local coverage – up to 130 municipalities	25
Local coverage – up to 65 municipalities	10
Local coverage – up to 5 municipalities	5
Local coverage – one base station	10
Point-to-point link	1
For the band above 2000 MHz for the purposes of the event	1
Use of radio frequencies for directional (point-to-point) links throughout Slovenia	32

Notwithstanding the previous paragraph, the E-factor for frequencies allocated for the provision of terrestrial wireless broadband electronic communications services, including for own use and public communications services to end-users, which are allocated for part of the territory of Slovenia, and for point-to-point links allocated on the basis of a public tender, irrespective of the radio frequency band, shall be determined according to the number of inhabitants (P) in the coverage areas in accordance with the following equation:

$E = 15 \times 10^{-6} \times P$, rounded to the nearest whole number greater than or equal to 1.

- P = is equal to the population of the coverage areas.

4.13 United Kingdom

The regulatory authority levies fees in accordance with the Communications Act 2003, which is updated at irregular intervals (e.g. in 2010, 2011 and twice in 2017 and 2024)⁵¹.

Licence and administrative fees are regularly updated by the regulatory authority at the start of the financial year. Administrative fees⁵² apply to all entities with a relevant turnover exceeding GBP 5 million in a calendar year. For 2024, these fees amount to approximately 0.1 per cent. If the calculated administrative fee exceeds GBP 75,000, Ofcom automatically allows the amount due to be paid in monthly instalments.

Administrative incentive prices (Administrative Incentive Pricing) used to set spectrum fees are intended to reflect the economic value calculated using the administrative method. Typically, the opportunity cost of the spectrum for a specific use is estimated, but this may also include monopoly rent and the value of options. In the United Kingdom, according to the regulator, more than half of the spectrum is valued using AIP methods.

Licence fees are governed by the Wireless Telegraphy Regulations 2020⁵³ and their amendments of 2021⁵⁴, 2022⁵⁵ and 2023⁽⁵⁶⁾ pursuant to the Wireless Telegraphy Act 2006.⁵⁷ These fees may consist of a fixed and a variable amount.

4.13.1 Fixed lines

Fixed links

Table 59: Charges for fixed connections:

Service	Charge (GBP)
Point-to-point security, CCTV services	720 for each splitter with a bandwidth of less than or 56 MHz
	885 for each splitter with a bandwidth of 56–140 MHz
	1,030 for each splitter with a bandwidth of 140–250 MHz
	1,155 for each splitter with a bandwidth of 250–308 MHz
Fixed point-to-point links (excluding the 71.125–73.125 GHz and 81.125–83.125 GHz bands)	$Sp \times Bwf \times Bf \times Plf \times Avf$ ⁵⁸ 50% for each coordinated two-way fixed link added after the licence is issued, and where additional links are operated in parallel and across poles, 75% for each one-way fixed link
Point-to-point fixed link (71.125–73.125 GHz and 81.125–83.125 GHz bands)	100 for each two-way channel pair with a bandwidth of less than 250 MHz 225 for every 250 MHz of bandwidth within a two-way channel pair, provided the two-way channel pair has a bandwidth of 250 MHz or more
Individually coordinated links	50 for each fixed link in the 71–76 GHz and 81–86 GHz bands
Scanning telemetry	410 for each 2×12.5 kHz channel used in a base station splitter that is not subject to national channel measure; 7,920 for each national channel (2×12.5 kHz)

⁵¹<https://www.legislation.gov.uk/ukpga/2003/21/section/400>

⁵²<https://www.ofcom.org.uk/siteassets/resources/documents/about-ofcom/how-ofcom-is-run/annual-reports/plans-and-financial-reporting/tariff-tables/ofcom-tariff-tables-2024-25.pdf?v=320681>

⁵³<https://www.legislation.gov.uk/uksi/2020/1068/contents/made>

⁵⁴ <https://www.legislation.gov.uk/uksi/2021/1117/regulation/2/made>, <https://www.legislation.gov.uk/uksi/2021/1412/contents/made>

⁵⁵<https://www.legislation.gov.uk/uksi/2022/1310/contents/made>

⁵⁶<https://www.legislation.gov.uk/uksi/2023/400/made/data.pdf>

⁵⁷<https://www.legislation.gov.uk/ukpga/2006/36/contents>

⁵⁸ Sp = spectrum price (a fixed amount of GBP 88 per 2×1 MHz bandwidth for each coordinated two-way fixed link), Bwf = bandwidth factor, Bf = band factor, Plf = path length factor, Avf = availability factor

Fixed Wireless Access (FWA) network

Table 60: Charges for the Fixed Wireless Access (FWA) network

Service	Fee (GBP)
Fixed Wireless Access (FWA) network (3.5, 3.6, 10 GHz—Guernsey, Isle of Man, Jersey)	5,000 ⁵⁹
Access to radio spectrum (3.9 GHz) ⁶⁰	8,436 for each 1 MHz national slot in the 3925.0–4009.0 MHz band, where coordination with earth stations is required 2,226 for each 1 MHz national slot in the 3925.0–4009.0 MHz, where coordination with earth stations and fixed links is required
Fixed wireless access network (5.8 GHz)	1 per terminal (minimum charge of 50)
Fixed wireless access network (28 GHz, Guernsey)	1,800 per channel (2 × 112 MHz)
Fixed wireless access network (28 GHz Isle of Man)	2,133 per channel (2 × 112 MHz)
Fixed wireless access network (28 GHz Jersey)	2,533 per channel (2 × 112 MHz)

4.13.2 Satellite services

Satellite services

Table 61: Fees for satellite services:

Service	Fee (GBP)
Global Navigation Satellite System (GNSS) – Repeaters	75
2 GHz network	For each base station, the following amount is payable for 2 × 1 MHz in the 1980–2010 MHz and 2170–2200 MHz bands: • 64,000 in a densely populated area • 8,025 in areas with a medium population density • 825 in sparsely populated areas For each base station using 2 × 15 MHz in the 1980–2010 MHz and 2170–2200 MHz bands, the following fee applies: • 960,000 in densely populated areas • 120,375 in areas with a medium population density • 12,375 in sparsely populated areas
Satellites (Earth Station Network)	200, for each terminal requiring technical coordination from OFCOM 200
Satellites (Earth Station – satellite service without a fixed connection)	500
Satellites (Earth station—other than geostationary)	500
Satellite (Permanent earth station) ⁶¹	$AS = \sum_{bands} [28 \times BF_{band} \times \sqrt{\sum_{pathsband} (P_{path} \times BW_{path})}]$
Satellite (Portable earth station)	200 – 7,400 (depending on the frequency band and maximum operating power)
Satellites (Complementary ground components of a satellite mobile system)	554,400 per channel of 2 × 1 MHz

4.13.3 Mobile service

Mobile service

Most mobile spectrum licences are still in the initial periods granted under the licensing processes and are not subject to further spectrum fees until these periods expire. For other licences, an annual fee has been calculated to reflect opportunity costs (or market values, where applicable) where there is excess demand for spectrum.

⁵⁹ The licence is valid for 60 months

⁶⁰ <https://www.legislation.gov.uk/uksi/2022/1310/regulation/2/made>

⁶¹ Details of the calculation formula: <https://www.ofcom.org.uk/siteassets/resources/documents/manage-your-licence/satellite-earth-stations/guidance/fees.pdf?v=330683>

Table 62: Charges for mobile cellular services:

Service	Fee amount (GBP)
412 MHz band (412.0 – 414.0 MHz and 422.0 – 424.0 MHz)	396,000 for each licence to use a 1 MHz national channel
900 MHz band ⁶²	1,093,000 per MHz before CPI adjustment
1,800 MHz band ⁶³	805,000 per MHz before CPI adjustment
2,100 MHz band ⁶⁴	560,000 per MHz before CPI adjustment
3.5 GHz band ⁶⁵	435,000 per MHz before CPI adjustment
10 GHz band	5,676 for each licence to use a national 2 x 1 MHz channel
28 GHz band	$R \times (LA / RA)^{66}$
32 GHz band	3,432 for each licence to use a 2 x 1 MHz national channel

Ofcom assesses its approach to setting annual fees in the following steps: It estimates the flat-rate market value of spectrum bands in the United Kingdom that have been auctioned in recent years and takes into account auction prices for spectrum bands in European countries, from which it derives the relative value of spectrum in these reference countries for the United Kingdom. It uses these relative values in combination with internal estimates of market value in the UK to derive a set of reference values for the flat-rate market value in the UK. Using these comparisons, it assesses the flat-rate market value of spectrum in the UK. To convert the lump-sum value into an equivalent annual payment, it uses an annual rate derived from the after-tax discount rate, which takes into account the degree of risk-sharing between licence holders and the government, and a tax adjustment factor that reflects the more favourable tax treatment of annual fees compared with lump-sum auction payments. Taking into account its statutory obligations, the regulator also considers the likely impact of the level of these fees and the reasons for setting a different fee level.

Public wireless network

Table 63: Fees for the public wireless network:

Service	Fee amount (GBP)
Public wireless network (Guernsey, Jersey, Isle of Man)	80 per channel or 100 kHz slot

4.13.4 Access to the radio spectrum

Table 64: Fees for access to the radio spectrum:

Service	Fee (GBP)
Access to radio spectrum (Extremely High Frequency) ⁶⁷	75 ⁶⁸
Local access	950
Shared access to radio spectrum (Low power)	80 for each authorisation to use a 2 x 3.3 MHz channel in the 1800 MHz band 80 for each licence to use a 10 MHz channel in the 2390–2400 MHz band 80 for each 10 MHz channel for use in the 3.8–4.2 GHz band; 320 for each licence to use the 26 GHz band
Shared access to the radio spectrum (medium power)	80 for each authorisation to use a 2 x 3.3 MHz channel in the 1800 MHz band 80 for each authorisation to use a 10 MHz channel in the 2390–2400 MHz band 80 for each 10 MHz channel for use in the 3.8–4.2 GHz band

⁶²<https://www.legislation.gov.uk/uksi/2018/1368/contents>

⁶³<https://www.legislation.gov.uk/uksi/2018/1368/contents>

⁶⁴<https://www.legislation.gov.uk/uksi/2021/1412/contents/made>

⁶⁵<https://www.legislation.gov.uk/uksi/2019/1004/made>

⁶⁶ R = fee for a 2 x 1 MHz channel in the region in question, LA = area of the relevant area specified in the licence, RA = total area of the region in which the relevant area specified in the licence is located

⁶⁷<https://www.legislation.gov.uk/uksi/2022/1310/regulation/2/made>

⁶⁸ Licence valid for 60 months

5 Analysis of fees in the Czech Republic and their comparison with selected EU countries

The current fee policy of the Czech Republic is governed by Government Regulation No. 154/2005 Coll. on the determination of the amount and method of calculation of fees for the use of radio frequencies and numbers, specifically its current version in force from 1 January 2023.⁶⁹ This Regulation was issued pursuant to the enabling provision of Section 150(1) of Act No. 127/2005 Coll. on Electronic Communications and on Amendments to Certain Related Acts (the Electronic Communications Act) to implement Section 24(5) and Section 37(2) of the relevant Act.

The latest amendment to the Government Regulation sets the levels of fees for the use of radio frequencies for fixed services, primarily in bands that allow the use of wider radio channels, thereby increasing data transmission capacity and speed. The current version has amended certain previous aspects of the calculations.

5.1 Overview of the current fee policy in the Czech Republic

Section 24(2) of the Electronic Communications Act sets limits on the annual amount of fees for individual radio communications services:

Table 65: Limits on the annual amount of fees:

Service	Limits on annual fee amounts
Land mobile service	CZK 1,000 – 8,000,000 per allocated radio spectrum frequency band of up to 5 MHz in width, depending on the width of the frequency band used, the parameters of the radio equipment and the size of the service area; in the case of a frequency band wider than 5 MHz, the upper limit of the fee is proportionally higher
Fixed service	CZK 300 – 1,200,000 per allocated frequency band in the radio spectrum, depending on the utilised bandwidth, the type of radio link, the type of frequency band and the parameters of the radio equipment
Broadcasting service (radio broadcasting)	CZK 375–180,000 per allocated frequency band in the radio spectrum, depending on the type of frequency band and radio broadcasting, and on the parameters of the radio equipment
Broadcasting service (television broadcasting)	CZK 375 – 18,000,000 per allocated frequency band in the radio spectrum, depending on the type of frequency band and television broadcasting, and on the parameters of the radio equipment
Satellite service	CZK 1,000 – 180,000 per allocated frequency segment of the radio spectrum, depending on the frequency band width used and the technology enabling the efficient use of the frequency band through the selection of a free frequency channel or multiple access to that channel
Other radiocommunication services	CZK 1,200 – 250,000 per allocated frequency band in the radio spectrum, depending on the parameters of the radio equipment and the size of the service area

For each type of service, in accordance with the Annex to the Government Regulation, a specific formula is used to calculate the annual fee, ensuring that the amount is fair and reasonable. The fee for the use of radio frequencies for experimental purposes amounts to 1 per cent of the fee for the use of radio frequencies for commercial purposes. If the amount of the fees determined in this way is lower than or higher than the limits set out in the Electronic Communications Act, the fee shall correspond to the limit which it falls short of or exceeds. Furthermore, no fee is payable for the use of radio frequencies for experimental purposes where the fee is less than 100 CZK.

Fees for the use of radio frequencies are payable within 15 days of the date on which the individual authorisation for their use becomes legally binding, and thereafter on 31 January of each year for the duration of the validity of such authorisations.

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⁶⁹ <https://www.zakonyprolidi.cz/cs/2005-154>, latest version 408/2022 Coll.

5.1.1 Land Mobile Service

Nationwide radio networks

Calculation: $C = S1 \times K1 \times$

K16

C = Fee for the use of 1 radio frequency

S1 = Rate per 1 kHz of utilised frequency bandwidth – 1,600 CZK

K1 = Coefficient of utilised frequency bandwidth

- This coefficient is calculated from the width (in kHz) of one frequency channel, which is equal to the channel spacing within the frequency band in use.
- $K1 = 1 \times \text{bandwidth [in kHz]}$ – for frequencies outside the 380–385 / 390–395 MHz frequency band
- $K1 = 0.25 \times \text{bandwidth [in kHz]}$ – for frequencies within the 380–385 / 390–395 MHz frequency band

K16 Frequency band coefficient

Table 66: K16 coefficient:

Coefficient K16	Frequency band
1	$f < 1 \text{ GHz}$
0.7	$1 \text{ GHz} \leq f < 2.2 \text{ GHz}$
0.2	$2.2 \text{ GHz} \leq f < 24 \text{ GHz}$
0.02	$f \geq 24 \text{ GHz}$

Regional and local radio networks

These networks refer to radio networks in which radio frequencies may be used by radio equipment within a defined area of the Czech Republic.

Regional networks use the same calculation as nationwide radio networks; the only difference is that the resulting value is multiplied by the regional coverage coefficient. This takes into account the extent of the territory over which the entity provides publicly available electronic communications services.

Calculation: $C = S1 \times K1 \times K16 \times Kr$

Kr = Regional network coverage coefficient

$Kr = \text{POP}_{\text{Reg}} / \text{POP}_{\text{CR}}$

- POP_{Reg} = the population of the region or locality specified in the allocation conditions
- POP_{CR} = the population of the Czech Republic

Other radio networks

Calculation: $C = Ca + Cb$

C = Fee for the use of a single radio frequency

Ca = Fee for the use of a radio frequency transmitted by mobile radio equipment within the service area, which depends on the size of the service area and the radiated power of the mobile radio equipment.

Cb = Fee for the use of a frequency transmitted by fixed radio equipment, which depends on the radiated power of the individual fixed radio equipment.

Calculation of the **Ca** fee:

The fee is assessed regardless of the number of mobile radio devices in the network. For the purposes of calculating the fee, the service area for a given radio frequency is defined as the geographical area determined by the geographical coordinates of the centre of the area and its radius (the maximum distance of mobile radio equipment from the centre of the geographical area within which it may be operated). The coverage area is determined on the basis of the technical parameters of the radio network, taking into account the need to ensure the uninterrupted operation of other radio networks. The Office may determine the coverage area if it has not been established in accordance with the above-mentioned parameters.

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For the purposes of coordination between the core components of the integrated rescue system on the dedicated coordination radio frequencies defined in the Radio Spectrum Utilisation Plan, the coefficient K2 is set at 1, regardless of the size of the service area's radius.

The calculation of the Ca fee shall also apply to fixed electronic communications equipment in remote control and signalling networks.

Calculation: $C_a = S_2 \times K_1 \times K_2 \times K_3 \times K_{16}$

where:

S2 Rate per 1 kHz of utilised frequency band width = 100 Kč

K1 Coefficient for the utilised frequency bandwidth ($K_1 = 1$ for 1 kHz)

This coefficient is calculated from the width (in kHz) of a single frequency channel, which is equal to the channel spacing in the utilised frequency band.

K2 Coefficient of the radius of the service area

Table 67: Coefficient K2:

Radius of the service area	Coefficient K2
Radius up to and including 5 km	1.5
Radius over 5 km up to and including 25 km	2
Radius over 25 km up to and including 70 km	5
Radius over 70 km up to and including 150 km	11
Radius over 150 km	15

K3 Coefficient of radiated power for mobile radio equipment

- $K_3 = 1$ up to and including 10 W of the permitted maximum effective radiated power
- $K_3 = 2$ for permitted maximum effective radiated power exceeding 10 W

K16 Frequency band coefficient

Table 68: K16 coefficient:

Frequency band	K16 coefficient
$f < 1$ GHz	1
$1 \text{ GHz} \leq f < 2.2 \text{ GHz}$	0.7
$2.2 \text{ GHz} \leq f < 24 \text{ GHz}$	0.2
$f \geq 24 \text{ GHz}$	0.02

Calculation of the Cb fee:

Calculation: $C_b = S_2 \times K_1 \times K_4 \times K_{16}$

where:

S2: Rate per 1 kHz of utilised frequency band width

K1 see above

K4 The sum of the power coefficients of individual fixed radio installations using the frequency in the service area, increased by a factor of 1.5.

$$K_4 = 1,5 + \sum_{i=1}^n X_i$$

where:

n the number of individual fixed radio installations

Xi is the power coefficient of the maximum effective radiated power P (e.r.p.) of an individual fixed radio installation

Table 69: Coefficient Xi:

Maximum effective radiated power P	Coefficient Xi
$P \leq 1 \text{ W}$	0.05
$1 \text{ W} < P \leq 5 \text{ W}$	0.10
$5 \text{ W} < P \leq 10 \text{ W}$	0.15
$10 \text{ W} < P \leq 20 \text{ W}$	0.50
$P > 20 \text{ W}$	1.00

K16 see above

Specific charging methods

National systems for the provision of wireless broadband electronic communications services in the 24.25–27.5 GHz and 40.5–43.5 GHz frequency bands.

CZK per year, calculated as follows:

$$C = \sum_{i=1}^n S4_i$$

where

C is the fee for the use of one radio frequency

n is the number of individual base stations

S4 is the fee for the use of a radio frequency by individual base stations, depending on the allocated bandwidth

Table 70: S4 fee in CZK by bandwidth

Bandwidth (MHz)	$0 < x \leq 200 \text{ MHz}$	$200 < x \leq 400 \text{ MHz}$	$400 < x \leq 600 \text{ MHz}$	$600 < x \leq 800 \text{ MHz}$	$800 < x \leq 1,000 \text{ MHz}$
S4 fee (CZK)	3,000	6,000	9,000	12,000	15,000

Complementary Ground Components of the mobile satellite service system in the 1980–2010 MHz and 2170–2200 MHz bands

$$C = S5 \times K5 \text{ CZK}$$

where:

C is the fee for the use of radio frequencies by a single base station of the complementary ground components (Complementary Ground Components) of the satellite mobile service system utilising radio frequencies in the 1980–2010 MHz and 2170–2200 MHz bands, through which a public electronic communications network is provided exclusively on board aircraft.

S5 Rate per 1 MHz of utilised frequency bandwidth = 13,500 CZK

K5 Frequency band width coefficient, which is equal to the number of MHz corresponding to the width of the frequency band occupied by the transmission.

5.1.2 Fixed service

$$\text{Calculation: } C = S3 \times K9 \times K10 \times K15$$

C = Fee for the use of a single radio frequency

S3 = Rate per radio frequency, depending on the type of radio relay link, frequency band and occupied frequency band width

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a) Point-to-point radio relay link

Table 71: Fees in the Czech Republic for point-to-point radio links

Sazba S3 za rádiový kmitočet v Kč	0 MHz < šp <= 5 MHz	5 MHz < šp <= 10 MHz	10 MHz < šp <= 20 MHz	20 MHz < šp <= 30 MHz	30 MHz < šp <= 60 MHz	60 MHz < šp <= 100 MHz	100 MHz < šp <= 150 MHz	150 MHz < šp <= 200 MHz	200 MHz < šp <= 300 MHz	300 MHz < šp <= 400 MHz	400 MHz < šp <= 500 MHz	šp > 500 MHz
f <= 1 GHz	1500	1000	2000	3000	3500		5600					
1 GHz < f <= 3 GHz	5000	10000	20000	30000	35000		56000					
3 GHz < f <= 16 GHz	4000	8000	16000	24000	28000	36000	44800	60000	79200	108000	146400	204000
16 GHz < f <= 24 GHz	3000	6000	12000	18000	21000	27000	33600	45000	59400	81000	109800	153000
24 GHz < f <= 35 GHz	2500	5000	10000	15000	17500	22500	28000	37500	49500	67500	91500	127500
35 GHz < f <= 40 GHz	2000	4000	8000	12000	14000	18000	22400	3000	39600	54000	73200	102000
40 GHz < f <= 47 GHz	1000	2000	4000	6000	10000	12900	16000	21600	28200	38700	52200	72900
47 GHz < f <= 55 GHz	600	1300	2500	3800	6300	8100	10000	13500	17700	24300	32700	45600
55 GHz < f <= 66 GHz	100	300	500	800	1300	1500	2000	2700	3600	4800	6600	9300
f > 66 GHz	600	1300	2500	3800	6300	8100	10000	13500	17700	24300	32700	45600

Source: ČTÚ

b) Point-to-multipoint radio relay link (1 control station)

Table 72: Fees in the Czech Republic for point-to-multipoint radio relay links

Sazba S3 za rádiový kmitočet v Kč	0 MHz < šp <= 5 MHz	5 MHz < šp <= 10 MHz	10 MHz < šp <= 20 MHz	20 MHz < šp <= 30 MHz	30 MHz < šp <= 60 MHz	60 MHz < šp <= 100 MHz	100 MHz < šp <= 150 MHz	150 MHz < šp <= 200 MHz	200 MHz < šp <= 300 MHz	300 MHz < šp <= 400 MHz	400 MHz < šp <= 500 MHz	šp > 500 MHz
f <= 1 GHz	1250	2500	5000	7500	8750		14000					
1 GHz < f <= 3 GHz	12500	25000	50000	75000	87500		140000					
3 GHz < f <= 16 GHz	10000	20000	40000	60000	70000	87600	112000	147600	195600	267600	363600	507600
16 GHz < f <= 24 GHz	7500	15000	30000	45000	52500	66000	84000	110700	146700	200700	272700	380700
24 GHz < f <= 35 GHz	6250	12500	25000	37500	43750	55200	70000	92400	122400	167400	227400	317400
35 GHz < f <= 40 GHz	5000	10000	20000	30000	35000	45600	56000	73800	97800	133800	181800	253800
40 GHz < f <= 47 GHz	2500	5000	10000	15000	25000	31500	40000	52800	69900	95700	129900	181200
47 GHz < f <= 55 GHz	1500	3250	6250	9500	15750	19800	25000	33000	43800	59700	81300	113400
55 GHz < f <= 66 GHz	250	750	1250	2000	3250	4200	5000	6600	8700	12000	16200	22800
f > 66 GHz	1500	3250	6250	9500	15750	19800	25000	33000	43800	59700	81300	113400

Source: ČTÚ

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K9 = Output power coefficient Q of the equipment used

Table 73: Values of the K9 coefficient according to output power

Coefficient K9	Output power Q of the equipment used
K9 = 0.25	$Q \leq 0$ dBm
K9 = 0.4	$0 \text{ dBm} < Q \leq 10 \text{ dBm}$
K9 = 0.6	$10 \text{ dBm} < Q \leq 20 \text{ dBm}$
K9 = 0.8	$20 \text{ dBm} < Q \leq 30 \text{ dBm}$
K9 = 1	$30 \text{ dBm} < Q \leq 40 \text{ dBm}$
K9 = 1.5	$Q > 40 \text{ dBm}$

K10 Output power control coefficient of the radio equipment used:

- K10 = 0.8 output power control system used
- K10 = 1: output power control system not used

K15 Cross-polarisation coefficient

- K15 = 1.25 cross-polarisation used
- K15 = 1 cross-polarisation not used

For MWS (multimedia wireless systems) of the point-to-multipoint configuration, in the case of two-way radio operation of such a system, fees are assessed under the fixed service category even if part of the service provided is of a broadcasting nature.

Fees for the use of frequencies by fixed-service radio equipment operating at frequencies up to and including 1 GHz shall be calculated in accordance with the formula for the land mobile service.

5.1.3 Broadcasting service

Calculation: $C = S4 \times V^2 \times K11$

C = Fee for the use of one radio frequency

S4 = Rate per radio frequency = 1 Kč

V = Average effective radiated power at the frequency used, in dBW, rounded down to the nearest whole number. It is determined as 1/36 of the sum of the permitted radiated powers in directions at intervals of ten degrees, starting from zero degrees. For an average effective radiated power less than or equal to 5 dBW, $V = 5$. In shortwave radio bands, V is equal to the transmitter's output power in dBW.

K11 = Transmission type coefficient

Table 74: Values of the K11 coefficient by type of transmission

K11 coefficient	Type of transmission
K11 = 10	Digital radio broadcasting on radio frequencies up to and including 30 MHz
K11 = 15	AM radio broadcasting
K11 = 30	FM radio broadcasting
K11 = 30	Digital radio broadcasting on radio frequencies above 30 MHz
K11 = 50	MWS systems
K11 = 250	Digital television broadcasting

Determination of the fee for digital television broadcasting via a single-frequency network

In the case of digital television broadcasting via a transmitter with a maximum effective radiated power (ERPmax) of less than 27 dBW, which is used as part of a single-frequency network, C is always 420 Kč.

Note No. 1:

In short-wave radio bands, the use of a single radio frequency means the right to use any of the radio frequencies utilised under an individual licence for the use of radio frequencies.

Note 2:

MWS (multimedia wireless systems) in the categories MMDS (multipoint multichannel distribution system), MVDS (multi-channel video distribution system) or LMDS (local multi-point distribution system) are defined as systems operating in a point-to-multipoint configuration, provided that radio traffic within the system is unidirectional only; consequently, fees are levied under the radio service category.

5.1.4 Satellite service

Calculation: $C = S5 \times K12 \times K13 \times K14$

C Fee for the use of one radio frequency by a terrestrial station

S5 = Rate per 1 MHz of frequency bandwidth occupied by transmission = 2,500 CZK

K12 = Coefficient for the bandwidth occupied by transmission

- K12 = 4 for a bandwidth ≤ 4 MHz
- K12 for a bandwidth > 4 MHz is equal to the number of MHz corresponding to the frequency bandwidth occupied by the transmission

K13 = Coefficient for the use of multiple access technology

- K13 = 0.1 when multiple access technology is used
- K13 = 1 if multiple access technology is not used

K14 = Frequency band coefficient

Table 75: Value of coefficient K14 by frequency band

Coefficient K14	Frequency band
K14 = 1	for $f \leq 14.8$ GHz
K14 = 0.8	for $14.8 \text{ GHz} < f \leq 21.2$ GHz
K14 = 0.4	for $21.2 \text{ GHz} < f \leq 24.45$ GHz
K14 = 0.2	for $24.45 \text{ GHz} < f \leq 31$ GHz
K14 = 0.1	for $31 \text{ GHz} < f \leq 86$ GHz
K14 = 0.05	for $f > 86$ GHz

5.1.5 Other radiocommunication services

Aeronautical mobile service and maritime mobile service

Calculation: $C = S6 \times K14$

C = Fee for the use of a single radio frequency

S6 = Rate for the use of a radio frequency by one aeronautical station or airborne station, or one coastal station or shipborne station = 1,200 CZK

K14 = Output power coefficient Q of the equipment used:

Table 76: Values of coefficient K14 by frequency band

Coefficient K14	Frequency band
K14 = 1	$Q \leq 14$ dBW (25 W)
K14 = 2	$14 \text{ dBW (25 W)} < Q \leq 20 \text{ dBW (100 W)}$
K14 = 4	$20 \text{ dBW (100W)} < Q \leq 27 \text{ dBW (500W)}$
K14 = 8	$Q > 27 \text{ dBW (500W)}$

Note:

a) For the purposes of calculating charges, the equipment used by ship and aircraft stations refers only to the main transmitter. Other transmitting equipment forming part of an aircraft or ship station is not taken into account. If only radio transmitting equipment for the safety service is on board an aircraft or ship, charges shall be calculated on the basis of such equipment;

b) the use of a radio frequency by ship and aircraft stations means the authorisation to use all radio frequencies allocated to these services by international treaties to which the Czech Republic is bound,

c) fees are also levied under category E.1 for the use of radio frequencies by stations of the radiotelephone service on inland waterways.

Radar service

Fee for the use of a single radio frequency by a single radio location facility for the purposes of:

Table 77: Fee amounts for the radiolocation service by type

Type of radiolocation service	CZK per year
Primary radar (PSR)	CZK 50,000
Secondary radar (SSR)	CZK 50,000
Meteorology in bands up to and including 5.85 GHz (for power ≥ 100 kW)	30,000 CZK
Meteorology in bands up to and including 5.85 GHz (for power < 100 kW)	6,000 CZK
Meteorology in bands above 5.85 GHz and up to and including 30 GHz	10,000 CZK
Meteorology above 30 GHz	6,000 CZK
Development and testing of radar equipment	6,000 CZK
other radar applications	6,000 CZK

Radio navigation service

The fee for the use of a single radio frequency by a radio navigation device is set at 6,000 CZK per year. **Earth**

observation, space research and radio astronomy radio communication services. The fee for the use of a single radio frequency for which protection against interference is required is set at:

- At 1,200 CZK per individual location;
- For the whole territory of the Czech Republic at 6,000 CZK.

5.2 Quantification of fee amounts in the Czech Republic for 2023

In its annual report for 2023, the Czech Telecommunications Office published the amounts of fees collected in accordance with Government Regulation No. 154/2005 Coll. The total amount of fees for the use of radio frequencies in 2023 exceeded one billion crowns; the exact figure was 1,176,118,808 CZK. According to the CTU's statistics, this represents a slight increase compared with 2022, which was primarily due to higher fee collections for the use of frequencies in the land mobile service, following the ongoing development of next-generation public broadband networks in new frequency bands. However, higher fee collections were also recorded in other services.⁷⁰

Table 78: Overview of fees collected in 2023 for the use of radio frequencies by individual radiocommunication services

Radiocommunication service	Fees collected	Share of total
Land mobile service	CZK 836,928,880	71.16%
Fixed service	CZK 245,620,252	20.88%
Radio service	CZK 83,498,887	7.10%
Satellite service	3,503,368 CZK	0.30%
Aviation	CZK 1,923,234	0.16%
Other (Radar / Radio navigation)	CZK 4,010,304	0.34%
Maritime	633,883 CZK	0.05%
Total	1,176,118,808 CZK	100%

*The amount of fees collected does not take into account the contribution to the Radiocommunications Account or the amount of refunds.

In addition to fees for the use of radio frequencies, the CTU collected a further sum of more than 24 million CZK in administrative fees. These fees are collected in accordance with Directive 2018/1972 of the European Parliament and of the Council.

⁷⁰<https://ctu.gov.cz/rok-2023-0>

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The following table contains data on the total amount of fees collected for the use of radio frequencies in accordance with Government Regulation No. 154/2005 Coll. for the years 2013–2023.

Table 79: Fees for the use of radio frequencies collected by the Czech Telecommunications Office (ČTÚ) in the years 2013–2023

Year	Fees collected (CZK million)	Overpayments refunded to licence holders (CZK million)	Transfer to the Radiocommunications Account (CZK million)
2013	1,063.6	28.9	60
2014	1,060.97	55.94	56.93
2015	1,102.54	25.58	63.44
2016	1,122.1	24.5	64.48
2017	1,160.23	31.19	304.67
2018	1,159.22	93.92	326.67
2019	1,008.71	59.58	305.41
2020	1,015.83	43.04	265.95
2021	1,024.39	19.73	59.71
2022	1,097.18	17.56	61.23
2023	1,176.12	24.14	68.4

The Czech Telecommunications Office (ČTÚ) transfers funds amounting to 6 per cent (in the previous version of the regulation, this was temporarily set at 30 per cent for the years 2017 to 2020) of the fees collected for the use of radio frequencies to the radio communications account.⁷¹

5.3 Comparison of fee levels in the Czech Republic with selected EU countries

The following table provides a further comparison of the levels of fees collected in the countries subject to a more detailed analysis in this study (and for which it was possible to obtain at least some data on selected fees for spectrum management or use), in relation to population size, relative GDP per capita and the state of 5G roll-out. It should be noted, however, that the amounts of fees collected are not defined uniformly in the data provided by national (regulatory) authorities. In some cases, they also include proceeds from licence auctions. In isolated cases, the relevant accounting period also differs, not necessarily corresponding to the standard calendar year from 1 January to 31 December. Nevertheless, even taking the above-mentioned inconsistencies into account, it can be stated that the level of fees for the use (plus management) of spectrum in the Czech Republic is in line with the European average.

- In 2022, Denmark collected DKK 560.6 million, including revenue from spectrum auctions and numbering administration.⁷²
- The Slovenian regulatory authority's revenue from spectrum management amounted to EUR 3.5 million in 2022, representing an increase of almost 50 per cent compared with 2021, when approximately EUR 2.36 million was collected.⁷³
- According to its annual report, the Luxembourg regulatory authority collected EUR 5.62 million in spectrum usage fees in 2023, which is EUR 68,000 more than in the previous year (EUR 5.55 million).⁷⁴
- In 2022, the Polish regulatory authority collected PLN 1,625.91 million in fees for the right to use spectrum.⁷⁵
- In Hungary, revenue from spectrum usage fees was projected at approximately 30.82 billion HUF for 2022.⁷⁶
- In its annual report covering the period from 1 July 2022 to 30 June 2023, the Irish regulatory authority reports revenue of EUR 163.05 million from spectrum usage fees and EUR 52.38 million from licence fees (auctions).⁷⁷
- Revenue from 'electromagnetic compatibility' services provided by the Latvian company VAS Elektroniskie sakari amounted to EUR 7.43 million in 2023.⁷⁸
- Revenue from radio spectrum licences in Cyprus exceeded EUR 2.25 million in 2022.⁷⁹

⁷¹ Pursuant to Government Regulation No. 153/2005 Coll. on determining the method and amount of funds allocated to the radio communications account and the method of their utilisation, as amended by Regulation No. 42/2017 Coll.

⁷²<https://sdfi.dk/Media/638150877665628114/%C3%85rsrapport%202022.pdf>

⁷³https://www.akos-rs.si/fileadmin/user_upload/dokumenti/O_agenciji/AKOS_OBLIKOVANO_letno_porocilo_2022_ANG.pdf

⁷⁴<https://assets.ilr.lu/Documents/ILRLU-1797567310-350.pdf>

⁷⁵ Report on the activities of the President of UKE for

2022 ⁷⁶<https://net.jogtar.hu/jogszabaly?docid=a2100127.tv77https://www.comreg.ie/media/2024/07/ComReg-Annual-Report->

[2022-2023-Combined-Report.pdf](https://www.vases.lv/sites/default/files/2024-2022-2023-Combined-Report.pdf)⁷⁸ <https://www.vases.lv/sites/default/files/2024->

07/GadaParskats_2023.pdf⁷⁹https://www.gov.cy/media/sites/13/2024/06/FINAL_DMRID-JUL-

BROCHURE-04-08-2023.pdf

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- In 2022, the French regulatory authority Arcep collected EUR 832.64 million in spectrum usage fees (including those collected as part of the so-called 5G auctions). This amount includes EUR 7.93 million for the National Life Insurance Fund (CNAV).⁸⁰
- Germany's planned budget for 2022⁸¹ was as follows: fees under the Telecommunications Act (TKG) €36.36 million; fees and contributions under the Electromagnetic Compatibility Act (EMVG), the Radio Equipment Act (FuAG) and the Act on Market Surveillance and Product Conformity (MüG) EUR 11.65 million, fees under the Amateur Radio Ordinance (AFuV) EUR 0.08 million.
- According to its 2022 annual report, the Slovak regulatory authority collected EUR 13.84 million in recurring fees.⁸²
- According to its annual report for the period 2022/23, the UK regulatory authority Ofcom collected GBP 66.17 million in licence, regulatory and administrative fees.⁸³

Table 80: Comparison of fee levels in the Czech Republic with selected EU countries and the United Kingdom

Country	Population (millions) 2024 ⁸⁴	Selected spectrum usage fees (2022) in millions of CZK	Selected spectrum usage fees per capita (2022, CZK)	5G penetration (DESI 2024 index) ⁸⁵	GDP per capita (2023, USD) ⁸⁶
Czech Republic	10,736	1,200 ⁸⁷	111.8	94.60%	30,427
Denmark	5,977	1,883 ⁸⁸	315.0	100.00%	67,967
Slovenia	2,119	88	41.5	82.13%	32,163
Luxembourg	0.673	139	206.5	99.60%	128,259
Poland	38,539	9,536	247.4	71.92%	22,112
Hungary	9,676	1,963 ⁸⁹	202.9	83.70%	22,157
Ireland	5,255	4,084 ⁹⁰	777.2	85.32%	103,684
Latvia	1,872	186	99.4	53.11%	23,184
Cyprus	1.358	57	41.97	100.00%	34,701
France	66.549	20,858 ⁹¹	313.4	93.21%	44,460
Germany	84,552	1,205	14.3	98.14%	52,745
Slovakia	5,507	347	63.0	79.03%	24,470
United Kingdom	69,138	2,007 ⁹²	28.6	Approx. 90 % ⁹³	48,866

An interesting comparison of the burden of spectrum acquisition and usage costs in European countries⁹⁴ relative to mobile operators' revenues is provided by a study commissioned by the Dutch operator KPN. This study was prepared in 2021 for the Dutch Ministry of Economic Affairs as part of a consultation on the 3.6 GHz band auction.⁹⁵ In July 2024, its conclusions were updated and its methodology was also made available in a brief summary.⁹⁶ The findings show that in 2024, the ratio of spectrum costs (including all bands providing mobile communications services) to operators' revenues from mobile services rose to 7.9 per cent from 7 per cent in 2021. The Netherlands recorded the second-highest ratio at 14.8 per cent, whilst the Czech Republic is at the opposite end of the scale, where spectrum costs relative to revenues are among the lowest, at around 5 per cent. The lowest ratio was recorded in Finland, where it stood at less than 2 per cent.

⁸⁰ https://web.archive.org/web/20230626184930/https://www.arcep.fr/uploads/tx_gspublication/RA-2023_TOME1_marches-regules_juin2023.pdf

⁸¹ <https://www.bundeshaushalt.de/static/daten/2022/soll/BHH%202022%20gesamt.pdf>

⁸² https://www.teleoff.gov.sk/files/urad/vyrocnne-spravy-vestniky/vyrocnne-spravy/53323_vyrocnna-sprava-2023-eng.pdf?csrt=15446710979313302838

⁸³ <https://www.ofcom.org.uk/siteassets/resources/documents/about-ofcom/how-ofcom-is-run/annual-reports/plans-and-financial-reporting/annual-reports/annual-report-2022/23/english/22-23-annual-report.pdf?v=329864>

⁸⁴ <https://www.worldometers.info/population/countries-in-europe-by-population/>

⁸⁵ https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/compare-countries-progress?indicator=desi_5gcov&breakdown=total_pophh&unit=pc_hh_all&country=BE,EU,AT,BG,HR (23 September 2024)

⁸⁶ https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?end=2023&name_desc=false&start=1960&view=chart

⁸⁷ Including administrative fees

⁸⁸ Including spectrum auctions and numbering administration

⁸⁹ Projected revenue

⁹⁰ From 1 July 2022 to 30 June 2023

⁹¹ Including 5G auctions

⁹² From 1 April 2022 to 31 March 2023

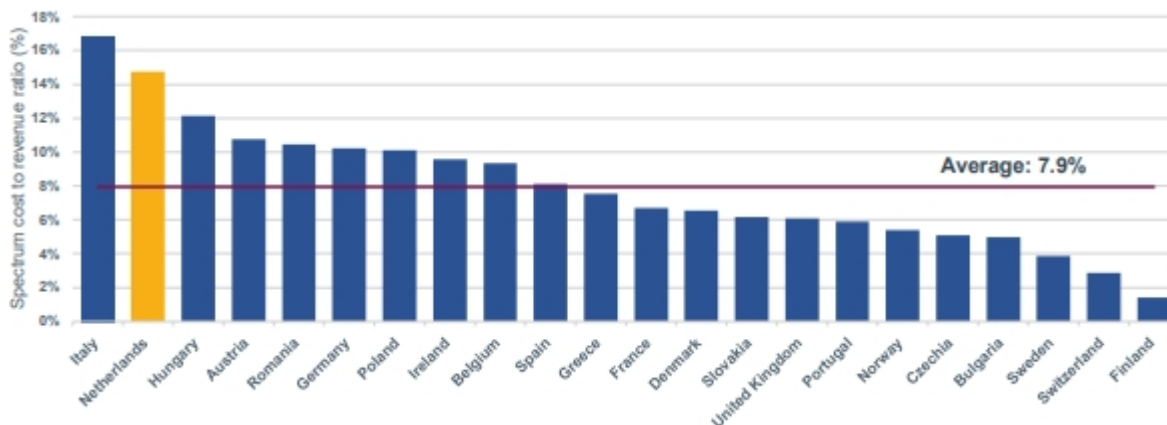
⁹³ <https://www.ofcom.org.uk/phones-and-broadband/coverage-and-speeds/connected-nations-update-spring-2024/>

⁹⁴ 22 countries, of which 19 were EU countries with a population of over 5 million, plus the United Kingdom, Norway and Switzerland.

⁹⁵ <https://www.aethaconsulting.com/wp-content/uploads/2024/07/A-European-benchmark-of-relative-spectrum-costs-23-June-2021-1.pdf>

⁹⁶ <https://www.aethaconsulting.com/wp-content/uploads/2024/07/Aetha-European-benchmark-of-relative-spectrum-costs-24-July-2024-3.pdf>

Chart 1: Ratio of spectrum costs to revenues (%)



Source: European benchmark of relative spectrum costs, Report for KPN by aetha

5.4 Analysis of the impact of fees on the development of 5G networks and other key services

The roll-out of 5G networks is currently one of the key technological objectives in many countries around the world. One of the fundamental factors influencing the pace and success of 5G implementation is, amongst other things, the fee policy associated with the use of radio spectrum. The level and structure of fees can either support or, conversely, significantly slow down investment in and the deployment of 5G networks. Spectrum usage fees represent a source of revenue for the state, but also a key tool for regulating access to the spectrum. In the context of 5G networks, auction models are commonly used, in which telecoms operators compete for the allocation of specific frequency bands. This model allows the price of spectrum to be set based on current demand, which is advantageous from the perspective of auction strategies. On the other hand, high auction prices may discourage the rapid roll-out of networks, as operators face high upfront costs, which affects their willingness to invest in infrastructure.

The impact of fees on 5G development is also evident in other key services that share or are adjacent to 5G spectrum, such as the Internet of Things (IoT), public safety networks or healthcare applications. The development of these services may be slowed down by high spectrum costs or a shortage of available frequencies. It is therefore important that the fee policy takes into account both the needs of 5G development and those of other services with high economic and social benefits. From a fee policy perspective, a combination of different models has proven to be an effective approach. For example, flexible fees for new technologies, alongside generic long-term fees for stable sectors, enable regulators to respond more effectively to market dynamics. In addition to pricing policy, it is crucial to ensure that frequency bands offering optimal characteristics for 5G's specific applications are made available. To realise the full potential of 5G, including support for high transmission speeds, low latency and stability, it is essential that bands with suitable bandwidths and characteristics are made available.

For the development of 5G networks and their adoption across various sectors, it is crucial that the terms and pricing for access to this technology are set in such a way that it is worth considering in the first place. One of the main prerequisites is setting a low yet fair price for access to the radio spectrum, which can attract interested parties without threatening market equilibrium or encouraging speculation. Such a pricing policy helps to create an environment in which businesses have a genuine incentive to consider deploying 5G rather than fibre-optic or other alternatives, which may in some cases be more cost-effective. Low spectrum fees are particularly crucial for the development of small and medium-sized enterprises, which would otherwise not consider 5G due to the high costs associated with auctions. For large operators, 5G spectrum acquired at auction may be affordable and network roll-out may be a lucrative investment, but for smaller players, the price of spectrum may be too high for them to participate at all. Yet it is precisely small and medium-sized enterprises that can play a key role in providing innovative services across sectors.

6 Specific issues relating to the CTU's fee policy

This chapter addresses specific issues that arose from discussions with representatives of the Czech Telecommunications Office (ČTÚ). It builds on the benchmark but examines specific areas in greater depth. It includes a number of proposals to amend the current method of fee collection, as well as comparisons with practices abroad to gain a different perspective on areas that may be the focus of the Czech regulator's attention in the near future.

6.1 Experimental / short-term use of spectrum

A specific aspect of the fee policy concerns authorisations for the use of spectrum for experimental and short-term purposes. This study examines the definition of experimental and short-term spectrum usage authorisations, as well as the level of fees in comparison with other countries.

6.1.1 The current state of legislation and fees in the Czech Republic

Definition of experimental purposes

Under Czech legislation, in accordance with Section 19b(2) of the Act, experimental purposes are defined as the use of radio frequencies for research, development and operational testing of new radio transmitting equipment, or for testing and determining the physical properties of radio wave propagation. The validity period of the authorisation is set at a maximum of 1 year (in specific cases up to 54 months), with the possibility of extending the validity period by 6 months. The authorisation permits the use of allocated frequencies exclusively for experimental purposes, without the possibility of commercial use.⁹⁷

Currently, the fee for the use of radio frequencies for experimental purposes amounts to **1 per cent of the fee for the use of radio frequencies as set out in the Annex to Government Regulation No. 154/2005 Coll.** The Czech Telecommunications Office (ČTÚ) also charges an administrative fee for carrying out the relevant procedure as described in the schedule of fees under the Act on Administrative Fees (note: this applies generally, not only to authorisations for experimental purposes). Under this authorisation, electronic communications services must not be provided for the purpose of direct or indirect economic or commercial gain, with the exception of pilot projects for the introduction of new technologies that are limited in time and geographical scope.⁹⁸

Definition of short-term use

Upon application, the Czech Telecommunications Office (ČTÚ) shall grant a short-term licence for the use of radio frequencies in accordance with Section 25 of the Act. The period of validity of a short-term licence for the use of radio frequencies cannot be extended. This licence is granted for the period strictly necessary, but for no longer than 15 days. A short-term authorisation is intended for one-off purposes that cannot be foreseen sufficiently in advance, in particular to ensure radio communications for the security escort of prominent persons, television and radio broadcasts of unexpected events, and geographically limited radio communications during the organisation of sporting and cultural and social events.⁹⁹

An applicant for a short-term authorisation is obliged to pay, and to provide proof of payment upon submission of the application, a one-off fee for the use of radio frequencies amounting to 3,000 CZK.¹⁰⁰

⁹⁷<https://portal.gov.cz/sluzby-vs/individualni-opravneni-kvyuzivani-radiovy-ch-kmitoctu-pro-experimentalni-ucely-S8704>

⁹⁸<https://www.zakonyprolidi.cz/cs/2005-127>

⁹⁹<https://portal.gov.cz/sluzby-vs/individualni-opravneni-kvyuzivani-radiovy-ch-kmitoctu-pro-experimentalni-ucely-S8704>

¹⁰⁰<https://www.zakonyprolidi.cz/cs/2005-127>

6.1.2 Access to experimental and short-term licences abroad

6.1.2.1 Denmark

The Danish Climate Data Agency issues licences for the use of frequencies for experimental purposes. Experimental licences are valid for up to one year, and the frequency fee is lower for experimental licences.¹⁰¹

A licence to use frequencies for experimental purposes is issued in accordance with the provisions of the Frequency Act relating to licences for experimental purposes. **The frequency licence fee is 600 DKK (approx. 2,000 CZK) for the 0–100,000 MHz band.**

6.1.2.2 Greece

The Authority grants temporary rights to use radio spectrum reserved for experimental, research, pilot, testing, demonstration or similar purposes. Rights to use radio spectrum for these purposes are granted on the basis of non-interference with existing systems or radio spectrum usage, where such exist. The use of these rights for the provision of electronic communications services to the public or for private purposes is prohibited.¹⁰²

An 80% discount shall be applied to the calculated fee in cases where the applicant does not carry out any commercial activity relating to the radio spectrum and the requested radio spectrum bands are not regulated by the EETT Regulation on the conditions for the use of the radio spectrum.

Temporary rights to use the radio spectrum are granted to cover time-limited events (e.g. sporting and cultural events). The maximum duration of a temporary right of use for short-term events is 2 months and may be extended once for a further 2 months.¹⁰³

Fees for a temporary right to use frequencies (short-term licence):

- **Fixed or mobile service stations, including special radio networks:** Frequency and site fee: EUR 60 for the first two days, EUR 10 for each subsequent day, up to a maximum of EUR 300.
- **Ground-based satellite stations (including SNG – Fly Away):** Siting fee: EUR 115 for the first two days, EUR 20 for each subsequent day, up to a maximum of EUR 1,000.

6.1.2.3 Ireland

Test licences apply exclusively to the testing of new or innovative radio equipment, spectrum usage or technologies, and may not be suitable if the applicant is seeking, in the long term, to obtain a full operating licence for the service being tested.

Trial licences relate to the testing of new or innovative radio services involving the public or other third parties. Trial licences will be available for all new services that do not fall within existing licence categories.

Test licences do not permit public participation in trials, whereas trial licences do.

The fee for a wireless connection test licence is €200 for 12 months (maximum duration), with the monthly fee reduced to a minimum of €100. The fee for a trial licence for wireless connectivity is EUR 500 for 12 months (maximum duration), with the monthly fee reduced to a minimum of EUR 100.

6.1.2.4 United Kingdom

Innovation and trial licences¹⁰⁴ allow the use of the radio spectrum for innovation purposes for a limited period, which includes:

- testing and development of wireless radio equipment
- scientific research and experiments
- testing and demonstration of radio equipment, applications and technologies

However, they do not permit the deployment of commercial or operational networks or systems and are not suitable for applicants seeking a licence for long-term access. Short-term licences are divided into **innovation and research licences** (used for research, development and testing) and **demonstration and testing licences** (used primarily for demonstrating and testing new equipment).

¹⁰¹<https://www.klimadatastyrelsen.dk/digital-infrastruktur/frekvenser/frekvenstilladelser->

¹⁰²<https://www.eett.gr/en/operators/radio-frequency-spectrum/radiospectrum-licensing/experimental-and-trial-operation/>

¹⁰³<https://www.eett.gr/en/operators/radio-frequency-spectrum/radiospectrum-licensing/temporary-rights-of-use/>

¹⁰⁴<https://www.ofcom.org.uk/siteassets/resources/documents/manage-your-licence/non-operational/ofw357nonopguide.pdf?v=333194>

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Both innovation licences and trial licences may permit **the use of radio equipment for up to twelve months**. Licences cannot be extended.

An innovation and research licence allows the applicant to use the spectrum on a non-commercial and non-permanent basis to develop an innovative instrument or device, or to carry out academic or scientific research. The licence also covers test equipment for various purposes, such as EMC testing or antenna calibration. The licence authorises the use of the spectrum at a single location, such as a university, test facility, factory or laboratory. The licence does not permit the involvement of the public in any trials. Collaboration and testing with third parties is permitted provided that it does not constitute an operational service.

A demonstration and testing licence allows the applicant to use the spectrum on a non-commercial and non-permanent basis for the purpose of testing and demonstrating a new system, radio concept, application or service. The licence allows third parties to participate in the tests, but requires that all participants be fully informed of the nature of the test (i.e. that it is a temporary, non-commercial application). Demonstration and trial licences are available only for new services that do not correspond to existing licence categories or technical parameters.

For an innovation and research licence, a fee of GBP 50 (approximately CZK 1,520) per year per site is payable upon issue of the licence.

For a licence for demonstration and trial purposes, a fee of 50 GBP per month per seat is payable upon issue of the licence.

6.1.2.5 Germany

The spectrum may be used for the development and testing of radio equipment, for the use of radio equipment for specific research purposes, or for testing new radio concepts, subject to obtaining a licence from the Federal Network Agency. These frequencies are allocated for one year in accordance with the law.

Fees are charged for the allocation of spectrum and, under certain conditions, also for the rejection of applications. The fees are calculated in accordance with the current version of the Federal Network Agency's special regulation on fees for spectrum allocation (BNetzA BNetzG FreqZut).¹⁰⁵

In the case of short-term use of frequencies¹⁰⁶, e.g. in the context of motor races, sporting events, concerts and trade fairs, the allocation is carried out via a simplified procedure as a short-term allocation for a maximum period of 30 days.¹⁰⁷

Experimental licences have a base fee of 60 EUR, which increases with the size of the area and with each additional year of authorisation. Military experiments do not take this time factor into account. Universities pay half the price of industry for experimental licences.

Short-term licences have a base price of 30 EUR; this also depends on the size of the area, but the fee for issuing them increases with the urgency of the application. The fee can therefore rise to up to three times the base price.

Table 81: Formulas for calculating experimental and short-term fees in Germany

Allocation of frequencies for one year, used by industry for the development and testing of radio equipment and radio systems , by allocation area.		$60 \cdot A \cdot t_N$
t_N	total number of years of frequency use since the initial allocation	
Area factor A with allocation area	$\leq 10 \text{ km}^2$ (A = 1)	
	$> 10 \text{ km}^2$ up to $10,000 \text{ km}^2$ (A = 2)	
	$> 10,000 \text{ km}^2$ (A = 3)	
Allocation of frequencies for one year, used by industry for the development, testing and repair of military equipment in the frequency bands used and managed by the armed forces, by allocation area		$60 \cdot A$
Area factor A with allocation area	$\leq 10 \text{ km}^2$ (A = 1)	
	$> 10 \text{ km}^2$ up to $10,000 \text{ km}^2$ (A = 2)	
	$> 10,000 \text{ km}^2$ (A = 3)	
Allocation of frequencies for one year, which are used by industry for research purposes in collaboration with universities and higher education institutions , for each area allocation		$60 \cdot A \cdot t_N \cdot 0.5$

¹⁰⁵

https://www.bundesnetzagentur.de/EN/Areas/Telecommunications/FrequencyManagement/FrequencyAssignment/ExperimentalRadio/experimentalradio_node.html

¹⁰⁶

https://www.bundesnetzagentur.de/SharedDocs/Downloads/EN/Areas/Telecommunications/Companies/TelecomRegulation/FrequencyManagement/FrequencyAssignment/ShortTermFreqUsage/vvkunz_e.pdf?__blob=publicationFile&v=1

¹⁰⁷<https://www.bundesnetzagentur.de/DE/Fachthemen/Telekommunikation/Frequenzen/SpezielleAnwendungen/Kurzzeitzuteilungen/start.html>

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IN	total number of years of frequency usage since initial allocation
Area factor A with allocation area	$\leq 10 \text{ km}^2$
	$> 10 \text{ km}^2$ up to $10,000 \text{ km}^2$
	$> 10,000 \text{ km}^2$
Allocation of frequencies for short-term use (short-term frequency allocation) per frequency	$30 \cdot A \cdot Z_{\text{Ant}}$
Area factor A with allocation area	$\leq 10 \text{ km}^2$ (A = 1)
	$> 10 \text{ km}^2$ to $10,000 \text{ km}^2$ (A = 2)
	$> 10,000 \text{ km}^2$ (A = 3)
Date of application submission prior to the first day of use	≥ 15 days ($Z_{\text{Ant}} = 1$)
	4 to 14 days ($Z_{\text{Ant}} = 2$)
	1 to 3 days ($Z_{\text{Ant}} = 3$)
	on the first day of use ($Z_{\text{Ant}} = 4$)

6.1.2.6 Latvia

In Latvia, there are three types of authorisation with limited validity:¹⁰⁸

- **A temporary licence** authorises the installation and use of radio equipment with a temporary radio frequency allocation and other temporary conditions for the purpose of verifying the operation of the radio equipment and its electromagnetic compatibility with other radio equipment under real-world conditions. A temporary licence is issued for **a maximum period of one year**.
- **A short-term licence** authorises the temporary use of radio equipment, for demonstration or testing purposes. A short-term licence is issued for **a maximum period of six months**.
- **Licences for military purposes** valid for 10 years.

The fees for applications for short-term use in Latvia are as follows:¹⁰⁹

- Application for short-term use – the fee for applying for short-term use of any radio equipment in fixed services is EUR 38.53 excluding VAT.
- For fixed radio communication systems (point-to-point), the fee for a short-term use application is EUR 225.19 excluding VAT.
- Wireless access systems – the fee for an application for short-term use is EUR 38.53 excluding VAT.

Other types of services and their fees for temporary use are set out in the table below:

Figure 4: Fees by service type for temporary use

No. Mr. k.	Type of service	Unit of measure	Price without VAT (euro)	VAT (euro)	Price with VAT (euro)
1.1.	Consideration of a request for installation or temporary use (except for amateur radio stations)				
1.1.1.	private land mobile radio network	base station or base station repeater	225.19	0.00	225.19
1.1.2.	public land mobile radio communications network	base station or base station repeater	38.53	0.00	38.53
1.1.3.	fixed radio communication system	system	225.19	0.00	225.19
1.1.4.	wireless access network	central or relay station sector	38.53	0.00	38.53
1.1.5.	broadcast radio station	radio station	541.12	0.00	541.12
1.1.6.	marine mobile radio shore radio station	radio station	154.12	0.00	154.12
1.1.7.	aviation ground radio station	radio station	154.12	0.00	154.12
1.1.8.	satellite network or Earth station	radio station	225.19	0.00	225.19
1.1.9.	other type of radio equipment or radio network	radio station or radio network	225.19	0.00	225.19
1.1.10.	special radio means	radio network	225.19	0.00	225.19
1.1.11.	private land mobile radio communication network without fixed radio equipment	radio network	225.19	0.00	225.19

¹⁰⁸<https://likumi.lv/ta/id/340434-radiofrekvences-pieskiruma-lietosanas-atlauju-noteikumi>

¹⁰⁹ <https://vases.lv/lv/cenradis> – all charges in Latvia

6.1.2.7 Sweden

Fees for test and demonstration transmitters, and transmitters intended solely for testing purposes on frequencies up to 461 MHz pre-determined by the Swedish Post and Telecom Agency, amount to **707 SEK** (1,550 CZK) per licence (SEK 680 covers the licence fee and SEK 27 covers the market supervision fee).¹¹⁰

The minimum fee for a temporary authorisation is 300 SEK per station, and the administration fee in the case of special spectrum planning is 700 SEK per hour.¹¹¹

6.1.2.8 Luxembourg

Temporary licences are licences not exceeding 30 consecutive or non-consecutive days and are granted only once per calendar year. Where frequencies are made available under an experimental licence, **the fee is set at EUR 200**.

6.1.3 Recommendation to amend the calculation of fees for experimental and short-term authorisations

The Czech Telecommunications Office (ČTÚ) charges CZK 3,000 for short-term authorisations. This fixed amount is ideal for potential users when planning their costs. The number of frequencies is irrelevant when granting authorisations. This amount is set by Act No. 127/2005 on Electronic Communications, not by a government regulation. Any adjustment to the amount or method of calculating the fee would therefore require an amendment to this Act. Given the complexity of amending the Act and the relatively standard level of the one-off fee, a change to the fee for short-term authorisation to use frequencies is not recommended. Although the amount of 3,000 CZK is slightly higher than in most other countries, the difference is by no means significant. At the same time, a one-off fixed fee is common practice abroad.

One area for potential amendment could be a change to the definition of a short-term licence. This currently excludes, for example, the demonstration and pilot use of radio frequencies for a short period. At the same time, unlike authorisations for experimental purposes, such use is subject to the requirement to comply with the conditions set out in the relevant section of the Radio Spectrum Utilisation Plan (PVRs) or the National Frequency Table (NKT). This causes difficulties in practice. Furthermore, many events can be anticipated well in advance and are planned on a long-term basis, such as most major cultural and sporting events (e.g. World and European Championships, etc.). Similarly, visits by prominent politicians.

Furthermore, most applications in the land mobile service contain frequency requirements that are not in accordance with the Radio Spectrum Utilisation Plan (e.g. compliance with channel spacing and radio channel centres). According to the Czech Telecommunications Office (ČTÚ), this is significant, for example, in the case of armed escorts for foreign dignitaries, who use TETRA radio stations with a channel spacing of 25 kHz in the 380–400 MHz band, whereas the relevant section of the Radio Spectrum Utilisation Plan stipulates a channel spacing of 12.5 kHz for the Tetrapol system used in the Czech Republic.

However, as mentioned above, amending the Act is a complex and time-consuming process. A possible amendment to Government Regulation No. 154/2005 may help to bridge the aforementioned period during which the amendment to the Act is being prepared.

Annual fees for authorisations for experimental purposes are currently calculated as 1 per cent of the annual standard service fee in accordance with the Annex to Government Regulation No. 154/2005. This licence may be granted for the use of radio frequencies which, by their nature, do not fall within a given service as defined by the PVRs. It is therefore possible, for example, to conduct an experiment of a land mobile service nature in a band designated exclusively for applications meeting the definition of a fixed service, provided that non-interference conditions are met. This does not apply in the case of short-term licences.

As with short-term authorisations, fees for experiments abroad are often structured as a fixed price, or a fixed price multiplied by a certain coefficient. This type of fee considerably simplifies the calculation of the fee for both potential applicants for authorisation and the CTU itself. Moving away from a calculation based on a percentage of a standard authorisation would reduce the administrative burden on the CTU and make the conditions for this type of authorisation more transparent. In view of the legislative amendment processes described above, **it would therefore be appropriate to consider setting a fixed price for experimental licences that would be similar to the price for short-term licences. This would simplify the entire process of setting the fee.** The potential use of a coefficient to reduce the fee for experimental licences granted to universities, following the German model, also appears relevant.

At present, the Czech Telecommunications Office (ČTÚ) is facing difficulties in charging for demonstration events. By definition, short-term licences are primarily intended for unforeseen events – security escorts for VIPs, television and radio coverage of unexpected events and sporting events, etc. The CTU therefore does not, as a rule, grant short-term licences for demonstration events. This is despite the fact that, due to their short-term nature, they are more suited to this type of licence than the one-year licences for experimental purposes, which are currently used for demonstration events in many cases. A separate issue is the amount of the fee charged for the use of radio frequencies, even for a demonstration event lasting just one day.

The question, therefore, is how to charge for these short-term demonstration events. If a single fixed amount were set, there is a possibility that licence applicants would request a greater number of frequencies than is strictly necessary for them and would block a disproportionately large part of the spectrum for a long period, which runs counter to the CTU's efforts to allocate the spectrum efficiently. At present, however, this is not happening, even

¹¹⁰<https://pts.se/contentassets/322caad6e82642599664cd7157ce75d4/pts-foreskrifter-om-avgifter-ptsfs-2023-4.pdf>

¹¹¹<https://pts.se/radio/radiotillstand/avgifter-for-radiotillstand/>

despite the fact that the fee for an experimental licence is even lower than the potential fixed fee for a short-term licence. It can therefore be assumed that spectrum hoarding is unlikely to occur.

One possible suitable alternative appears to be the division of experiments into two sub-groups: conventional experiments as currently defined, and short-term experiments used for demonstration events or one-off verification of production technology, etc. This new category would be of a short-term nature and would also meet the definition of a demonstration event (unlike a short-term licence). If such a division were to be implemented, the fee for a short-term experiment should be lower than that for a long-term experiment. This would make spectrum management more efficient, as users would have no reason to pay more for long-term experimental licences that they do not need.

At present, therefore, an applicant for an experimental licence pays an administrative fee of 3,000 CZK plus 1 per cent of the standard fee. The new fee, based on a fixed amount, would be divided into two categories:

- **Short-term experiment** – an administrative fee of the appropriate amount + a fixed rate (e.g. 3,000 CZK) as the experiment fee
- **Long-term experiment** – an administrative fee of the appropriate amount + a fixed rate (e.g. 6,000 Kč) as the experiment fee

The administrative fee mentioned above corresponds to the relevant nature of the use of the radiocommunications service and the corresponding procedure in accordance with the schedule of administrative fees.

A short-term experiment should have a defined maximum duration, e.g. 15 days, as reflected in the short-term authorisation. This limit would thus reflect the current duration of a standard experiment in the form of a demonstration event, in accordance with the CTU's standard practice. The fee for this authorisation would not be affected by the number of frequencies allocated, as no misuse is anticipated; indeed, such misuse does not occur even at present, where fees are lower.

The definition of a long-term experiment would be the same as the current one; in other words, it would apply to authorisations valid for more than 15 days. However, compared to a short-term experiment, the fixed fee for the authorisation would be higher. The aim is not to limit the number of frequencies per authorisation, but it would be necessary to justify the purpose of their use. Such an authorisation would be limited to a single experimental purpose, meaning that any additional purpose would again be subject to a fee.

A specific case regarding fees for experimental authorisations is where the fee calculated as 1 per cent of the standard fee does not, in some instances, exceed the threshold of 100 Kč (most commonly for radio navigation and radio location services where a single radio frequency is used for experimental purposes). In such cases, the fee is not charged to the entity in question. The introduction of a fixed fee would increase the cost of authorisation for these entities. However, given the generally low number of experimental authorisations and the benefits of potentially adjusting and simplifying the calculation of fee amounts, such a change should still be beneficial. The amount has also been set so as not to be disproportionately high for applicants.

6.2 Revision of the method for calculating fees for the fixed service and the land mobile service

6.2.1.1 Point-to-multipoint

The method for calculating fees for the use of frequencies for point-to-multipoint fixed services, as set out in Government Regulation No. 154/2005 Coll., specifically point B, paragraph b), and the table for point-to-multipoint radio relay links (1 control station), is currently used for only a very small number of links. **Calculations using this table are unnecessarily complex, too expensive for users, and the frequency bands are not available to them.** The calculation reflects a historical situation in which, in the past, these systems were used in a selected set of bands (3.5 GHz, 26 GHz and 28 GHz); it reflected the technologies of the time, based primarily on frequency-division duplexing, and maximum channel widths of 28 MHz or 56 MHz. The charging method therefore does not correspond to the current situation, nor to the technologies and modes of use that can be anticipated in the near future.

In particular, there is a gradual convergence of terrestrial mobile and fixed radiocommunication services, as seen in MFCN networks. The same equipment uses the same frequencies both whilst in motion (e.g. transmission of vehicle location data) and whilst stationary (e.g. water level in a reservoir). This fact was taken into account in the distant past in Government Regulation No. 154/2005, amongst other things, in that the fee for fixed service connections up to 1 GHz is determined in the manner specified for the land mobile service. Many applications in the land mobile service bands therefore also include exclusively fixed applications, such as fixed wireless access (FWA).

Currently, within the Czech Republic, instead of the point-to-multipoint fixed service, the method for calculating fees for the land mobile service is used to determine the fee for entities with this characteristic, which is significantly cheaper for providers of these services. The table for point-to-multipoint radio links is therefore redundant in its current form, as the fee is calculated on the basis of the radio frequency rates in the table for the minimum authorisation issued by the Czech Telecommunications Office (ČTÚ), and no further authorisations will be granted.

In view of this situation, it would be appropriate to remove the table for the fixed point-to-multipoint service from Regulation No. 154/2005 Coll., thereby clarifying the fee collection system and standardising the method of calculating fees for services of the same nature. At the same time, the definition in the relevant section concerning the fixed service should be amended. Currently, the calculation for the land mobile service is used to determine the fee where frequencies are utilised by fixed-service radio equipment operating at frequencies up to and including 1 GHz. It is worth considering whether to extend the definition, or rather the condition, to include a reference to the calculation for the land mobile service in the case of

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point-to-multipoint links in frequency bands where the fixed and land mobile radiocommunication services converge, including for frequencies above 1 GHz.

Under current legislation, the land mobile service is subject to charges in several ways. Firstly, there are nationwide radio networks (A 1). Secondly, there are regional and local radio networks (A 2.1). The formula for calculating charges for other radio networks (A 2.2) is used for TETRA networks and business radio.

Paragraph A (Specific method of charging) of point 3.1 is used, or rather is prepared for application, in the case of the 26 GHz and 42 GHz bands for terrestrial systems providing wireless broadband electronic communications services. In future, it would be advisable to plan for the extension of this table to include the 4 GHz band, which is being considered for use in both private and public networks. However, the table for calculating the S4 coefficient may pose a problem, as its intervals for determining bandwidth are far too large for users' needs, since they are primarily designed to meet the requirements of large public networks. The fee, which is linked to the number of base stations, thus becomes too high for smaller licence applicants. **It would therefore be advisable to consider increasing the granularity of the bandwidth intervals used to calculate the S4 coefficient, or alternatively to opt for a fee structure based on the specific number of MHz of spectrum utilised.**

The S4 coefficient table currently looks as follows:

Table 82: S4 coefficient table

Šířka pásma [MHz]	0 MHz	200 MHz	400 MHz	600 MHz	800 MHz
	<=	<=	<=	<=	<=
	200 MHz	400 MHz	600 MHz	800 MHz	1000 MHz
S4 [Kč]	3000	6000	9000	12000	15000

Source: ČTÚ

Increasing the granularity makes sense particularly for lower bandwidths. The amounts would increase linearly, just as in the current table. After division, the table could look as follows:

Table 83: Proposed new table for the S4 coefficient

Bandwidth range (MHz)			S4 (CZK)
0	<=	50	750
50	<=	100	1,500
100	<=	150	2,250
150	<=	200	3,000
200	<=	300	4,500
300	<=	400	6,000
400	<=	600	9,000
600	<=	800	12,000
800	<=	1,000	15,000
1,000	<=		Number of MHz × 15 Kč

This would enable smaller entities to utilise these frequencies, as the nature of their usage is not adequately reflected in the currently applicable table of channel widths. At the same time, it would limit the accumulation of unused spectrum. Users who, under the current calculation method, block a wider spectrum bandwidth than they need – because they pay the same high fees for it – would have an incentive to apply for the bandwidth they actually require. This would increase the efficiency of spectrum allocation, and previously unused frequencies would be released for other licence applicants.

There is also currently demand for the 26 GHz band to be made available for FWA networks. However, this service is currently held back by the absence of conditions set out in the PVRs and, according to some members of the telecommunications sector, by high fees for the use of allocated frequencies. Reducing the fee for lower bandwidths could bring the implementation of this type of connection a step closer.

When addressing the issue of charging for the land mobile service, there is also the option of amending the fee calculation in accordance with point A 3.1. The formula currently takes into account only the number of base stations and the bandwidth. A potential amendment could add a frequency band coefficient to the calculation formula, which would allow for an appropriate valuation of frequencies in the 4 GHz, 26 GHz and 42 GHz bands.

6.2.1.2 Coefficient K9

Regulation No. 154/2005 Coll. sets out the following formula in Section B for calculating the fee for fixed services:

$$\text{Fee} = S3 \times K9 \times K10 \times K15$$

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The K9 coefficient takes into account the output power Q of the equipment used. In its current version, the value of the coefficient is governed by the following table:

Table 84: Table for calculating the value of coefficient K9

Coefficient value	Output power of the equipment
K9 = 0.25	$Q \leq 0$ dBm
K9 = 0.4	$0 \text{ dBm} < Q \leq 10$ dBm
K9 = 0.6	$10 \text{ dBm} < Q \leq 20$ dBm
K9 = 0.8	$20 \text{ dBm} < Q \leq 30$ dBm
K9 = 1	$30 \text{ dBm} < Q \leq 40$ dBm
K9 = 1.5	$40 \text{ dBm} < Q$

The output power of device Q is currently divided into 10 dBm intervals. In the opinion of the Czech Telecommunications Office (ČTÚ), this division may encourage licence applicants to artificially overstate the power of their equipment, as the level of fees would remain unchanged in such cases. For example, an applicant who, in order to provide their services with the defined availability of a point-to-point radio link, would only need equipment with an output power of 14 dBm, would certainly opt to use equipment with a power of 20 dBm, as the final amount payable for the use of frequencies would be the same. In some cases, they do not increase the power of the equipment, but still apply for authorisation to use equipment with higher power, as they have no reason not to do so and this increases the flexibility of their authorisation. However, the CTU carries out frequency coordination based on the power specified in the application, or subsequently in the authorisation.

These circumstances have two consequences. One is a distorted perception of the actual power of certain equipment. The second is unnecessarily high device power, which then results in more complex coordination of devices by the CTU. The proposal is therefore to scale these intervals in 5 dBm increments. This solution could provide an incentive for licence holders to declare the output power of their devices that is actually required, as they would fall into a lower category and thus reduce the amount of their licence fee. At the same time, they would have no reason to unnecessarily increase the power of the equipment, for the same reason. This scaling makes sense up to 30 dBm; higher levels apply to only a small number of licences, partly due to the technological limitations of the equipment. The new table could therefore look as follows:

Table 85: Proposed new table for coefficient K9

Coefficient value	Equipment output power
K9 = 0.25	$Q \leq 0$ dBm
K9 = 0.3	$0 \text{ dBm} < Q \leq 5$ dBm
K9 = 0.4	$5 \text{ dBm} < Q \leq 10$ dBm
K9 = 0.5	$10 \text{ dBm} < Q \leq 15$ dBm
K9 = 0.6	$15 \text{ dBm} < Q \leq 20$ dBm
K9 = 0.7	$20 \text{ dBm} < Q \leq 25$ dBm
K9 = 0.8	$25 \text{ dBm} < Q \leq 30$ dBm
K9 = 1	$30 \text{ dBm} < Q \leq 40$ dBm
K9 = 1.5	$40 \text{ dBm} < Q$

Given the administrative fee of CZK 5,000 for a change to a licence that constitutes a technical amendment (in this case, a change to the prescribed power level), the proposed amendment would probably not lead to a change in all the radio links concerned, as the change – or rather the saving equivalent to the annual fee – would not always be worthwhile. In view of this, no significant shift of existing licence holders to other categories, nor mass applications for amendments to individual measures, is anticipated. However, particularly in the case of new applications for licences to use frequencies, the power of the equipment should be set accordingly in order to generate savings for applicants or licence holders.

If all licences were transferred in accordance with the new table (which is not, however, anticipated), the frequency allocation implemented under this proposal would reduce the CTO's fee revenue by a few million CZK. The result, however, would be a more precise classification of equipment and a more even distribution of equipment across the K9 coefficient scale.

Structure of the Government Regulation

Government Regulation No. 154/2005 was introduced to replace the inadequate Government Regulation No. 181/2000. The new Government Regulation adopted the structure of the previous Government Regulation No. 181/2000 ('nationwide', 'other' and, over time, 'regional' networks). It would be advisable to adapt this structure to current needs in future, particularly to improve clarity. At present, there are discrepancies between the calculation of the fee and ambiguities in assessing the nature of the network. This is because there is a division into nationwide networks, regional networks and other networks, whilst the fee is calculated on the basis of technical parameters or a simplified calculation for large-scale networks. As a result, the fee for a regional network may currently be higher than that for a nationwide network.

Part A2.1 of the fee calculation for terrestrial mobile services applies to regional and local networks. Its formula uses the Kr coefficient, which relates to the population of the area covered by the licence. This category was established in preparation for the auction of 3,800 MHz band frequencies in 2017. However, the concept of regional internet providers based on auction allocations has been superseded by the advent of 5G technology and does not correspond to the current or expected future development of electronic communications systems. Point A2.1 is therefore unsuitable for current needs, and its removal from Government Regulation No. 154/2005 is recommended. Furthermore, its removal would have no impact on the activities of the Czech Telecommunications Office (ČTÚ), as no network that would be included in this calculation exists, nor is its future creation anticipated.

6.3 Review and adjustment of the charging method for private networks

Private networks are generally divided into two main categories of use.

- **5G private networks** are typically deployed in industrial facilities, factories, ports and sites where high-speed data transmission, high device density and low latency are required. They enable use cases such as real-time data analysis, autonomous machines, the Industrial Internet of Things, and augmented reality (AR) or virtual reality (VR) for remote operations.
- **TETRA and Business Radio networks** are types of professional radio communication systems used for specific applications, particularly in environments where reliable, secure and efficient communication is essential. **TETRA networks** are designed for critical communications. They are widely used in public safety (police, fire services, emergency services), the military and transport, where voice communication, group calls and reliability in critical situations are essential. The TETRA system is valued for its PTT (push-to-talk) function, group communication and high reliability in emergency situations. **'Business Radio'** is a term used to describe a range of professional radio systems designed for corporate and commercial use. It is a simpler alternative to more complex technologies such as TETRA and is often used in businesses, warehouses, the construction industry and other sectors where effective communication between staff is essential.

6.3.1 5G private networks

There is currently a growing trend worldwide towards the allocation of frequency bands for the creation of private networks for industrial purposes using 5G technology. Private 5G networks can cover a single company building, a company site or an agricultural area, connecting employees' mobile devices exclusively to the resources the company wishes to make available – without the need for access to the public internet.

5G is not only used by mobile network operators, but also by industrial networks that are replacing existing Wi-Fi networks or other business models requiring wireless connectivity. Examples of its use include factory automation, business parks, local networks in ports or at airports, connected cars, and agricultural projects.

Security and privacy are the two most obvious reasons why a company might wish to operate its own 5G network. However, users also see promise in the new technologies included in 5G, including an ultra-reliable, low-latency communication protocol that can be used for factory or farm automation, and numerous technical improvements for more efficient spectrum utilisation.

In connection with the development of this method of spectrum utilisation, it is essential to resolve the issue of annual fees for the use of frequencies for private networks. Any amendments should take into account those bands which can be expected to be used for both private and public networks, i.e. currently the 4.2 GHz and 26 GHz bands. The situation is specific in the 3.5 GHz band, where the relevant spectrum is held by licence holders, with some holders subject to a condition requiring the spectrum to be leased for Industry 4.0 purposes.

6.3.1.1 Germany

Germany was the first country to allocate 100 MHz from the pioneering 3.4–3.8 GHz band (specifically 3.7–3.8 GHz) for private 5G networks. Germany's decision to offer the 3.7–3.8 GHz spectrum to private companies, which purchase narrow local rights to use the frequencies as required, means that national operators cannot acquire rights to spectrum that could otherwise be used to provide faster public services.¹¹²

Deutsche Telekom has also successfully tested 5G frequencies in the millimetre-wave (mmWave) band at 26 GHz for industrial use and is now offering them commercially to industrial customers.¹¹³

Campus networks utilising private networks that combine frequency bands are currently being established in Germany.¹¹⁴ For example, 5G-Industry Campus Europe is creating a complete 5G ecosystem. The project was implemented using the participating institutions' indoor networks in the machine halls, combined with open-air areas on the Melaten Campus equipped with an outdoor network covering the space between the buildings. The network was technically implemented with a 4G anchor band at 2.3 GHz and a 5G network in the

¹¹²<https://venturebeat.com/business/germany-opens-door-to-private-5g-networks-with-3-7-3-8ghz-licenses/>

¹¹³<https://www.telekom.com/en/media/media-information/archive/5g-mmwave-for-industrial-customers-in-germany-1068180>

¹¹⁴<https://5g-industry-campus.com/infrastructure/>

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in the 3.7 to 3.8 GHz range. Within the hall, the network can be supplemented with additional 5G radio units in the 26 GHz frequency band. The signal transmission technology comprises the following elements:

- Outdoor infrastructure: 4 transmission sites as per the frequency allocation application, each with 1–2 sectors.
- Indoor infrastructure: 3 transmission sites, each with 4–8 access points.

Frequencies used:

- 2300–2320 MHz (4G anchor band)
- 3700–3800 MHz (5G band)
- In future, a technical transition to standalone 5G operation combined with the loss of 4G frequencies.

BNetzA (the German regulator) has opted for a ‘real-estate’ model for licence allocation. This means that the licence area corresponds to one or more plots of land in the land registry, whereby the applicant must either have the right to use the land (ownership, lease, tenancy) or must act with the consent of the landowner. Given that the right to apply for spectrum is restricted to the owner/tenant/leaseholder of the area, spectrum cannot be allocated effectively in areas with a fragmented ownership structure; in other words, it remains unused in city centres and residential areas, where mobile operators need it most urgently. This results in a relatively significant inefficiency in spectrum utilisation.

Licences include a ‘use it or lose it’ clause as well as a non-interference clause. The German regulator had anticipated significant demand for private networks, but since the start of licence issuance in November 2019, the number of users has been growing more slowly than expected. Those interested in setting up campus networks tend to rely on operators and their 5G services. The prevailing view is that the targets set by the BNetzA for spectrum allocation could have been achieved more effectively by auctioning the spectrum.¹¹⁵

Germany – licence fees for the use of frequencies for private networks¹¹⁶

Fees for the granting of authorisation to use local broadband frequencies in the 26 GHz band (24.25–27.5 GHz) are calculated using the following formula:

$$\text{Fee (€)} = 1000 + B \times t \times 0.63 \times (a_1 + a_2)$$

Where:

- 1000 – base amount in EUR
- B – bandwidth in MHz (at least 50 MHz)
- t – duration of the allocation in years (e.g. 15 years)
- a – area of the plot in square kilometres, divided into:
 - a₁ – land for housing and transport
 - a₂ – other types of land

Licence fees in the 3.7–3.8 GHz band are calculated using the same method. The only exception is the minimum and maximum width of the allocated band t (10–100 MHz).

The formula for the fee has been designed to ensure optimal and efficient use of the spectrum. The wider the bandwidth, the higher the fee. A base amount of EUR 1,000 was chosen to enable start-ups, small and medium-sized enterprises to enter the market. The base amount encourages cooperation between very small, neighbouring uses of spectrum, for which it would be difficult to ensure radio compatibility individually.

The longer the allocation period, the higher the fee. This encourages applicants to apply for allocations only for the period during which they actually intend to use the spectrum. This discourages applicants from hoarding spectrum, as, in addition to the risk of the allocation being revoked in the event of non-use, holders would pay a higher fee without actually utilising the spectrum.

According to the regulator, the base rate of EUR 0.63 was set in line with the fees established for local spectrum use in the 3.7–3.8 GHz band, taking into account differing bandwidth requirements and propagation conditions.

The fee increases with the extent of the area of spectrum use. The formula also distinguishes between land designated for residential and transport purposes and other types of land. Spectrum allocations for areas classified as residential and transport land are therefore six times more expensive than for other areas.

¹¹⁵<https://www.gsma.com/connectivity-for-good/spectrum/wp-content/uploads/2023/06/Spectrum-Set-Asides-Germany.pdf>

¹¹⁶<https://www.bundesnetzagentur.de/DE/Fachthemen/Telekommunikation/Frequenzen/OeffentlicheNetze/LokaleNetze/lokalenetze-node.html>

Table 86: Example of fee calculation

Fee calculation examples:

Area	Bandwidth (MHz)	Period (years)	Area a ₁ (km ²)	Area a ₂ (km ²)	Fee [€]
Campus – example 1	200	10	0.3		3268,-€
Campus – example 2	800	10	0.3		10072,-€
Industry – example 1	400	10	1	5	28720,-€
Industry – example 2	400	10	3		46360,-€
FWA urban district – example 1	800	10	4		121960,-€
FWA urban district – example 2	800	20	4		242920,-€

By way of example, one might compare the licence fees for a private network with those charged by mobile network operators. A 20-year licence for 100 MHz covering an area of 1 km² of a manufacturing plant in urban areas costs approximately 60,000 EUR. Whilst this is not a direct comparison, the contrast with the cost of around EUR 150 million for 10 MHz paid by mobile operators at auction highlights the inefficient allocation of spectrum in terms of its economic value.

6.3.1.2 United Kingdom¹¹⁷

As part of the development of 5G private networks, Ofcom decided in 2019 to introduce three changes to support this sector by amending the conditions for spectrum sharing. The bands listed in the table below were affected.

Table 87: Potential spectrum utilisation in the United Kingdom in the case of shared access

Table 2.1: Potential uses of the band we are making available under spectrum sharing

Uses	1800 MHz shared spectrum	2300 MHz shared spectrum	3.8–4.2 GHz	Lower 26 GHz band	Licensed mobile spectrum
Private network	✓ (narrowband)	✓	✓	✓ (indoor)	✓
Mobile coverage (rural)	✓	certain locations ²⁰	✗	✗	✓
Mobile coverage (indoor)	✓	✓	✗	✓	✓
Fixed wireless access ²¹	✗	✗	✓	✓ ²²	✓

Shared access bands

In 2019, Ofcom made spectrum available in the 3.8–4.2 GHz, 1800 MHz and 2300 MHz bands through local licences. Applicants may apply to Ofcom for coordinated access to these bands and pay a licence fee that reflects Ofcom's costs in issuing the licence. To ensure a straightforward process across all shared access bands, the authorisation procedures for existing licence holders in the shared 1800 MHz spectrum have also been aligned with those for the bands mentioned above.

Applicants may apply for two types of shared-access licences (differing primarily in terms of permitted power levels), which are designed for different types of potential use:

- **Low-power licences (area licences):** These will allow users to deploy the required number of base stations within a circular area with a radius of 50 metres without further authorisation from the regulator. In the case of large sites, interested parties may apply for multiple licences for individual areas in order to achieve the required coverage.

¹¹⁷<https://www.ofcom.org.uk/siteassets/resources/documents/consultations/category-1-10-weeks/129951--enabling-opportunities-for-innovation/associated-documents/enabling-wireless-innovation-through-local-licensing.pdf?v=324096>

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- **Medium-power licence (per base station):** Given the higher transmission power and greater potential area of interference, this licence is issued for a single base station and generally only for deployment in rural areas where it is unlikely to restrict low-power users.

The regulator does not permit the 3.8–4.2 GHz band to be used for the provision of domestic mobile broadband services, as this could preclude opportunities for local users. To this end, proposals have been published for the award of national licences for spectrum in the 3.6–3.8 GHz band. Equipment must commence transmission within six months of the licence being issued and must remain in operation thereafter. If the spectrum is not utilised within this period, or if its use subsequently ceases, Ofcom may revoke the licence with one month's notice.

Licence fees are set on the basis of expected costs. The fee will be charged on an annual basis for both low-power licences (charged per area) and medium-power licences (charged per base station).

The average licence fee is set at GBP 320 (approx. CZK 9,700) per year, based on data regarding the actual costs of the Business Radio Tech Assigned licence product. In view of concerns regarding applications for an inefficiently large amount of spectrum that would not be sufficiently utilised, it was proposed that licence fees should vary depending on the amount of spectrum requested, taking into account the following principles:

- The total amount collected in fees should fully cover the regulator's costs of spectrum management;
- all fees should cover at least the notional variable costs of issuing a licence, which, based on Business Radio Tech Assigned Cost data, were estimated at approximately 10 per cent of the average cost per licence. This means that the fee for the smallest bandwidth should not be less than GBP 32;
- All fees should contribute towards common and specific fixed costs; however, it is reasonable and appropriate for licences with higher bandwidth to contribute more towards these costs;
- It is assumed that the average licence will be for a bandwidth of 40 MHz.

Annual fees are based on bandwidth. They are the same for both low- and medium-power licences.¹¹⁸

Table 88: Access fees in the United Kingdom for shared spectrum

Licence fee	
The same annual licence fee applies for both low power or medium power licences. This is £80 in the 1800 MHz and 2300 MHz band, and £80 per 10 MHz in the 3.8 to 4.2 GHz band.	
This table shows the annual licence fee for the different channel sizes.	
Channel size	Price per channel
2x3.3 MHz	£80
10 MHz	£80
20 MHz	£160
30 MHz	£240
40 MHz	£320
50 MHz	£400
60 MHz	£480
80 MHz	£640
100 MHz	£800
For the 26 GHz band, the annual licence fee is £320 and does not vary by bandwidth.	
Short-term licences of less than one year in the 1800 MHz, 2300 MHz, 3.8 to 4.2 GHz and the 26 GHz will be priced on a pro-rata basis, with a minimum cost of £32 per licence.	

Adding the 26 GHz band to shared access bands

The 24.25–26.5 GHz band ('lower 26 GHz band') will be added to the shared access bands for indoor use. The primary use is planned, for example, for industrial users. This use will not conflict with future outdoor use of the band. Holders of these licences may deploy any number of indoor base stations within a circular area with a radius of 50 metres without requiring further authorisation from Ofcom.

A licence fee of GBP 320 is payable for each licence in this band, payable annually for 50 MHz, 100 MHz or 200 MHz channels.

¹¹⁸<https://www.ofcom.org.uk/spectrum/frequencies/shared-access/>

Access to licensed mobile spectrum

Where spectrum is licensed at national level to mobile network operators and is not utilised in all locations, Ofcom allows new users to access this spectrum. If, following discussions with the existing licence holder, the regulator agrees that the new user is unlikely to interfere with their network or restrict their future plans, it will issue a licence for local access.

Spectrum can only be shared in this way in remote areas, but in these locations it can be used, for example, to support private networks or wireless broadband services. There may also be other locations not served by the existing mobile network, such as underground mining operations, where mobile technology can be used to support a private network without affecting existing networks or their future plans.

Unless the operator raises a justified objection, the licence is issued for three years. In some cases, it may be desirable and possible to negotiate (in agreement with the operator) a longer licence validity period. Conversely, a shorter licence period may also be negotiated.

As each application is dealt with on a case-by-case basis, the technical transmission parameters for each licence will be unique, as they will reflect the agreed transmission parameters (including the location/area of service provision, frequency, power, etc.) and any further requirements that may be necessary to prevent interference with an existing operator.

A one-off, cost-based licence fee of GBP 950 (approx. CZK 29,000) will be charged.

6.3.1.3 Finland¹¹⁹

Since 2020, the Finnish regulator has permitted the roll-out of local 5G networks in two frequency bands. The 2300–2320 MHz and 24.25–25.1 GHz bands are available for this purpose. Local 4G/5G networks are intended for local use, for example in factories, ports, airports, shopping centres, power stations and mines. Under certain conditions, these networks may also facilitate small-scale public telecommunications services or fixed wireless access (FWA).

In Finland, there has also been interest in using the 3800–4200 MHz frequency band for local mobile communication networks, and its allocation for this purpose is currently being prepared. Harmonisation at European level is due to be completed by the end of 2024.

A radio licence for private networks defines the technical licensing conditions for the network and other conditions governing its use. Furthermore, the radio licence specifies the geographical area of use and the maximum permitted power of the radio transmitter outside the defined area of use. Networks operated outdoors in geographical areas that are adjacent or close to one another must be synchronised to prevent interference. If, during the term of the radio licence, the area or purpose of use of the mobile network changes, or if the number of subscribers or customers on the public network exceeds the maximum limit specified in the radio licence, the licence holder must apply for an amendment to their radio licence or for a new radio licence before making any changes.

Public local telecommunications services in the 2300–2320 MHz and 24.25–25.1 GHz frequency bands

The provision of mobile network services generally requires a network licence. At the start of 2021, new legislation came into force, simplifying the licensing processes. A local mobile network in which small-scale public telecommunications services are provided may now be operated on the basis of a radio licence granted by Traficom without a separate network licence.

In addition to local mobile networks, a radio licence may be granted for a local FWA network in which public telecommunications services are provided. Such a prepaid network may only be used at a predefined location, primarily via a fixed outdoor antenna installed on a building.

Radio licences for local public telecommunications networks are granted on a case-by-case basis in accordance with the conditions laid down by law. When assessing the granting of a radio licence, the local and small scale of the service is evaluated on the basis of the area of use, the planned services and the number of users.

Fees for frequency allocation and radio licences¹²⁰

Frequency fees are levied for the reservation of frequencies and radio licences on the basis of the number of frequencies and other grounds for fees set out in the Decree of the Ministry of Transport and Communications on frequency fees. The fee is calculated using the formula for the general frequency fee for local mobile networks. (For details, see Annex 2 – Finland)

Formula:

$$B0 \cdot K1 \cdot K \text{ population} \cdot S \cdot \text{€}1,295.50$$

¹¹⁹<https://www.traficom.fi/en/communications/communications-networks/local-4g5g-networks>

¹²⁰<https://www.traficom.fi/en/communications/communications-networks/frequency-fees-radio-reservation-and-radio-license>

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Where:

- c_1 = Frequency band coefficient
- S = Basic charge coefficient
- B_0 = Relative bandwidth
- $B_0 = (B \cdot C_j) / B_{ref}$
- $C_j = 2$, $B_{ref} = 25$ kHz and K population = 0.05

The population coverage coefficient (K population) is determined by the ratio of the population within the area covered by the right to use a radio transmitter or radio network, radio system or radio station to the total population of Finland. However, in the 2 300–2 320 MHz and 24.25–25.1 GHz frequency bands, the population coverage factor is always at least 0.05. A value higher than the minimum population coverage factor shall only be applied if the population within the area covered by the right of use exceeds 275 000.

Further examples of fee amounts are given below and are also available at <https://www.traficom.fi/en/communications/communications-networks/frequency-fees-radio-reservation-and-radio-license>

Table 89: Example of fee levels in Finland

Frequency band	Bandwidth (MHz)	Frequency fee
2,300-2,320 MHz	5	€279.83
2,300-2,320 MHz	10	€559.66
2,300-2,320 MHz	20	€1,119.31
24.25-25.1 GHz	50	€310.92
24.25-25.1 GHz	100	€621.84
24.25-25.1 GHz	200	€1,243.68

Table 1. Examples of the annual frequency fee with different numbers of frequencies when the population coverage factor is 0.05.

6.3.1.4 Norway

In the regulation of the 3.8–4.2 GHz band, two different levels of permitted power have been set for base stations: low power and medium power. Low-power licences are granted as site licences, whilst medium-power licences are granted as transmitter licences (one licence per base station).¹²¹

- The 3.8–4.2 GHz band will be used for applications in non-public networks within a geographically defined area. These resources may not be used to extend the coverage or capacity of public nationwide mobile networks.
- Only the SA-NPN (Standalone Non-Public Network) configuration is permitted.
- Applications for new local networks in areas where local networks have already been established, or in the vicinity of airports and satellite ground stations, may require amendments to the application or result in its rejection.
- Licences are granted with a bandwidth of 20, 40, 60 or 80 MHz. The applicant must justify the requested bandwidth in the application.
- Equipment used for regulation must support the entire 3800–4200 MHz frequency band in order to facilitate the efficient allocation of frequencies to local networks. Until equipment supporting the entire frequency band is widely available, Nkom may authorise the use of equipment with a restriction on the supported frequency range. The tuning range of the equipment must be specified in the application.

¹²¹ https://nkom.no/aktuelt/nkom-has-opened-3-8-4-2-ghz-for-local-area-5g-networks/_/attachment/download/cedba85d-febe-41ab-bfba-348a118f7150:2288b83dfe5e9deea2bf5c153a397354a795b0cf/Regulation%20of%203.8-4.2%20GHz%20December%202022.pdf

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- Nkom may reassign the allocated frequency range to a different location within the 3800–4200 MHz band, if this is necessary to facilitate efficient use, including to enable more parties to utilise frequencies in this band within a given geographical area.

Figure 5: Possible locations for low- and medium-power base stations

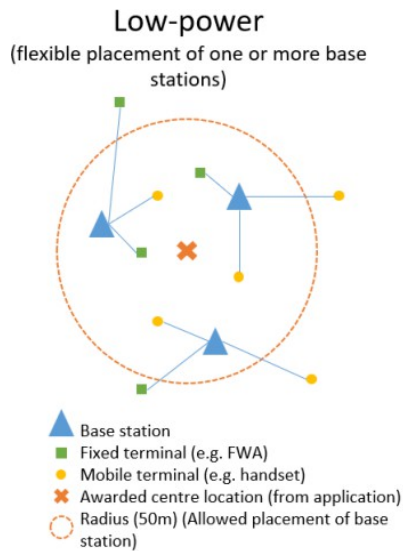


Figure 5

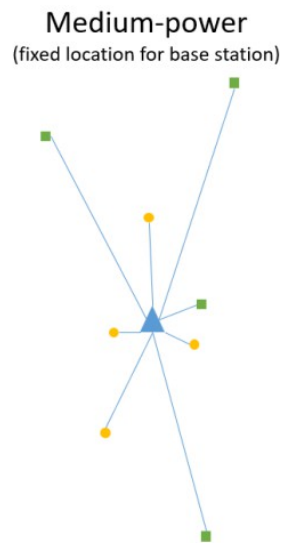


Figure 6

For low-power applications, a distinction is made between indoor use, where all base stations within the licence area are located exclusively indoors, and outdoor use, where one or more base stations within the licence area are located outdoors. For medium-power applications, either an indoor or outdoor location must be specified for each individual base station.

Applications may be made for multiple licence areas/locations and combinations thereof. For example, an indoor installation may require six licence areas for low power; see the figure below.

Figure 6:



Figure 7: Multiple low-power licence areas combined, and how the uppermost licence area is deemed outdoors (if one or more low-power base stations are outdoors, the entire licence area is deemed outdoors)

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Low-power

- Low-power operation allows for flexibility in the placement of any number of base stations within a defined geographical area (licence area). The licence area is defined as a radius of 50 metres around the centre of the area.
- The maximum permitted antenna height for low-power installations is 10 metres above ground level for outdoor antennas. There is no height restriction for indoor antennas.
- For low-power applications, an application for an indoor network must be submitted if all base stations within the licence area are located indoors. An application for an outdoor network must be submitted if one or more base stations are located outdoors.

Medium power

- In the case of medium power, the licence is granted for a base station.
- No restrictions are set on the maximum permitted antenna height for medium-power applications. The antenna height must be specified in the application. Nkom reserves the right to enter into dialogue with the applicant in cases where Nkom considers the location or height of the antenna applied for to be problematic in terms of the efficient use of spectrum resources.
- The application must specify whether the base station will be located indoors or outdoors.
- Due to the higher likelihood of interference, it is not permitted to install medium-power base stations and associated equipment in areas situated within a 10 km radius of urban centres with more than 10,000 inhabitants.

Fee

Applicants who have been granted licences in the 3.8–4.2 GHz band for local networks must pay an annual sector fee to Nkom. For low-power applications, the sector fee is calculated per licence area covered by the frequency licence. For medium-power applications, the sector fee is calculated per base station covered by the licence. For 2023, the annual sector fee is calculated according to the following table.

Table 90: Annual sector fee in Norway

Bandwidth	Low-power	Medium-power
20 MHz	NOK 200	NOK 1,000
40 MHz	NOK 400	NOK 1,400
60 MHz	NOK 800	NOK 2,200
80 MHz	NOK 1,600	NOK 3,800

Table 8: Annual sector fee

(1 NOK = 2.1 CZK)

The rates of the annual sector fee in the table above are set on the basis of the expected costs of Nkom's work in connection with processing licence applications and implementing the licensing regime. The rates may be adjusted in the future once Nkom has gained experience in the use of resources for this activity.

To ensure sufficient predictability of fees for licence holders, Nkom issues licences with a validity period of up to 10 years. The required validity period must be specified in the application form.

6.3.2 Comparison of fee levels in different countries

Comparison of fees for local networks in the 3.8–4.2 GHz band. The calculation is based on values for an area of $7^{.800} \text{ m}^2$ over a five-year period and a bandwidth of 80 MHz.¹²²

Germany

Germany will charge an entity just over 25,000 CZK for a licence covering an area of $7^{.800} \text{ m}^2$ for a local network with a bandwidth of 80 MHz in the 3.8–4.2 GHz band for a period of 5 years. The German regulator tends to base its calculations on larger areas, where the fees then increase relatively rapidly in line with the size of the area.

¹²² The figure of $7^{.800} \text{ m}^2$ has been chosen to represent the area of a circle with a radius of approximately 50 metres.

United Kingdom

In the United Kingdom, users pay a licence fee of 640 pounds per year, or 3,200 pounds for 5 years, for 80 MHz in the 3.8–4.2 GHz band, either per station or for a circular area with a radius of up to 50 metres. This amounts to around 97,000 CZK.

Norway

In Norway, the fee for the same 80 MHz bandwidth in the 3.8–4.2 GHz band and the same area or a single station is 3,800 NOK; over five years, this amounts to 19,000 NOK, which is equivalent to just under 40,000 CZK.

6.3.3 Conclusions on private 5G networks

Private 5G networks are a relatively new field, but growing interest in this service is expected in the future. Germany is the most advanced European country in this regard. Although the number of entities applying for spectrum for private 5G networks remains below expectations, our western neighbour serves as a good example of how to manage this new technology. In the Czech Republic, the relevant bands for private 5G networks are 26 GHz and 42 GHz, with the 4 GHz band also being considered for the future.

Given that, when preparing the tender procedure for the award of rights to use radio frequencies for the provision of electronic communications networks in the 700 MHz and 3400 – 3,600 MHz, drew inspiration from German legislation when defining the pricing conditions under the obligation to lease frequencies for Industry 4.0 purposes, there is a possibility of applying the charging model for 5G private networks in line with the German model as well.

The aforementioned tender (for 700 MHz and 3.4–3.6 GHz) contains the following wording regarding the definition of the lease price:

The price for the lease of radio frequencies under the radio frequency lease commitment charged by the Obligated Lessor shall be determined as follows:

- The one-off service set-up fee is **CZK 50,000** excluding VAT
- The annual lease fee will be calculated as follows:

$$\text{Roční cena služby (Kč)} = \frac{m}{12} \times 1000 \times V \times a$$

where:

- m is the number of months of rental per calendar year
- V is the leased spectrum bandwidth in MHz
- and a denotes the actual area of the plot in km²

We can see from the formula that it is very similar to the German regulator's formula for calculating the fee for private 5G networks. The difference is that the Czech formula takes monthly leases into account, whereas the German one includes a coefficient for the duration of the licence in years.

For a formula that would determine the fee for Czech private 5G networks, it would be appropriate to consider using the same model with coefficients taking into account bandwidth, area and the duration of the allocation. The issue is the fixed amount, which is EUR 1,000 per licence under the German regulator's system; in the case of the Czech formula for the 700 MHz and 3.4–3.6 GHz bands, this amounts to CZK 50,000. In the case of 5G private networks in the Czech Republic, this fixed amount warrants consideration, as it could deter small licence applicants and further reduce the already relatively low level of interest in private networks in the Czech Republic.

Another possible suitable approach, which would be both transparent and simple to implement, would be to utilise the existing framework set out in Section A2.2 of Government Regulation No. 154/2005.

Another alternative method of charging is offered by the model used in the UK and Norway, which takes into account the power output of base stations and determines the fee amount and method of calculation accordingly. The fundamental difference lies in the possibility of locating an unlimited number of transmitters within a specific circular area in the case of low power output, and, conversely, charging for each station in the case of medium power output.

All charging models are relevant for different purposes. In the case of a site, interference at the boundary of the plot may pose a complication, where it is not possible to precisely cover a non-circular area. In this case, neighbouring sites need to be co-ordinated to minimise interference. For municipal and campus networks, it is advisable to use a model combining both approaches.

6.3.4 TETRA networks and business radio

6.3.4.1 England – Business Radio

In the UK, there are five types of licences for business radio.¹²³

Simple UK Light:

This licence authorises the use of handheld, portable or mobile radio equipment anywhere within the United Kingdom. The use of base stations is not permitted. Licence holders have access to nineteen frequencies divided into four Business Radio frequency bands and must coordinate with other Simple UK Light licence holders themselves. The licence fee is £75 for five years.

Simple Site Light:

This licence authorises the use of a radio system operating a base station and mobile stations within a small area (usually 1 km or less). The frequencies available under this licence class are typically used for radio paging systems. Licence holders have access to a range of frequencies and must coordinate with other licence holders of the same type themselves. The licence fee is £75 for five years.

Suppliers Light:

This is a specialised licence for suppliers of radio services, enabling them to:

- service and repair business radio and marine equipment
- to hire out business radio stations (including linked business radio stations) and/or radio paging equipment to customers for up to one year
- to allocate business radio equipment (including linked business radio equipment) to customers awaiting a business radio licence, for a period of up to three months (known as 'parking')
- demonstrate business radio equipment (including interconnecting business radio equipment) to customers for up to eight days.

Licence holders have access to a wide range of frequencies and must share these and coordinate their use with other Suppliers Light licence holders.

The licence fee is £75 for five years.¹²⁴

Technically allocated licences:

This is a flexible licence that authorises the use of a wide range of business radio equipment. Licence holders can choose from a wide range of frequencies across all business radio bands and from a wide range of coverage areas, from very small (e.g. in-building coverage) to very large (e.g. a county).

Licence fees are calculated on the basis of several factors, including the size of the coverage area and the popularity of the frequency band, and range from GBP 75 to GBP 1,480 for the allocation of a single channel with a bandwidth of 2 × 12.5 kHz (or 1 × 25 kHz).

Table 91: Licence fees for flexible licences in the United Kingdom

Band category	Highly Popular						Medium Popular						Less Popular
Coverage category	1		2		3		1		2		3		1, 2 or 3
Assignment Type	Exclusive	Shared	Exclusive	Shared	Exclusive	Shared	Exclusive	Shared	Exclusive	Shared	Exclusive	Shared	Exclusive or Shared
Population category A	£200	£100	£740	£370	£1480	£740	£100	£75	£370	£185	£740	£370	£75
Population category B	£100	£75	£200	£100	£300	£150	£85	£75	£170	£85	£250	£125	
Population category C	£75	£75	£95	£75	£110	£75	£75	£75	£80	£75	£90	£75	

¹²³<https://www.ofcom.org.uk/spectrum/radio-equipment/business-radio-faqs/>

¹²⁴<https://www.ofcom.org.uk/siteassets/resources/documents/manage-your-licence/business-radio/forms/nonexcelguide.pdf?v=331714>

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Table 92: Licence fees for flexible licences in the United Kingdom

Band categories	Bands	Frequency range (MHz)
Highly Popular bands (HPB)	High Band	165.04375 – 173.09375
	UHF 1	425.00625 – 449.49375
	UHF 2	450.0 – 470.0
Medium Popular bands (MPB)	Mid Band	137.9625 – 165.04375
	Band III	177.20625 – 207.49375
Less Popular bands (LPB)	Paging	26.225 – 49.49375
	Band 1	55.75 – 68.0
	Low Band	68.08125 – 87.49375

Figure 7: Population categories in the United Kingdom

Figure 1 – Population categories

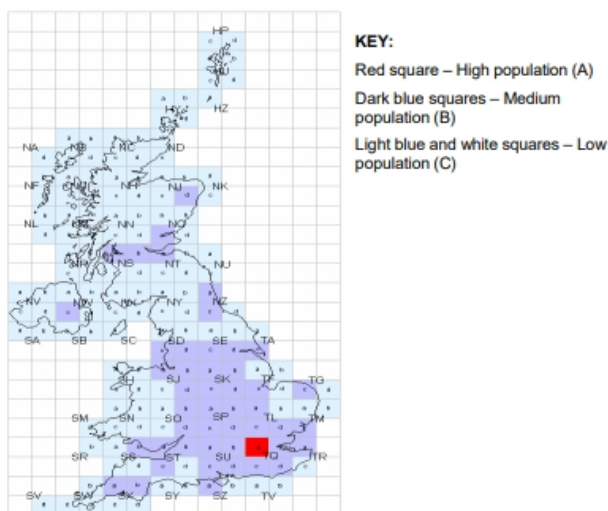


Table 2 – Coverage categories (Technically Assigned licences only)

Coverage categories	Combinations of ERP Power (P) in Watts, and antenna height above ground level (A_0) in metres – for base station	Operational area radius (R) in km for mobile to mobile systems
Category 1	$P \leq 5 \text{ W}$ and $A_0 \leq 10\text{m}$	$0 < R \leq 3$
Category 2	$P \leq 5 \text{ W}$ and $10\text{m} < A_0 \leq 30\text{m}$	$3 < R \leq 15$
	$P > 5 \text{ W}$ and $A_0 \leq 10\text{m}$	
Category 3	$P > 5 \text{ W}$ and $A_0 > 10\text{m}$	$15 < R \leq 30$
	$P \leq 5 \text{ W}$ and $A_0 > 30\text{m}$	

* If the antenna is used indoors or underground or is a downfire, leaky feeder or radiating cable type, it will fall within category 1.

Area-specific licences:

Area-specific licences allow customers exclusive use of a frequency either within a 50 km² grid square, within a county, or across the whole of the United Kingdom. Licence fees are calculated based on a combination of the bandwidth, frequency range and area covered.

One example is a 12.5 kHz duplex frequency band between 450 and 470 MHz, which can be used throughout the United Kingdom for GBP 9,900. A 12.5 kHz duplex frequency band between 68 and 80 MHz for use throughout the United Kingdom would then cost GBP 3,300.

Table 93: Fees for area-specific licences

Area	Fee (£) for Highly Popular bands	Fee (£) for Medium Popular bands	Fee (£) for Less Popular bands
UK	9900	8250	3300
England	8275	6895	2758
Wales	490	410	163
Scotland	855	710	285
Northern Ireland	280	235	93
GB (England, Wales and Scotland)	9620	8015	3206
Trading unit within high population category (A)	1185	990	395
Trading unit within medium population category (B)	150	125	50
Trading unit within low population category (C)	14*	12*	5*

*subject to a minimum annual licence fee of £75

IoT spectrum¹²⁵

For IoT applications for which specific bands (Band One) are designated, the fees are determined in accordance with the following table:

Table 94: Fee levels for IoT applications

Band One (55.75 MHz – 68 MHz) annual fees per 2 x 12½ kHz (or 1 x 25 kHz) channel

Assignment Type	Fee
Technically assigned	75
Area-defined (UK)	600
Area-defined (England)	150
Area-defined (Wales)	150
Area-defined (Scotland)	150
Area-defined (Northern Ireland)	150
Area-defined GB (England, Wales and Scotland)	450
Area-defined per Trading Unit in population category A	150
Area-defined per Trading Unit in population category B*	50
Area-defined per Trading Unit in population category C*	5

*subject to a minimum annual licence fee of £75

6.3.4.2 Ireland¹²⁶

Private mobile radio

Licence fees are based on the number of devices to be licensed.

The price is 22 EUR per device plus a fixed fee of 22 EUR for the duration of the licence. (E.g. 4 walkie-talkies + 2 radio microphones = 6 units + fixed fee = 7 × 22 EUR = 154 EUR).

Community repeaters

Fees:

- First year: 625 EUR + 12 EUR administration fee.
- Subsequent years: 1,000 EUR for annual licence renewal.

Mobile radio systems (Trunked radio)

- First year: €625 per channel (12.5 kHz) per base station.
- Subsequent years: €1,000 per channel (12.5 kHz) per base station for annual licence renewal.
- For 25 kHz channels, the fee is 1,250 EUR (625 EUR × 2) for the first year and 2,000 EUR (1,000 EUR × 2) for each subsequent renewal.

¹²⁵<https://www.ofcom.org.uk/spectrum/radio-equipment/internet-of-things/>

¹²⁶<https://www.comreg.ie/industry/radio-spectrum/licensing/search-licence-type/business-radio/>

Paging

- Free of charge

Third-party radio for businesses

- The TPBR licence fee is 5,000 EUR per channel for five years

6.3.5 Comparison of fees in the Czech Republic and the UK

In the Czech Republic, the fee for a single 25 kHz channel, with a coverage radius of between 5 and 25 km and a transmitted power of up to 10 W, is around 9,000 CZK. This amount is charged regardless of the location of the service area. The unit price per frequency is therefore the same, for example, for a taxi service in a smaller town or a company operating in the building materials sector outside the city, as it is for a company operating in the centre of Prague, where frequencies are much more valuable due to the higher number of licence applicants.

In the UK, licence fees are calculated on the basis of several factors, including the size of the coverage area and the popularity of the frequency band, and range from 75 to 1,480 pounds for the allocation of a single channel with a bandwidth of 2×12.5 kHz (or 1×25 kHz).

Operating a business in London in the most expensive band would therefore cost approximately 37,500 CZK per 25 kHz channel. It can therefore be concluded that costs in the Czech Republic – at least in Prague – are significantly lower than in London. Conversely, in remote areas of the Czech Republic, fees remain similar to those in the capital, whilst in the UK they are falling rapidly.

The calculations in these examples illustrate the differences in fee levels; however, the fees in the Czech context are appropriate and there is no need to adjust them.

6.3.6 Conclusions on the chapter on Private Tetra Networks and Business Radio

At present, point A 2.2 of the Annex to Government Regulation No. 154/2005 Coll. is used to calculate the fee for the use of this type of private network. The fee consists of two parts – one for mobile (Ca) and one for fixed (Cb) radio equipment.

- The Ca value depends on the radius of the service area, as well as the power of the mobile equipment and the frequency band.
- The Cb value depends on the bandwidth, the sum of the power coefficients of the mobile equipment, and the frequency band.

Having examined the charging structure for this category of services based on Ofcom's regulations for the UK, we can conclude that the calculation method used there is more complex than that under Czech legislation. Variables such as the popularity of the band, the power of the equipment, the exclusivity of the frequencies, and the geographical location of the area are taken into account. Based on these variables, the fee for a single licence ranges from 70 to 1,480 pounds. Thanks to this price range, which varies according to different parameters, an appropriate valuation of the allocated channel based on its economic value is ensured. **This means that in remote areas, the frequency band is cheaper than in more densely populated areas; popular bands are more expensive than less-used ones; and a higher fee is charged for exclusive bands than for shared ones, and so on.**

Part of the sector in the Czech Republic has been trying to push through this idea for some time. However, such an approach is used only exceptionally in Europe, and given trends in population numbers and general connectivity in local areas, this method could lead to an unpredictable regulatory environment. Another argument against introducing this model is the fact that there is greater competition within conurbations, which reduces operators' net profits per subscriber – a factor that is not taken into account by the fee structure.

Nor can we overlook the differing nature of settlement patterns in rural areas across different countries. A location-based (population density-based) charging model, for example, makes sense in countries with highly isolated areas, such as Spain, where there are vast regions with virtually no commercial potential. It therefore makes no sense to charge these areas at the same rate as metropolitan areas. The Czech Republic, by contrast, has a relatively evenly distributed population (Czech villages are not as remote as those in other countries); therefore, given the country's relatively small size, this measure would be more likely to cause problems than to streamline the collection of fees. Changing the model would introduce a degree of uncertainty into the decision-making process regarding the economics of radio network operations across the entire charging system.

A model using location-based coefficients also exists outside the United Kingdom; within the European Union, fees are adjusted in some way according to geographical location, for example in Slovakia, Ireland, Slovenia and Poland. In Slovakia, for instance, the coefficient takes into account the region covered by the service, thereby reducing the fee compared to the fee for covering the whole of Slovakia. The amount of the fee for CGC and point-to-multipoint services (in bands above 1 GHz) then depends on the attractiveness of the area in terms of population coverage (see Annex 11). Ireland, meanwhile, sets the fee according to the specific region (see Annex 5). Another example is Slovenia, which takes into account urban areas and geographical coverage (see Annex 12). In Poland, a different principle is applied, whereby the type of municipality (rural area, municipality, town with district rights, etc.) covered is taken into account when calculating the fee (see Annex 9). It can therefore be concluded that a model using location or the size of the territory and population as determining factors for the fee amount is used in some countries, but rather rarely, and its implementation into the fee calculation mechanism would be ineffective in the Czech context and would, in fact, be counterproductive.

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If the aim were to align with the British model, it would be necessary to introduce a coefficient based on pre-defined values allocated to individual areas within the country. However, this approach is complicated, not only for the reasons mentioned above, but also due to the complex definition of individual areas (e.g. the definition of the territory of Prague, where to draw any territorial boundaries, etc.).

Another option, should the need arise to assess allocated frequencies more precisely, is to adjust the fee according to a division into exclusive and shared frequency bands. Exclusive bands are allocated to a single entity, which is not at risk of signal interference. They are used primarily for TETRA networks; however, the problem is that the entire band is blocked for a single user, and the whole band is not utilised efficiently. Conversely, shared bands have a higher number of users but must account for the potential problem of interference between users. However, they are used more efficiently, as more applications can be accommodated within a single frequency band. Based on this distinction, fee levels in the United Kingdom vary significantly. If we view frequencies as a scarce resource, it makes sense to charge higher fees to users who benefit from the exclusivity of a band at the expense of efficiency. However, one potential problem with this solution could be the political unfeasibility of the proposal and resistance from representatives of organisations such as DPP and the police, who would be affected by the change in the calculation method. It is therefore essential to discuss any potential adjustments with the relevant parties. Furthermore, the application of the 'shared/non-shared' spectrum classification changes over time as spectrum usage evolves (networks are established and decommissioned). Incorporating these parameters would introduce uncertainty for users when making decisions regarding the economics of radio network operation.

In conclusion, the current mechanism for charging networks under A2.2 appears to remain adequate. Minor adjustments taking into account the value of the radio spectrum as a resource could be considered, but the challenges described above may undermine this idea, and the expected effect of the change could ultimately be entirely the opposite.

6.4 Charging for satellite services

The current structure of licence fees for satellite service providers, such as Starlink, may confer certain advantages over traditional electronic communications services, such as mobile and fixed-line operators. These differences stem primarily from the way in which satellite services are charged compared with terrestrial services, which may raise questions regarding the distortion of fair competition.

The current fee structure and its implications

Satellite service providers are generally charged on the basis of the frequencies they use to transmit control signals from ground stations to satellites, or primarily in the case of so-called HUB stations or gateways. Although satellite services are usually provided on a regional or global basis, these stations are located only in selected countries. The actual use of radio frequencies by client terminals is not, as a rule, subject to charges. This differs significantly from the fee structure applied to other telecommunications services, such as mobile networks or fixed broadband providers, which are usually charged on the basis of parameters such as:

- The number of terminals or stations (e.g. mobile masts, base stations).
- The number of users or devices connected to the network.
- The size of the area served by the network.

Traditional telecoms operators often face high costs in acquiring spectrum licences through competitive auctions and are also subject to ongoing fees for each user, station or terminal they operate. In contrast, satellite service providers avoid these specific costs, as they pay only for the spectrum used to transmit signals, not for the number of devices receiving signals from satellites in Earth orbit. This results in a significantly lower regulatory burden for satellite providers compared with their terrestrial counterparts.

Challenges and market disruption

This difference results in a lower total amount collected from satellite service providers in licence fees. Whilst satellite service providers collect fees directly from users for access to their services and thus generate profits, regulatory authorities, such as the Czech Telecommunications Office (ČTÚ), are not entitled to adequate compensation to cover the costs of managing and regulating the frequencies for this service. As a result, satellite operators benefit from lower regulatory costs, which gives them a competitive advantage over traditional telecommunications service providers, who face higher licence fees. A typical example of the situation in the Czech Republic is that the provision of satellite services to end-users is effectively permitted simply by submitting a notification of business activity in electronic communications.

In addition to licence fees, traditional telecommunications services also require significant investment in physical infrastructure, such as the laying of fibre-optic cables, the construction of mobile masts and the maintenance of terrestrial networks. Satellite operators, by contrast, invest heavily in launching satellites, but do not face the same level of local infrastructure costs in every country, which can offset the lower costs of obtaining a licence. Whilst launching satellites is costly, they can serve vast, sparsely populated areas without the need for terrestrial infrastructure in every market. Satellite spectrum fees are also generally lower than those for mobile networks, which must bid for scarce frequencies in competitive auctions, particularly for 4G or 5G networks.

Possible adjustments to the fee model

Given the growing importance of satellite services in global telecommunications, there is increasing discussion on how to adjust the fee collection model to ensure a level playing field between satellite service providers and traditional operators, or more generally, terrestrial network operators (excluding the general authorisation regime for low-power terrestrial stations). A frequently mentioned option is the introduction of a fee collection model based on the number of terminal devices or users connected to the satellite network. This would ensure that satellite operators contribute in proportion to their market influence, similar to mobile operators, who are charged according to the number of connected users. However, this solution is difficult to implement in practice and is therefore – at least at present – rarely used. The reason lies in the complexity of counting end-users of the satellite signal. Each user would have to be uniquely identifiable, which cannot be guaranteed when broadcasting via satellite reception cards. Nevertheless, there are examples of countries that have adopted this charging model; see the section below.

Another potential model is to charge satellite operators based on their revenue in a given country, which would ensure that the fees reflect the actual economic activity generated by satellite services. This approach would ensure that the fee level reflects the economic performance of services such as Starlink, even though it does not apply directly to every connected device. However, determining the actual revenue generated by a specific service within the country is problematic. A satellite connectivity provider must hold a licence to broadcast within the Czech Republic, but is not required to have its registered office there. The ability to correctly calculate the basis for a percentage-based levy based on such a company's revenue would be limited. A blanket taxation of this service in the form of a sectoral tax also makes little sense. Taxation would also affect the company's other business activities, whilst the enforcement of such tax collection would be considerably complicated.

6.4.1 Challenges of charging for satellite services

Charges for low-power terminals are not typically levied in the Czech Republic, as they fall under VO-R/1. As regards ground stations with a power output higher than that specified in VO-R/1, the Czech Republic has a functioning charging mechanism in place.

The problem therefore arises primarily with the frequencies used by satellites, where:

1. the entity has registered a satellite network in the Czech Republic – there is no defined fee for the IO for a space station.
2. the entity has registered a satellite network in the Czech Republic and its signal covers the territory of the Czech Republic – the level of fees based on the number of terminals is problematic, but it is possible to charge fees based on the range of spectrum used and the type of network (GSO/NGSO). In other words, a fee for the fact that the entity is transmitting and providing services on Czech territory, albeit via an intermediary.

6.4.2 CGC

The benchmark also includes a comparison of service charges in the Czech Republic and abroad. In the Czech Republic, the fee for the CGC (Complementary Ground Components) of the satellite mobile service system in the 1980–2010 MHz and 2170–2200 MHz bands is calculated as follows.

Fee per base station = **Bandwidth (in MHz) × 13,500 CZK**

Croatia

In Croatia, the fee is paid to two bodies: the regulatory authority and the state treasury. Fee payable to

the state budget: $\text{Fee} = a \times b$

- **a:** unit price for the use of the radio spectrum – 66 EUR
- **b:** coverage coefficient – for the purposes of comparison with the Czech fee, coefficient $b = 2$ (1.710–2.500 GHz band)
- The fee for CGC is then 150% of the formula for the satellite service
- i.e. calculation of the fee: $(66 \times 2) \times 1.5 = 198$ EUR per 1 MHz for CGC Fee

payable to the regulatory authority: unit price 199.08 EUR.

In total, therefore, the CGC fee in Croatia amounts to EUR 397.08 – that is, around **CZK 10,000 per 1 MHz** of bandwidth.

Luxembourg

In Luxembourg, a fixed fee is payable per station based on the total number of stations:

- €2,000 per station if the operator's total number of authorised stations is less than or equal to 10;
- €6,000 for each additional station.

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The fee therefore amounts to around 50,000 CZK for the first 10 stations and 150,000 CZK for each additional one. This means that the fee for the first 10 stations is equivalent to the fee for a CGC in the Czech Republic with a bandwidth of 3.7 MHz, or 11.1 MHz for each additional station.

Hungary

In Hungary, the fee for the use of frequencies for CGC satellite services is 0.5 HUF/kHz/month for the band $960 \text{ MHz} < F \leq 10 \text{ GHz}$. That is, around **370**

CZK/MHz/year. United

Kingdom¹²⁷

To calculate the licence fee for CGC, Ofcom uses the same methodology as for TETRA networks, distinguishing geographical locations according to the population density of the area. It therefore distinguishes between three location categories for the fee:

- Category A (high demand) – 64,000 pounds for **2 x 1 MHz** per base station (**1.957 million CZK**)
- Category B (medium demand) – £8,025 for **2 x 1 MHz** per base station (**CZK 245,000**)
- Category C (low demand) – £825 for **2 x 1 MHz** per base station (**CZK 25,000**)

France

The allocation of terrestrial elements complementing satellite mobile systems for public services is calculated using the formula $I \times k^5 \times N$.

I = frequency band width

k^5 = 267

N = number of complementary terrestrial components of satellite mobile systems installed in metropolitan France. The fee therefore amounts to 267 EUR per 1 MHz of bandwidth per station. This equates to **approximately 6,750 CZK/MHz/year/station. Poland**

In the mobile satellite service sector, the fee for the use of frequencies with a total bandwidth of 1 MHz utilised by complementary ground components of mobile satellite systems, where such frequencies are used within the boundaries of a single municipality or a smaller area, amounts to 250 PLN.

Where the service is used across an area larger than that of a single municipality, the fee is calculated as the product of 250 PLN and the number of municipalities in which the frequencies are used. If this product exceeds the maximum value of 70,000 PLN for the 1,900–2,300 MHz band, the value is adjusted using a formula based on population coverage, up to a maximum of 115,000 PLN. This means that the fee ranges from **1,450 CZK per year per 1 MHz** for coverage of a single municipality **up to 670,000 CZK per year per 1 MHz** for the whole of Poland.

6.4.2.1 Conclusion of the CGC comparison

A comparison of licence fees for the use of complementary terrestrial stations (CGC) in various countries reveals significant variability in both the method of calculation and the absolute value of the fees. These differences stem from the varying methodologies and approaches adopted by individual national regulators in valuing the use of the frequency spectrum.

Significant price differences across countries

The Czech Republic applies a linear calculation based on bandwidth (13,500 CZK per 1 MHz). A comparison with other countries shows that:

- **Croatia** has lower fees per 1 MHz (approximately 10,000 CZK/MHz), even though the system includes two types of fees.
- **Luxembourg** uses fixed rates per station. The price for the first 10 stations roughly corresponds to the fee in the Czech Republic for a bandwidth of 3.7 MHz, whilst for each additional station the rate increases to a level corresponding to 11.1 MHz.
- **Hungary** is among the countries with the lowest fees, at just 370 CZK/MHz/year.
- **The UK**, by contrast, shows a high degree of variability. High-demand areas (Category A) have extremely high fees (1.957 million CZK for 2 x 1 MHz), whilst in low-demand areas (Category C) the fees are comparable to those in the Czech Republic. This calculation demonstrates a strong market-based approach to spectrum management.
- **France** charges 267 EUR (approx. 6,750 CZK) per 1 MHz per station per year, which is roughly half the Czech fee.
- **Poland** applies a combined model of a fixed fee per municipality and a maximum cap of up to 115,000 PLN (670,000 CZK/MHz) for nationwide coverage, thereby creating considerable variability depending on the extent of coverage.

¹²⁷<https://www.ofcom.org.uk/siteassets/resources/documents/consultations/uncategorised/7815-2ghz-mobile-satellite-systems/summary/authorisation-terrestrial-mobile-networks-2-ghz-mss.pdf?v=322796>

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Different calculation methodologies

- **The Czech Republic** and **France** use linear models based on bandwidth.
- **Luxembourg** and **Poland** apply a system of fixed rates depending on the number of stations or territorial coverage.
- **The UK** differentiates fees according to geographical demand, which takes into account the economic attractiveness of the area.
- **Croatia** combines a percentage surcharge on satellite service fees with fixed payments to the regulatory authority.

In a comparative context, the Czech Republic ranks among countries with **average to slightly higher fees**. Given the simplicity of the calculation, the Czech model is transparent, but less flexible than, for example, in Poland or the United Kingdom, where regional factors are taken into account to a greater extent.

Annex 1 – Denmark¹²⁸

The Danish Energy Agency (which falls under the Ministry of Climate, Energy and Utilities) collects fees for the use of radio frequencies in accordance with Section 50 of the Radio Frequencies Act, see Consolidated Act No. 151 of 27 January 2021.

Holders of spectrum licences must pay an annual spectrum fee. The spectrum fee consists of a fixed user fee and a variable component. The fixed user fee is DKK 600 per licence, regardless of the frequency band. The variable fee depends on the fee category to which the licence belongs, the frequencies for which the licence was issued, and the bandwidth allocated. The tariff schedule for the current year is always published on the regulator's website.

Fees are levied annually on all existing licences and on new licences. They are payable in advance during the calendar year in which the licence is valid.

Licences are divided into nine fee categories.

- 1) Mobile and fixed services
- 2) Fee for a specific transmission site
- 3) Terrestrial use with multiple connected devices within a defined area or from a specific location
- 4) Applications not coordinated with other users
- 5) Digital terrestrial television (DTT)
- 6) Digital Audio Broadcasting (DAB)
- 7) National and regional FM broadcasting
- 8) Local FM broadcasting
- 9) Experimental purposes

The tables below set out the fees for the period from 1 January to 31 December 2024.

Mobile (and fixed) service

This fee category covers licences for the use of frequencies issued on a national basis or for geographically defined areas (area-wide use) for use by mobile systems (or fixed services). The fee is based on a national licence. If the licence is not nationwide, the frequency fee is adjusted in proportion to the area of the geographical region for which the licence was issued. The frequency fee is as follows:

Table 95: Fee in Danish kroner (DKK) per MHz for a nationwide network

Frequency band (MHz)	Fee in DKK
0–470	56,405
470–1,000	112,811
1,000 – 3,000	56,405
3,000 – 9,500	5,640
9,500 – 33,400	564
33,400 – 57,000	282
Over 57,000	94

Fee for a specific transmission site (fixed point-to-point/point-to-multipoint service)

This fee category covers authorisation to use frequencies from a specific transmission site. The fee is calculated on the basis of a single transmission site. If authorisation has been granted for multiple transmission sites, the frequency fee is adjusted according to the number of transmission sites. The frequency fee in fee group 2 is as follows:

¹²⁸<https://www.klimadatastyrelsen.dk/digital-infrastruktur/frekvenser/frekvenstilladelser->

Table 96: Fee per MHz per transmission site (DKK)

Frequency band (MHz)	Fee (DKK)
0 – 470	5,531
470 – 1,000	5,531
1,000 – 3,000	2,766
3,000 – 9,500	227
9,500 – 21,000	11
21,000 – 33,400	6
33,400 – 57,000	3
Over 57,000	1

Terrestrial use with multiple connected devices within a defined area or from a specific location (mobile service, geographically restricted)

This fee category covers licences for the use of frequencies allocated in 25 kHz-spaced channels for use from a specific transmission site or within a geographically defined area (terrestrial use), to which a specific number of mobile units are connected for frequency utilisation. The fee amount is based on a 25 kHz channel at a specific transmission site. If a licence has been issued for multiple transmission sites in 25 kHz channels or for multiple 25 kHz channels at a single transmission site, the frequency fee is adjusted according to the number of transmission sites and the number of 25 kHz channels.

The fee for fee group 3 also depends on whether fewer or more than 30 mobile devices are associated with the licence. The frequency fee for fee group 3 is as follows:

Table 97: Fees per 25 kHz per transmission site

Frequency band (MHz)	Fee for up to 30 mobile devices (DKK)	Fee for 30 or more mobile devices (DKK)
0 – 470	52	208
470 – 1,000	52	208
1,000 – 3,000	26	104
3,000 – 9,500	3	12
9,500 – 33,400	3	12
Over 33,400	3	12

Applications not coordinated with other users (e.g. satellite service)

This fee category covers authorisations to use frequencies issued for a frequency or frequency band where such use is not specifically coordinated with other users of the same frequency or within the same frequency band. The fee is calculated on the basis of each individual authorisation issued. The fee for each frequency is as follows:

Table 98: Fee for individual authorisations issued (DKK)

Frequency band (MHz)	Fee (DKK)
0 – 470	1,593
470 – 1,000	3,186
1,000 – 3,000	1,593
3,000 – 9,500	159
9,500 – 33,400	16
Over 33,400	8

Digital terrestrial television (DTT)

Fee Group 5 covers licences for the use of frequencies issued for the nationwide DTT (Digital Terrestrial Television) broadcasting network. This fee group also covers licences issued for specific channels for use in digital television.

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The fee is based on a nationwide transmission network comprising 17 main transmitters linked to a number of auxiliary transmitters, which use the same frequency as the main transmitters. If the licence is not nationwide, the frequency fee is adjusted according to the number of channels compared with the 17 channels. The fee is as follows:

Table 99: Fee for the nationwide DTT transmission network

Frequency band (MHz)	Fee (DKK)
0 – 470	1,579,782
470 – 1,000	3,159,565

Digital Audio Broadcasting (DAB)

This fee category covers licences to use radio frequencies issued for the whole country or for geographically limited areas for use by a DAB (Digital Audio Broadcast) transmission network. The fee is based on a transmission network comprising several main transmitters linked to several auxiliary transmitters, which use the same radio frequency as the main transmitters. If the licence is not nationwide, the frequency fee is adjusted in proportion to the area of the geographical region for which the licence was issued. The frequency fee is as follows:

Table 100: Fee for the nationwide DAB broadcasting network

Frequency band (MHz)	Fee (DKK)
0 – 470	43,035

National and regional FM broadcasting

This fee category covers licences to use frequencies issued at national level or for regionally defined areas for the operation of FM broadcasting networks.

The fee is based on a transmission network comprising several main transmitters linked to several auxiliary transmitters. If the licence is not national, the frequency fee is adjusted in proportion to the area of the regionally defined territory for which the licence was issued. The frequency fee is as follows:

Table 101: Fee for a nationwide FM broadcasting network

Frequency band (MHz)	Fee (DKK)
0 – 470	72,064

Local FM broadcasting

This fee category covers licences for the use of frequencies issued to local FM broadcasters. The fee is calculated on the basis of a single FM frequency allocated to a single transmission site. If a licence has been issued for multiple FM frequencies at a single transmission site, or for the same FM frequency at multiple transmission sites, the fee per frequency is adjusted according to the number of FM frequencies and transmission sites. The fee per frequency is as follows:

Table 102: Fee for individual frequencies allocated to a transmission site

Frequency band (MHz)	Fee (DKK)
0 – 470	146

Experimental purposes

This fee category covers licences for the use of frequencies for experimental purposes issued in accordance with the provisions of the Radio Act relating to licences for experimental purposes. The fee amount depends on each individual licence issued. The fees for frequencies are as follows:

Table 103: Fees for authorisations to use frequencies for experimental purposes (DKK)

Frequency band (MHz)	Fee (DKK)
0 – 100,000	600

Expiry of spectrum licences – refund of spectrum fee

If a spectrum licence holder terminates their licence before the expiry date, they will be refunded a pro rata share of the spectrum fee paid. The amount refunded to the licence holder corresponds to the variable spectrum fee paid for the period from the date on which the regulator receives notice of termination of the licence until the end of the current calendar year. The licence application fee is non-refundable.

Annex 2 – Finland¹²⁹

Spectrum management in Finland was for a long time the responsibility of the regulator FICORA. At the start of 2019, this authority, together with other institutions, was merged into a single body called TRAFICOM, whose full name is the Finnish Transport and Communications Agency. This agency is also responsible for collecting fees for the use of radio frequencies.¹³⁰ Since 2020, the fees have been reviewed every two years (the current version is valid from 1 January 2024 to 31 December 2025).

The method of collecting the fees is currently set out in Decree 1169/2023 of the Ministry of Transport and Communications on administrative fees for radio frequencies and other fees collected by the Finnish Transport and Communications Agency, published on 21 December 2023.

The fee is charged for the following:

- 1) the right to own and use a radio transmitter or licensed radio transmitters of a radio network, radio system or radio station (radio licence);
- 2) the allocation of radio frequencies;
- 2a) protection of a receiving radio station against interference; and
- 3) the management of frequencies related to the country's military defence.

TRAFICOM collects fees for all radio licences and frequency allocations it grants. The pricing of different frequency bands is used as a tool to steer users towards frequencies with lower traffic.

The amount of the spectrum usage fee is based on three parameters, namely availability, usability and the number of frequencies included in the licence. A fee is also charged for frequency reservations.

When setting the frequency fee for radio transmitters, radio networks, radio systems or radio stations, the Finnish Transport and Communications Agency takes into account the following general principles for fee setting, as set out below:

- 1) the number of frequencies allocated or reserved for use, the nature of the right of use and the width of the reference band;
- 2) the frequency band designated or reserved for use;
- 3) the population in the area covered by the radio system with a right of use, as well as the population in the area with a right of use;
- 4) the group of radio equipment to which the transmitter belongs.

When determining the fee for the possession and use of certain radio transmitters, radio networks or radio systems, the Finnish Transport and Communications Agency shall also take into account the number of radio transmitters in use or the type of operation on the frequencies designated for use.

For short-term licences, the fee is charged according to the period of use. However, the fee amounts to at least 25 per cent of the annual frequency fee and is always at least EUR 18.

Telecommunications companies with a turnover exceeding EUR 300,000 are also required by law to pay a fee of 0.135 per cent of their relevant turnover. This fee, known as the 'Information Society Fee', is intended to support the creation of the so-called information society – that is, a digital and technologically advanced Finnish society capable of making effective use of information technology.¹³¹

General fees for the use of frequencies

The fee for the use of frequencies is generally calculated using the following formula:¹³²

$$\text{Fee} = c_1 * c_{inh} * c_{6b} * B_0 * S * P$$

This formula is not the same for every category of radio equipment. Each category of equipment substitutes variables into the calculation based on the table below. This then determines the amount of the fee depending on the values of the coefficients.

¹²⁹<https://www.finlex.fi/fi/laki/alkup/2023/20231169>

¹³⁰https://www.epra.org/news_items/finnish-regulator-to-change-name-and-merge-with-traffic-safety-authority

¹³¹<https://www.finlex.fi/fi/laki/ajantasa/2014/20140917>

¹³²<https://www.traficom.fi/en/communications/communications-networks/frequency-fees-guide-spectrum-use>

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Table 104: Schematic showing the substitution of variables into the formula for calculating fees by category of radio equipment

Radio equipment category	C1	Cmode	Cinh	C6b	B0	S	P
Television transmitters	x		x		x	x	x
Transmitters: radio broadcasting	x		x		x	x	x
Public mobile networks	x		x		x	x	x
Ground component for the 2 GHz satellite system	x		x		x	x	x
Network of Public Authorities (VIRVE)	x		x		x	x	x
GSM-R radio system for railways	x		x		x	x	x
Radio systems in a fixed wireless access network	x		x		x	x	x
Radio stations on ships and in aeroplanes		x				x	x
Aeronautical mobile radio stations		x				x	x
Personal Locator Beacon (PLB)	x		x		x	x	x
Amateur radio transmitters with increased transmission power					x	x	x
Tracking systems for research purposes with a radiated power of less than 1 mW	x		x		x	x	x
Systems for remote control, telemetry and data transmission	x		x		x	x	x
Amateur radio transmitters						x	x
Other amateur radio stations requiring a special licence					x	x	x
Transmitters with radio microphones	x		x	x	x	x	x
Private Mobile Radio (PMR)	x		x	x	x	x	x
Radio control transmitters	x		x	x	x	x	x
Paging networks	x		x	x	x	x	x
Maritime radio systems other than shipboard radio stations	x			x	x	x	x
Radio transmitters operating below 960 MHz and radio links for the transmission of audio programmes	x		x		x	x	x
Fixed high-frequency transmitters	x		x		x	x	x
Air-to-ground radio systems	x			x	x	x	x
Radio probe systems	x		x		x	x	x
Ground stations in the fixed satellite service	x		x		x	x	x
Radio transmitters operating above 960 MHz	x		x		x	x	x
Radio transmitters on all spacecraft sent into space						x	x
Radar stations other than those on ships or aircraft	x		x		x	x	x

c₁ = Frequency band coefficient

Table 105: Value of the c₁ coefficient by frequency band

Frequency band	c ₁
0 – 28 MHz	0.2
28.001 – 87.5 MHz	0.9
87.501 – 108 MHz	1.5
108.001 – 146 MHz	1.7
146.001 – 174 MHz	1.9
174.001 – 380 MHz	2.0
380.001 – 470 MHz	2.0
470.001 – 862 MHz	2.0
862.001 – 960 MHz	1.4
960.001 – 2200 MHz	1.0
2200.001 – 3100 MHz	0.6
3100.001 – 5000 MHz	0.4

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5000.001 – 10700 MHz	0.3
10,700.001 – 19,700 MHz	0.25
19,700.001 – 39,500 MHz	0.2
39,500.001 – 55,000 MHz	0.1
Above 55,000 MHz	0.03

c_{inh} = Population coefficient. This is defined as the ratio of the population in the area covered by the right to use a radio transmitter or radio network, radio system or radio station to the population of Finland. It takes the value 1 for areas covering the whole of Finland. For a frequency fee relating to a service other than those defined, the population coefficient has a fixed value of 0.01.

c_{6b} = System coefficient. The system coefficient c_{6b} is defined according to the graded number of mobile radio transmitters in the system, such that the weighting coefficient for mobile radio transmitters is 0.25. The system coefficient for radio control transmitters is defined by the number of mobile terminals (No) and a weighting coefficient of 0.25, according to the formula $c_{6b} = 0.25 \times \text{No}$. However, the maximum value of the system coefficient is 23.75. When calculating the frequency fee for radio systems and radio networks without mobile terminals, the value of the system coefficient is 1.

Table 106: Value of the c_{6b} coefficient according to the number of mobile radio transmitters

Number of mobile terminals (No)	Scaled number (Nos)	$c_{6b} (0.25 \times \text{Nos})$
1	1	0.25
2–4	2	0.5
5–8	5	1.25
9 – 14	9	2.25
15–24	15	3.75
25–34	22	5.5
35–44	30	7.5
45–59	40	10
60–79	55	13.75
80–99	70	17.5
100 or more	95	23.75

B_0 = Relative bandwidth. This coefficient is used to take account of the number of frequencies used. The relative bandwidth is the ratio of the allocated number of frequencies (B) to the reference bandwidth (B_{ref}), which is 25 kHz.

Relative bandwidth is calculated using the formula: $B_0 = (B \times c_j) / B_{ref}$

Relative bandwidth is the ratio of the allocated frequency (B) to the reference bandwidth (B_{ref}), or the cube or eighth root of this ratio.

When defining the relative bandwidth (B_0) for certain groups of radio equipment, the right of use (c_j) as set out in the table below is also taken into account. Where frequencies have been allocated or reserved for use with different rights of use, the frequency quantity is the sum of the various frequency quantities.

The usage rights coefficients (c_j) are as follows:

Table 107: c_j coefficient values by category of radio equipment and right of use

Category of radio equipment	Right of use	c_j
Public mobile networks, public authority networks (VIRVE), the GSM-R radio system for railways, radio systems in fixed wireless networks and broadcasting networks	National channel with exclusive right of use	5
	National channel for a limited group of users	2
	A local channel with exclusive rights of use	2
	Local shared channel	1
Radio link transmitters below 960 MHz, radio relay links for the transmission of audio programmes, private mobile radio (PMR) networks, paging networks, remote control systems, telemetry and data transmission, and maritime radio systems other than shipboard radio stations	National channel with exclusive right of use	5^3
	Local channel with exclusive right of use	2^3
	National channel for a restricted group of users	2
	Local shared channel	1
	National shared channel	0.4
Transmitters for radio control	National channel with exclusive right of use	5^8
	Local channel with exclusive right of use	2^8
	National channel for a restricted group of users	2
	Local shared channel	1

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	National shared channel	0.4
Radio link transmitters above 960 MHz	Local shared channel	1
	National shared channel	0.01
Radio transmitters and radio systems for military radio communications	National channel with exclusive right of use	5
	Local channel with exclusive right of use	2
	Local shared channel	1
	National shared channel	0.4
Other	All channels	1

S = Basic fee coefficient. This coefficient allows the same basic fee to be applied to all categories of radio equipment. The basic fee coefficients (S) are:

Table 108: Value of the S coefficient by category of radio equipment

Category of radio equipment	S
Transmitters for broadcasting services	0.018
Public mobile networks	0.018
Supplementary terrestrial component of systems providing MSS at 2 GHz	0.018
Public authorities' network (VIRVE)	0.018
GSM-R radio system for railways	0.018
Radio systems in fixed wireless networks	0.018
Radio stations on ships and aircraft	0.001
Radio transmitters for the aeronautical mobile service	0.001
Personal Locator Beacon (PLB)	0.15
Amateur radio transmitters with increased transmission power	0.004
Tracking systems for research purposes with a radiated power of less than 1 mW	0.4
Remote control, telemetry and data transmission systems	0.9
Amateur radio transmitters	0.014
Other amateur radio transmitters requiring a special licence	0.014
Microphone radio transmitters	1
Private mobile radio (PMR) networks	2.1
Transmitters for radio control	2.1
Paging networks	2.1
Maritime radio systems other than shipboard radio stations	0.021
Transmitters for radio-relay links below 960 MHz and links for the transmission of audio programmes	3.1
Fixed transmitters in the high-frequency (HF) bands	3.8
Ground-based radio systems for aviation	0.038
Radiosonde systems	0.05
Ground stations in the fixed satellite communications service requiring coordination	6
Earth stations in the fixed satellite communication service not requiring coordination	1.1
Radio transmitters operating above 960 MHz	25
Radio transmitters of any equipment launched into space	30
Radar stations other than ship- or aircraft-based radar stations	1.5

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P = Basic fee – EUR 1,295.50. P is the basic fee used to calculate the frequency fee for all categories of radio equipment. This is not a fixed fee, but a calculated value which is adjusted using additional coefficients to arrive at the final frequency fee.

When calculating the frequency fee for **marine or aeronautical radio stations** and **mobile aeronautical radio transmitters**, the general formula given above is replaced by the operating mode coefficient C_{mode}

The calculation formula in this case is as follows: $C_{mode} \cdot S \cdot P$

C_{mode} = is the operating mode coefficient. It is defined on the basis of the operating mode of the frequencies allocated in the licence holder's licence. The table below lists the operating mode coefficients.

Table 109: Value of the C_{mode} coefficient by operating mode

Operating mode	C_{mode}
Satellite frequencies	20
Maritime in the medium frequency (MF) and high frequency (HF) bands	15
Frequencies for maritime very high frequency (VHF), distress communications and radio navigation, and non-maritime and non-aviation uses in the very high frequency (VHF) band	15
Aeronautical in the medium (MF) and high (HF) frequency bands	15
Aviation in the very high frequency (VHF) band and distress frequencies	15
Maritime and other very high frequencies	7
Frequencies for aeronautical radio navigation	3

Frequency reservation fee

The Finnish Transport and Communications Agency charges a fee for the reservation of radio frequencies at the same rate as for the right to own and use a radio transmitter. The frequency fee is levied even if it amounts to less than 18 EUR or less than a quarter of the annual frequency fee.

If the reservation ceases to apply due to the granting of a licence to own and use a radio transmitter, the annual frequency fee for the first year or the short-term frequency fee will be deducted.

The amount deducted is equal to the frequency fee multiplied by the ratio of 365 to the difference between the number of days of the frequency reservation's validity and its actual validity due to expiry. However, no deduction is made from the transmitter frequency fee or the short-term frequency fee.

However, the frequency reservation fee does not include mobile stations of private mobile radio (PMR) networks, paging networks, maritime radio systems other than ship-to-shore radio stations, or land-based radio systems operating on aviation frequencies. If a network or system comprises only mobile stations, the frequency allocation fee shall be calculated on the basis of a single mobile station.

However, the frequency allocation fee for remote control, remote measurement and data transmission systems is determined by calculating one radio transmitter for each radio channel allocated to the system.

Frequency fee for protection against interference to a receiving station

For the protection of a receiving station against interference pursuant to a decision, an annual frequency fee is levied in the same amount as would be levied for a transmitter, radio network or radio system for the primary use of the frequency band whose frequencies are protected under the decision. Where the protected frequencies are in frequency bands with different frequency band coefficients, the frequency band with the highest frequency band coefficient shall be used when determining the frequency fee.

Frequency management fee for military radiocommunications

The Finnish Transport and Communications Agency collects an annual fee for the management of frequencies relating to the country's military defence, which is set for each frequency band. The frequency management fee is calculated using the following formula:

$$B_0 \cdot K_1 \cdot \text{Kasuk} \cdot S \cdot \text{€}1,295.50$$

In this case, the coefficients S and B_0 differ from those in the general formula.

B_0 – The relative radio frequency bandwidth (B_0) used for the frequency management fee is the ratio of the number of frequencies (B) allocated to radio communications relating to the country's military defence within a given frequency band to the width of the 14 MHz reference band.

S – The basic fee coefficient S used for the frequency management fee is a coefficient specific to that fee, which is used to determine the ratio of the basic fee to the amount of the frequency management fee collected. The value of the coefficient is 0.85.

Apart from the frequency management fee, no fee is levied for the reservation of frequencies allocated to the armed forces or border guards, or for the right to own and use a radio transmitter or radio network, a radio system or a licensed radio transmitter of a radio station.

A typical annual frequency fee for a radio licence that is valid immediately.

- The typical annual frequency fee for a marine radio licence ranges from EUR 19.43 to EUR 38.86, depending on the type and number of radio transmitters.
- The annual frequency fee for a radio licence for ground-based VHF aeronautical radiotelephones at uncontrolled aerodromes is usually €20.92.
- The annual frequency fee for a licence for VHF aeronautical radiotelephones used on board aeroplanes and gliders and on the ground is €19.43.
- The annual frequency licence fee for a PLB is €19.43.
- The standard annual frequency licence fee for aircraft radiotelephones ranges from €18 to €37.43, depending on the types and number of radio transmitters.

The annual frequency licence fee for an amateur radio licence is EUR 18.14.

Annex 3 – France¹³³

Under the law, fees are divided into:

- State fee for the allocation of radio frequencies
- Fees for the administration of frequencies (set by order of the Minister responsible for electronic communications)
- Fees paid by operators of publicly accessible terrestrial mobile networks

State fees for the allocation of radio frequencies distinguish between the following services:

- Fixed point-to-point service (service fixe point à point)
- Fixed local radio loop/point-to-multipoint links (service fixe de boucle locale radio)
- Fixed or mobile satellite services (service fixe ou mobile par satellite)
- Mobile service of independent networks (service mobile des réseaux indépendants)
- Other services

The 2007 decree itself, which sets the levels of the fees, has been amended twenty times since it came into force; in some years it was amended more than once (specifically in 2009, 2016, 2023 and 2024).

Emergency medical services provided by public hospitals, fire and rescue services, civil protection networks included in the list drawn up on the basis of a regulation issued by the Minister of the Interior and the Minister for the Budget, and radio broadcasters are exempt from paying state fees.

Fees for the provision of frequencies are calculated as the product of various coefficients. A list of these is set out in the table below.

Table 110: Coefficients for calculating fees for the use of frequencies

Name of coefficient	Meaning
l	allocated frequency band width
bf	frequency band
lb	step size for point-to-point fixed services
es	spectral efficiency for fixed point-to-point service
a	authorisation to use frequencies on the basis of an allocation
c	the area covered by the authorisation to use frequencies
k1, k2, k3, k4, k5, k6	reference values
N	number of complementary terrestrial elements of mobile satellite systems installed in the territory of metropolitan France

The values of the coefficients bf, lb, es, a, k1, k2, k3, k4, k5, k6 and N are set by order of the Minister responsible for electronic communications.¹³⁴

- k1 = 15.5
- k2 = 2,745
- k3 = 15.5
- k4 = 1,050,000
- k5 = 267
- k6 = 34,000
- bf = 0.07 to 8.7 depending on the band
- For further coefficients, see the Minister's order

¹³³<https://www.legifrance.gouv.fr/loda/id/JORFTEXT000000619224/>

¹³⁴<https://www.legifrance.gouv.fr/loda/id/JORFTEXT000000791516>

Fixed-line service

The fixed service is divided into point-to-point and point-to-multipoint connections.

Table 111: Coefficients used to calculate fees for the use of frequencies for the fixed service

Point-to-point links (microwave links) in networks open to the public or operating independently	Price calculation
Allocation of a fixed point-to-point service	$I \times bf \times lb \times es \times k1$
bundled fixed point-to-point services ¹³⁵	$I \times bf \times a \times c \times k1$
Point-to-multipoint connections (Radio local loop)	Price calculation
Allocation of a fixed radio local loop ¹³⁶	$I \times bf \times c \times k2$

For point-to-point connections, price adjustments are applied in line with the consumer price index, with 2007 as the base year.

For the allocation of a fixed loop service outside metropolitan France, the annual fee for provision is set at 23 EUR per MHz. For the territorial collectivity of Saint-Pierre-et-Miquelon and the department of Mayotte, this amount is 7.7 EUR per MHz.

Satellite service

Satellite service:

Table 112: Coefficients used to calculate fees for the use of frequencies for the satellite service

Satellite service	Calculation of the fee
Allocation of a ground station to the fixed or mobile satellite service	$I \times bf \times k3$
Satellite fixed service	$I \times k3 \times a$
Satellite mobile public service	$I \times k3 \times a$
Allocation of terrestrial elements complementing satellite mobile systems for public services	$I \times k5 \times N$

For the satellite service, indexation is applied in line with the consumer price index, with 2007 as the base year.

Mobile service

For the mobile service, indexation applies in line with the consumer price index, with 2007 as the base year.

Mobile service in bands below 470 MHz

The allocation of the mobile service for independent networks in frequency bands below 470 MHz is the annual fee for the provision of the service, expressed in euros, calculated as the product shown in the table below:

Table 113: Coefficients used to calculate fees for the use of frequencies for the mobile service (up to the 470 MHz band)

Mobile service	Calculation of the fee
Independent networks in frequency bands below 470 MHz	$I \times bf \times c \times K4$

The values of the coefficient c for this calculation can be found in this table:

Table 114: Values of the coefficient c for calculating the fee for mobile services in the band up to 470 MHz

Allocated zone (km²)	Coefficient (c)
Greater than 300,000	1
300,000 – 125,000	0.75
125,000 – 30,000	0.605
30,000 – 8,000	0.217
8,000 – 800	0.076
800 – 80	0.04
80 – 20	0.014

¹³⁵ The coefficient c is equal to the ratio between the area covered by the allocation and the total area of metropolitan France

¹³⁶ The coefficient c is equal to the ratio of the area covered by the allocation to the total area of metropolitan France

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Less than 20	0.0051
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For allocations to the mobile service for independent networks in frequency bands below 470 MHz with an effective radiated power, as defined in Article 1.162 of the Radio Regulations, **exceeding 50 milliwatts**, the annual fee for the provision of the service, expressed in euros, is calculated as the product of the coefficients in the table.

Table 115: Coefficients used to calculate fees for the use of frequencies for the mobile service (up to the 470 MHz band with an radiated power exceeding 50 mW)

Mobile service	Calculation of the fee
Independent networks in frequency bands below 470 MHz	$I \times bf \times c \times K4$

Table 116: Value of coefficient c in the band below 470 MHz with a radiated power of at least 50 mW

Area covered by the allocation	Value of coefficient c
National allocation	1.05
Domestic allocation restricted to railway rights	0.6
Allocation covering the Île-de-France region	0.06
Allocation covering the region (excluding the Ile-de-France region)	0.048
Allocation covering no more than one territorial unit	0.012

Mobile service in the 2570–2620 MHz TDD band

For allocations to the mobile service of independent networks in the 2570–2620 MHz TDD band, the annual fee for the provision of the service, expressed in euros, is calculated as the product shown in the table below:

Table 117: Calculation of the fee for the mobile service of independent networks in the 2570–2620 MHz TDD band

Mobile service	Calculation of the fee (in EUR)
2570–2620 MHz TDD band	$I \times bf \times c \times a \times K6$

The values of the coefficient c for this calculation can be found in this table:

Table 118: Values of the coefficient c for calculating the fee for the mobile service in the 2570–2620 MHz TDD frequency band

Allocated zone in the 2570–2620 MHz TDD frequency band (km²)	Coefficient (c)
Greater than 300,000	1.050
300,000 – 200,000	0.600
200,000 – 100,000	0.400
100,000 – 80,000	0.200
80,000 – 60,000	0.160
60,000 – 40,000	0.120
40,000 – 20,000	0.080
20,000 – 5,000	0.060
5,000 – 1,000	0.045
1,000 – 500	0.030
500 – 200	0.020
200 – 100	0.010
100 – 20	0.006
20 – 5	0.0015
5 – 1	0.0005
1 – 0.3	0.00013
Less than 0.3	0.00005

Publicly accessible terrestrial mobile networks

This section covers fees paid to operators of publicly accessible terrestrial mobile networks.

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The fees for the bands listed in the table below consist of a fixed and a variable component. The variable component is the same for all these bands, namely 1 per cent of total turnover recorded as at 31 December of the year for which the frequencies are used. The amount of the fixed component is set out in the table below:

Table 119: Amount of the fixed component of the fee payable by operators of publicly accessible terrestrial mobile networks

Frequency band	Amount of the fixed component (EUR)
700 MHz	fee determined on the basis of a competitive licence allocation process
800 MHz	fee determined on the basis of a competitive licence allocation process
900 MHz	1,068 per allocated duplex kHz ¹³⁷
1.8 GHz	571 per allocated duplex kHz ¹³⁸
2.1 GHz	571 per allocated duplex kHz ¹³⁹
2.6 GHz	fee determined on the basis of the licence allocation tender process
3.5 GHz	fee determined on the basis of the licence allocation tender process

Alternatively, the fee is determined on the basis of the 2018 competitive licensing process in the 900 MHz band.

The fee for the administration of frequencies for point-to-multipoint links (radio local loop) is calculated as the product of EUR 533,570 and the ratio of the area covered by the allocation to the total area of the metropolitan area.

¹³⁷ calculated in proportion to the population of the areas covered by the licence

¹³⁸ calculated in proportion to the population of the areas covered by the licence

¹³⁹ calculated in proportion to the population of the areas covered by the licence

Annex 4 – Croatia

The amounts of the fees are governed by the **Compendium of Regulations on the Payment of Fees for the Right to Use Addresses, Numbers and the Radio Frequency Spectrum NN 151/22¹⁴⁰** and its addendum NN 37/23¹⁴¹ issued by the Croatian Ministry of Maritime Affairs, Transport and Infrastructure pursuant to the Electronic Communications Act of 2022¹⁴² and the **Rules on the Payment of Fees for the Fulfilment of Obligations by the Croatian Regulatory Agency for Network Activities of 2022¹⁴³** and its amendment of 2023¹⁴⁴ issued by the Regulatory Authority Council.

The **Compendium of Regulations** distinguishes between the following areas:

- Direct point-to-point connection
- Satellite service
- Private networks
- Public electronic communications networks
- User-to-user communication systems (paging)
- Point-to-multipoint networks
- Aviation, maritime, radar, radio navigation and inland waterway services
- Terrestrial broadcasting services
- Other services

Fees are payable on the basis of two decisions:

- A payment to the state budget to ensure the efficient use of frequencies.
- A payment to the regulatory authority to cover the costs of spectrum management.

In Croatia, a fee of 0.2% is levied on the total annual gross revenue generated by licence holders and telecommunications service providers in the previous year from the provision of telecommunications services and activities.

Direct point-to-point connections without portable terminal equipment (fixed service)

Fees payable to the state budget:

Possible uses of point-to-point links without portable terminal stations **include, amongst others, microwave links in the radio frequency range above 1 GHz.**

The amount of the annual fee for the use of unpaired radio frequency spectrum with a bandwidth of 1 MHz, based on the route length and radio frequency band specified in the licence for the use of radio frequency spectrum, is calculated using **the following formula:**

$$(0.16 \times a \times b \times \max(1, \min(5, c/d)))$$

Where:

a: unit price for the use of the radio spectrum – 66 EUR

b: coverage coefficient

¹⁴⁰https://narodne-novine.nn.hr/clanci/sluzbeni/2022_12_151_2359.html

¹⁴¹https://narodne-novine.nn.hr/clanci/sluzbeni/2023_03_37_638.html

¹⁴²https://narodne-novine.nn.hr/clanci/sluzbeni/2022_07_76_1116.html

¹⁴³https://narodne-novine.nn.hr/clanci/sluzbeni/2022_12_154_2430.html

¹⁴⁴https://narodne-novine.nn.hr/clanci/sluzbeni/2023_07_72_1195.html

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Table 120: Coefficient *b* as a function of frequency band

Frequency band (GHz)	Radio frequency band coverage coefficient (b)
0.470 or less	8
0.470–1.710	4
1.710–2.500	2
2.500–10.000	1
10,000–14,500	0.8
14,500–24,500	0.4
24,500–42,500	0.2
42,500 and over	0.01

If a radio station utilises paired frequency spectrum from bands with different frequency band congestion coefficients *b*, where it is necessary to coordinate operations with other radio stations or radio communications services in both frequency bands, the frequency band congestion coefficient *b* for the band with the higher utilisation coefficient shall apply.

c: minimum path length expressed in kilometres for the frequency band as per the table

Table 121: Value of coefficient *c* based on the shortest route by frequency band

Frequency band (GHz)	Shortest path length (km)
0.790 and below	35
0.790–1.710	30
1.710–10.000	25
10,000–14,500	12
14,500–19,700	5
19,700 and over	0

(An exception applies to links using modulation schemes with at least 64 states and a transmission rate of at least 70 Mbit/s; the minimum path length in the 1.71 GHz–10 GHz radio frequency band is 20 km.)

d: the route length expressed in kilometres and determined by the geographical coordinates of the end points as specified in the radio spectrum licence.

The **maximum / minimum (x, y)** function returns the largest / smallest value of these two arguments

If the applicant is allocated radio spectrum with a bandwidth other than 1 MHz, the fee shall be reduced or increased proportionally.

If an applicant or licence holder utilises a total of 82.5 MHz or more of contiguous radio frequency bandwidth on a single microwave link within the same radio band, using both horizontal and vertical polarisation in each individual frequency channel, they shall pay 50 per cent of the fee.

For the use of the radio frequency band above 1 GHz in directional point-to-point links, for which authorisation is granted via a simplified procedure, provided that this is stipulated in the radio spectrum allocation plan for this frequency band, 10 per cent of the fee specified in the preceding paragraphs shall be payable.

For the use of the radio frequency band above 1 GHz in a direct point-to-point link, where one point is located in the territory of another state, 50 per cent of the amount specified in the paragraph above.

Fees payable to the regulatory authority:

For the use of the radio frequency spectrum above 1 GHz in point-to-point directional links (with or without portable terminal stations) and ENG/OB, which utilise a spectrum bandwidth greater than 2 MHz, the fee is EUR 106.18.

No fee is payable for the use of the radio frequency spectrum above 1 GHz in point-to-point links (with or without portable terminal stations) and ENG/OB, which utilise a spectrum bandwidth of 2 MHz or less.

For the use of the radio frequency band above 1 GHz in directional point-to-point links, for which authorisation is granted via a simplified procedure, provided that this is stipulated in the radio spectrum allocation plan for this frequency band, the fee is EUR 26.54.

Direct point-to-point links with portable terminal stations (fixed service)

Fees payable to the state budget:

The possible use of point-to-point directional links with portable terminal stations operated as fixed stations includes, amongst other things, portable microwave links and electronic newsgathering and outside broadcasting (ENG/OB) in the radio frequency range above 1 GHz.

The amount of the annual fee for the use of an unpaired radio frequency band with a bandwidth of 1 MHz, for the radio frequency band and geographical area specified in the licence for the use of the radio frequency spectrum, shall be calculated according to the following formula:

$$(0.75 \times a \times b \times c)$$

Where:

a: unit price for the use of the radio spectrum – 66 EUR

b: coverage coefficient

c: coverage coefficient for the area, where:

- $c = 4$ for an area covering up to 10 neighbouring regional (county) self-government units
- $c = 20$ for an area covering 11 or more neighbouring regional (county) self-government units or the whole of Croatia

If the applicant is allocated radio spectrum with a bandwidth other than 1 MHz, the fee shall be reduced or increased proportionally.

For the use of the radio frequency spectrum for electronic news gathering and outside broadcasting (ENG/OB), 10 per cent of the fee calculated as set out above shall be payable.

Fees payable to the regulatory authority:

A fee of EUR 13.27 is set for the use of the radio frequency spectrum in links for ENG/OB applications in frequency bands below 1 GHz. This applies to mobile point-to-point links or cameras for ENG/OB, and mobile point-to-point links for ENG/OB used exclusively for the transmission of audio.

Satellite service

Fees payable to the state budget:

The amount of the annual fee for the use of unpaired and paired radio spectrum utilised by a ground station in the satellite service with a bandwidth of 1 MHz, for the radio band specified in the licence, is calculated according to the following formula:

$$(a \times b)$$

Where:

a: unit price for the use of radio spectrum – 66 EUR

b: coverage coefficient

If the applicant is allocated radio frequency spectrum with a bandwidth other than 1 MHz, the fee shall be reduced or increased proportionally.

For the use of unpaired and paired radio frequency bands used by a fixed radio station on Earth, which is used for communication with satellites and/or aircraft (Complementary Ground Component (CGC) of a satellite mobile network) with a bandwidth of 1 MHz, a fee of 150 per cent of the amount calculated using the formula above shall be payable for the radio frequency band specified in the licence for the use of the radio frequency spectrum.

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The amount of the annual fee for the use of unpaired and paired radio frequency bands used by fixed radio stations on Earth, which form part of the same system, use the same radio frequency band and communicate with the same satellite, is calculated depending on the number of radio stations in the system in Croatia according to the following formulae:

- $0.1 \times$ the amount derived from the formula in this chapter for the second to the tenth radio station in the system
- $0.01 \times$ the amount derived from the formula in this chapter for the eleventh to twentieth radio station in the system
- no fee is payable for any further radio stations in the system

For the use of a paired radio frequency band used by radio stations in the satellite service on Earth, where protection of the radio station's reception against interference from radio stations of the same or other radiocommunication services with which the radio station shares the radio frequency band is required, 200 per cent of the fee determined by the formula above shall be payable.

Fees payable to the regulatory authority:

For satellite connections, the fee for the use of the radio frequency spectrum is EUR 199.08.

The fee for the use of the radio spectrum for the complementary ground component (CGC) of a satellite mobile network is EUR 199.08.

The one-off fee for space activities for which a licence has been granted is EUR 331.81.

Fees for the procedure for bringing a satellite network into service in accordance with the provisions of the Radio Regulations of the International Telecommunication Union (ITU) and ITU Council Decision No 482 constitute revenue for the ITU.

Networks for own use

Fees payable to the state budget:

The annual fee for mobile networks or point-to-point links for own use (e.g. voice and data transmission, reporting links, telemetry, paging and public access for closed user groups) for the use of unpaired radio frequency spectrum up to 1 GHz (duplex or half-duplex) with a bandwidth of 1 MHz, for the radio frequency band specified in the licence for the use of the radio frequency spectrum, is calculated according to the formula:

$$(10 \times a \times b \times c \times d)$$

Where:

a: unit price for the use of the radio spectrum – 66 EUR

b: coverage coefficient

c: effective radiated power coefficient, where:

- $c = 1.0$ if the effective radiated power is less than 5 W
- $c = 1.5$ if the effective radiated power is equal to or greater than 5 W and less than 10 W
- $c = 2.0$ if the effective radiated power is equal to or greater than 10 W and less than 25 W
- $c = 2.5$ if the effective radiated power is equal to or greater than 25 W and less than 50 W
- $c = 3.0$, if the effective radiated power is equal to or greater than 50 W

d: coefficient of effective antenna height, where:

- $d = 1$, if the effective antenna height is less than 500 m
- $d = 2$, if the effective height of the antenna is 500 m or greater

The amount of the annual fee for the use of unpaired radio spectrum up to 1 GHz (simplex) with a bandwidth of 1 MHz, and where the network consists solely of terminal stations using duplex or half-duplex channels, for the radio frequency band and territorial coverage specified in the licence for the use of the radio frequency spectrum, shall be calculated according to the following formula:

$$(10 \times a \times b \times e)$$

Where:

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a: unit price for the use of the radio spectrum – 66 EUR

b: coverage coefficient

e: coverage coefficient for the area, where:

- e = 1 for an area comprising a single regional self-governing unit and for the joint area of the City of Zagreb and Zagreb County
- e = 4 for an area comprising between two and six neighbouring regional self-government units
- e = 7 for an area comprising seven or more neighbouring regional self-government units or for the entire territory of the Republic of Croatia

If the applicant or licence holder is allocated radio spectrum with a bandwidth other than 1 MHz, the fee shall be reduced or increased proportionally. A fee of 75 per cent shall be payable for the use of radio spectrum below 1 GHz in a fixed telemetry network. For the use of radio spectrum below 1 GHz in a mobile terrestrial network for closed user groups, 30 per cent of the fee is payable.

The fee for terminal radio stations in a mobile terrestrial network for closed user groups is EUR 6.60 per radio station for the use of the radio frequency spectrum up to 1 GHz. For the use of the radio frequency spectrum below 1 GHz for electronic news gathering and outside broadcasting (ENG/OB), 2 per cent of the fee is payable.

The amount of the annual fee for the use of unpaired radio frequency spectrum below 1 GHz (simplex) with a bandwidth of 1 MHz, where the effective radiated power of the radio station exceeds 100 W, is calculated using the following formula:

$$(10 \times a \times b \times e \times f)$$

Where:

a: unit price for the use of the radio spectrum – 66 EUR

b: coverage coefficient

e: see definition above

f: radiated power coefficient, where:

- f = 1 if the effective radiated power is less than 100 W
- f = 50 if the effective radiated power is equal to or greater than 100 W and less than 1 kW
- f = 100 if the effective radiated power is equal to or greater than 1 kW and less than 10 kW
- f = 150 if the effective radiated power is equal to or greater than 10 kW

The fee for radio stations for special applications, as specified in the relevant radio frequency allocation plan, is EUR 20 per radio station for the use of the radio frequency spectrum below 1 GHz.

The amount of the annual fee for the use of unpaired radio frequency spectrum above 1 GHz for private-use broadband networks with a bandwidth of 1 MHz, for the radio frequency band and area of coverage specified in the licence for the use of the frequency spectrum, is calculated according to the following formula:

$$(0.25 \times a \times b \times P^{0.15})$$

Where:

a: unit price for the use of the radio spectrum – 66 EUR

b: coverage coefficient

P: the area of the geographical region specified in the licence for the use of the radio frequency spectrum, expressed in square kilometres.

Fees payable to the regulatory authority:

The fee for the use of radio spectrum for a private network is determined according to the type and purpose of the radio station:

Table 122: Fee for the use of radio spectrum for a private network:

Type of radio station	Annual fee (EUR)
Fixed radio station acting as a repeater in a private mobile network, for each pair of radio frequencies (Tx/Rx)	86.27

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Fixed radio station acting as a repeater in a public mobile network for closed user groups and in a private telemetry network, for each pair of radio frequencies (Tx/Rx)	86.27
Fixed radio station as a base station in a public mobile network for closed user groups, for each pair of radio frequencies (Tx/Rx)	86.27
Fixed radio station as a base station in a private mobile network, for each pair of radio frequencies (Tx/Rx)	86.27
Fixed radio station as a terminal station in a public mobile network for closed user groups	6.64
Stationary radio station as a terminal station in a voice and telemetry network	6.64
Mobile radio stations in a public mobile network for closed user groups	3.32
Mobile radio stations in a private mobile telecommunications network	3.32
Other fixed radio stations	265.45
Radio stations for special applications, where required by the relevant radio frequency allocation plan	6.64

The fee for the use of the radio spectrum for a network operating in simplex and duplex modes, comprising only terminal radio stations, is determined according to the coverage area of the communications network using the radio spectrum:

Table 123: Fee for the use of the radio spectrum for a network operating in simplex and duplex modes, comprising only terminal radio stations:

Coverage area of the communications network	Annual fee (EUR)
Territory of the Republic of Croatia	199.08
Area covering two to six neighbouring counties	99.54
An area comprising up to one county or the combined area of the city Zagreb and Zagreb County	33.18

The fee for the use of the radio spectrum for in-house broadband networks is determined according to the coverage area of the communications network using the radio spectrum:

Table 124: Fee for the use of radio spectrum for in-house broadband networks:

Communication network coverage area	Annual fee (EUR)
Territory of the Republic of Croatia	200
Area comprising two to six neighbouring counties	100
An area comprising up to one county or the combined area of the city Zagreb and Zagreb County	35

Public electronic communications networks (mobile service)

Fees payable to the state budget:

The total amount of the annual fee for the use of the radio spectrum in a public electronic communications network consists of the annual fee for the use of unpaired radio spectrum and the annual fee for the licence to use the radio spectrum.

The amount of the annual fee for the use of unpaired radio spectrum with a bandwidth of 1 MHz, for the radio frequency band and population coverage specified in the licence for the use of the radio frequency band, is calculated using the following formula:

$$(5 \times a \times b \times c)$$

Where:

a: unit price for the use of radio spectrum – 66 EUR

b: coverage coefficient

c: population coverage coefficient:

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Table 125: Value of coefficient *c* according to population coverage

Population covered	Population coverage coefficient (c)
5,000 or fewer	0.03
5,001–10,000	0.04
10,001–30,000	0.10
30,001 – 50,000	0.20
50,001 – 100,000	0.40
100,001 – 300,000	1
300,001 – 500,000	2
500,001 – 1,000,000	4
1,000,001 – 3,000,000	10
3,000,001 and over	20

If the applicant is allocated radio spectrum with a bandwidth other than 1 MHz, the fee shall be reduced or increased proportionally.

No annual fee for the use of frequencies is payable under this chapter for radio spectrum allocated in the 1900 MHz – 1920 MHz radio frequency band.

The licence holder shall pay an annual licence fee for the use of the radio frequency spectrum amounting to 0.5 per cent of the total annual gross revenue generated from the operation of electronic communications networks and services on the market via the allocated radio frequency spectrum for public electronic communications networks in the previous calendar year. No annual fee is payable for the first year of the licence's validity.

The licence holder shall submit, by 31 March of the current year at the latest, a report on the amount of the total annual gross revenue referred to in the preceding paragraph of this Article for the previous calendar year.

Fees payable to the regulatory authority:

The fee for the use of radio spectrum for a public electronic communications network, with the exception of point-to-multipoint networks, is determined according to the allocated radio spectrum and the area for which the licence was granted. For areas with a population of over 1,000,000, the following table applies:

Table 126: Fee for the use of radio spectrum for a public electronic communications network for areas with a population of over 1,000,000:

Frequency range <i>f</i> of the allocated radio frequency spectrum for public electronic communications networks (MHz)	Annual fee per allocated MHz (EUR)
$f < 3,400$	8,388.08
$3,400 \leq f < 3,800$	2,621.28
$3800 \leq f$	597.25

For areas with fewer than 1,000,000 inhabitants, the following table applies:

Table 127: Radio spectrum usage fee for public electronic communications networks in areas with fewer than 1,000,000 inhabitants:

F (MHz)	Annual fee per MHz (EUR)		
	The city of Zagreb or areas with a population of between 500,001 and 1,000,000 inhabitants	Area with a population of between 300,001 and 500,000	Area with up to 300,000 inhabitants
$f < 3,400$	268.76	117.46	50.43
$3,400 \leq f < 3,800$	84.28	37.16	15.93
$3800 \leq f$	21.24	9.29	3.98

If the applicant or licence holder is allocated radio spectrum with a bandwidth other than 1 MHz, the fee is adjusted proportionally.

No annual fee is payable for the use of unpaired radio spectrum for allocated radio spectrum in the 1900 MHz – 1920 MHz frequency band.

Point-to-multipoint networks

Fee payable to the state budget:

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Possible uses of the radio frequency band in a point-to-multipoint network include, amongst others, radio communication services in technology-neutral frequency bands, broadband wireless access and multi-venue distribution services (MVDS).

The amount of the annual fee for the use of unpaired radio spectrum with a bandwidth of 1 MHz, for the radio frequency band and population coverage specified in the licence for the use of radio spectrum, is calculated using the formula:

$$(0.5 \times a \times b \times c) \times (1 + d)$$

Where:

a: unit price for the use of radio spectrum – 66 EUR

b: coverage coefficient

c: population coverage coefficient – see definition above

d: coefficient equal to:

- 0.2 for the first year of validity of the licence to use the radio frequency spectrum
- 0.4 for the second year
- 0.6 for the third year
- 0.8 for the fourth year
- 1 for each subsequent year of the licence's validity for the use of the radio frequency spectrum.

If the applicant is allocated radio spectrum with a bandwidth other than 1 MHz, the fee shall be reduced or increased proportionally.

Where the same radio spectrum is allocated to an applicant or licence holder in overlapping or adjacent geographical areas, the fee shall be calculated for the entire geographical area.

Where the same radio spectrum is allocated to an applicant or licence holder in non-overlapping or non-adjacent geographical areas, the fee shall be calculated as the sum of the fees for the individual geographical areas.

Fee payable to the regulatory authority:

The fee for a point-to-multipoint network is determined according to the allocated radio frequency spectrum and the area for which the licence is granted:

Table 128: Fee for the use of point-to-multipoint networks:

Annual fee per MHz (EUR)				
Area with more than 2,000,000 inhabitants	Area with a population of between 1,000,001 to 2,000,000	The city of Zagreb or an area with a population of between 500,001 and 1,000,000 inhabitants	An area with a population of between 300,001 to 500,000	Area with a population of up to 300,000
477.80	179.18	106.18	46.45	19.91

Air, maritime, radar, radio navigation and inland waterway services

Fee payable to the state budget:

Fee for the use of the radio frequency band for aviation, maritime transport, radar and radio navigation services, and inland waterway services

Table 129: Annual fee by service and station type

Type of radio station	Annual fee (EUR)
Ground-based radio stations in the aeronautical and maritime services	33
Aircraft radio stations used for communication, radio navigation, identification, positioning, signalling and measurement and so on	33

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A radio station on a vessel used for communication, radio navigation, identification, positioning, signalling, measurement and the like	33
Other radio stations in the radiolocation and radionavigation services	265

Fee payable to the regulatory authority:

The fee for the use of the radio frequency spectrum designated exclusively for the aeronautical or maritime service, the radiolocation or radionavigation service and the inland waterway service is EUR 6.64, regardless of the type of radio station.

Terrestrial broadcasting

Fee payable to the state budget:

Possible uses of the radio spectrum in terrestrial broadcasting include the transmission, transmission and/or reception of radio and/or television signals and other data transmitted via broadcasting systems.

The amount of the annual fee for the use of a 1 MHz radio frequency spectrum bandwidth for all radio stations which, in accordance with a concession agreement and/or a licence to use the radio frequency band, broadcasting within the same broadcasting network, is determined by the intended coverage area of all transmitters in that broadcasting network, the radio frequency band and the transmission system, and is calculated using the following formula:

$$(7.5 \times a \times b \times c \times k)$$

Where:

a: unit price for the use of the radio spectrum – 66 EUR

b: coverage coefficient

c: population coverage coefficient – see definition above

k: coefficient determined by the type of transmission system, which is:

- 0.025 for analogue broadcasting (VHF Bands I and III, UHF Bands IV and V)
- 0.1 for digital broadcasting, for systems using bandwidths greater than 1.6 MHz (VHF Band III, UHF Bands IV and V)
- 0.05 for digital broadcasting, for systems using bandwidths of 1.6 MHz or less (VHF Band III)
- 0.5 for analogue VHF broadcasting (VHF Band II)
- 1.5 for analogue and digital LF, MF and HF broadcasting (bands 148.5 kHz – 283.5 kHz, 526.5 kHz – 1 606.5 kHz, 3 950 kHz – 26,100 kHz).

The annual fee for the use of the radio frequency spectrum in terrestrial broadcasting is not payable if the population coverage coefficient c is less than or equal to 1 ($c \leq 1$).

If an applicant or licence holder is allocated radio spectrum with a bandwidth other than 1 MHz, the amount of the fee will be proportionally reduced or increased, taking into account the maximum bandwidth utilised by the transmission network.

Where a network of transmitters for the distribution of radio programmes in analogue broadcasting systems is used in such a way that the radio programmes of two or more radio broadcasters are broadcast on the same radio frequencies, the amount of the fee shall be determined for each radio broadcaster separately, in proportion to the total duration of their programme broadcasts over the course of a week.

Fee payable to the regulatory authority:

For all radio stations which, in accordance with their licence agreement and/or licence to use the radio spectrum, broadcast on the same broadcasting network, the fee is determined according to the population in the projected coverage area, the number of transmitters in that broadcasting network, the frequency band and the method of transmission:

Table 130: Fee for all radio stations within the same broadcasting network:

Population in the broadcasting network's coverage area	Basic fee (EUR)
From 300,001 to 500,000 inhabitants	663.61
From 500,001 to 1,000,000 inhabitants	1,327.23

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From 1,000,001 to 3,000,000 inhabitants	3,318.07
More than 3,000,001 inhabitants	6,636.14

The annual fee is calculated by multiplying the corresponding fee from the table above by a coefficient k , which, depending on the system, is:

$k = 1$ for digital broadcasting for systems using bandwidths greater than 1.6 MHz (VHF Band III, UHF Bands IV and V)

$k = 0.5$ for other systems: for analogue broadcasting (VHF Bands I, II and III, UHF Bands IV and V), and for analogue and digital LF, MF and HF broadcasting (bands: 148.5 kHz – 283.5 kHz, 526.5 kHz – 1,606.5 kHz, 3 950 kHz – 26 100 kHz) and for digital broadcasting for systems using bandwidths up to and including 1.6 MHz (VHF Band III).

Where a transmitter's radio network for broadcasting a radio programme in analogue broadcasting systems is used in such a way that the radio programmes of two or more radio broadcasters are transmitted on the same frequencies, the specified amount of compensation shall be calculated separately for each broadcaster, in proportion to the total duration of their programme's broadcasts during the week.

User-to-user communication systems (paging)

For the use of the radio frequency spectrum in a paging system, **the fee payable to the regulatory authority** is set at EUR 66.36, depending on the type of radio station. This applies to base stations in a one-way personal paging system (on-site paging in the RDS system) and base stations in a two-way personal paging system (paging).

Other fees

Fees payable to the regulatory authority:

For the use of the radio spectrum under a temporary licence to use the radio spectrum, the amount of the fee is determined in proportion to the annual fee set for the relevant type of service. The fee is payable in advance, prior to the issue of the radio station licence, for the entire period of validity of the licence and authorisation.

The fee for carrying out a technical inspection to verify compliance with the conditions of a licence granted to an electronic media publisher is EUR 265.45 per technical inspection carried out.

An applicant for a special authorisation to carry out activities in the field of electronic communications is required to pay the sum of EUR 92.91 upon submission of the application.

The holder of the authorisation referred to in the preceding paragraph is obliged to pay an annual fee of EUR 66.36 for the exercise of the authorisation for the duration of the authorisation.

In the event of non-payment of the fee under this Article, the provisions of specific regulations shall apply.

Unless the licence holder renounces the issued licence in writing by the start of the next financial year, they are required to pay an annual fee of EUR 66.36.

The fee for the provision of other activities, expressed as a percentage of the total annual gross revenue generated by operators in the previous calendar year from the provision of electronic communications networks and services on the market, is payable as a proportion of the operator's annual gross revenue from the provision of electronic communications networks and services on the market that exceeds 995,421,06 at a rate of 0.45%.

Any fee exceeding EUR 265,445.62 per individual account is payable in up to four equal instalments, with the final instalment due by 15 December of the current year, i.e. the date stated on the invoice.

All operators are required to submit to HAKOM, by 31 March of the current year at the latest, a report on the total annual gross revenue from the provision of electronic communications networks and services on the market

Annex 5 – Ireland ¹⁴⁵

For most services, there is a separate statutory instrument setting out the amounts of the individual charges. Some of these charges are subject to indexation. The Charges Act is updated from time to time.

No fee is payable upon notification. An annual fee (0.2 per cent of the relevant turnover) is payable only if the operator's relevant turnover (i.e. relating to the service or network) in Ireland for the relevant financial year amounts to EUR 500,000 or more.¹⁴⁶

Mobile service

Annual fees for mobile services are set according to the specific band/use. Fees are set separately for the 900 and 1800 MHz bands for GSM, 3G and Liberalised Use services.

Third-generation network licences¹⁴⁷

The fee for a provisional third-generation licence for the 2.1 GHz Band A or a provisional licence for liberalised use of the 2.1 GHz Band A is EUR 725,415 per 2 x 5 MHz block.

The fee for a provisional third-generation licence for the 2.1 GHz Band B or a provisional licence for liberalised use of the 2.1 GHz Band B is EUR 120,508 per 2 x 5 MHz block.

Liberalised use and related licences in the 700 MHz Duplex, 2.1 GHz, 2.3 GHz and 2.6 GHz bands ¹⁴⁸

Four types of licence are issued in this category:

- Licences for liberalised use
- Spectrum leasing licences
- Preparatory licence (€100)
- Transitional licence for the 2.3 GHz band

The fee for a licence for liberalised use is the sum of the spectrum access fee (SAF – payable by the successful bidder at the end of the award process and prior to the licence being granted) and the spectrum usage fees (SUF) for the duration of the licence.

Annual SUF before CPI adjustment for each block of liberalised spectrum.

The CPI adjustment for the SUF is calculated using 14 February 2022 as the base date for the CPI (i.e. CPI = 100). When calculating the CPI adjustment for the SUF, the Commission will use the most up-to-date CPI data available at that time.

SUF – Spectrum usage fees are set at the following amounts, which are subsequently adjusted in line with the CPI (Consumer Price Index)

Table 131: Fee amounts by frequency band

Band (MHz)	Width of a single block	Annual fee per spectrum block (in EUR before CPI adjustment)
703–733 paired with 758–788	2 x 5 MHz	998 931
1920–1980 paired with 2110–2170	2 x 5 MHz	525 753
2300–2390	5 MHz	52,575

¹⁴⁵<https://www.comreg.ie/about/legislation/statutory-instruments/>

¹⁴⁶<https://www.irishstatutebook.ie/eli/2003/si/346/made/en/print>

¹⁴⁷<https://www.comreg.ie/media/2021/05/S.I-2021.0265.pdf>

¹⁴⁸<https://www.irishstatutebook.ie/eli/2021/si/264/made/en/print>

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2390 – 2400	10 MHz	52 575
2500–2570 paired with 2620–2690	2 × 5 MHz	105,151
2570–2575	5 MHz	5,000
2615 – 2620	5 MHz	5,000
2,575 – 2,615	5 MHz	52,575

The results of the 2018 spectrum allocation competition in the 26 GHz band indicate that the total annual fees for the use of the frequency band should amount to EUR 3,750,000 over the ten-year licence period.¹⁴⁹

Annual fee for point-to-multipoint radio links under a transitional licence for the 2.3 GHz band

Calculation according to the formula:

$$\text{Fee} = A \times (B/100)$$

Where:

A is EUR 4,000, being the relevant annual fee for point-to-multipoint radio links operated in the 1 GHz $\geq$ F > 17 GHz band and with a bandwidth of 3.5 MHz or less;

B is the consumer price index relevant for the period from the base date in September 2009 (where CPI = 100) to the date of issue of the 2021 Regulation on Wireless Telegraphy (liberalised use and related licences in the 700 MHz Duplex, 2.1 GHz, 2.3 GHz and 2.6 GHz bands).

The annual spectrum usage fee for a licence for liberalised use is the sum of the annual spectrum usage fees, before CPI adjustment, associated with each block of liberalised spectrum specified in the licence, and the CPI adjustment for each block of liberalised spectrum specified in the licence.

Liberalised use and preparatory licences in the 800 MHz, 900 MHz and 1800 MHz bands¹⁵⁰

In 2011, the Irish regulatory authority set a minimum price for spectrum usage rights in the 800, 900 and 1800 MHz bands. The licence fees were structured to include an upfront fee for access to the spectrum and ongoing fees for spectrum usage, with the minimum price to be divided between the two types of payment on a 50/50 basis. Furthermore, the regulator proposed that the ongoing fees for spectrum usage be indexed to inflation based on the consumer price index. The prices in the table below are given in million EUR.

Table 132: Fee amounts by frequency band

Frequency band	Annual fee per frequency block (in million EUR)
800 MHz	1.08
900 MHz	1.08
1800 MHz	0.54

A frequency block is defined as a paired spectrum block with a

width of 5 MHz. The fee for a provisional licence is EUR 100.

Fees for the use of frequencies in the 3.6 GHz band ¹⁵¹

Annual fees per operator are based on the results of the 2017 tender for the allocation of spectrum in the 3.6 GHz band. These fees will be further indexed in line with the CPI. Their breakdown by individual operator can be found in the table below.

¹⁴⁹https://www.comreg.ie/media/dlm_uploads/2018/06/ComReg1853.pdf

¹⁵⁰<https://www.irishstatutebook.ie/eli/2012/si/251/made/en/print>

¹⁵¹https://www.comreg.ie/media/dlm_uploads/2017/06/ComReg-1746.pdf

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Table 133: Annual fee for use of the 3.6 GHz band, broken down by specific operators

Operator	Airspan	Imagine	Meteor	Three	Vodafone
Annual fee (EUR)	2,078,550	1,640,520	4,163,610	5,059,200	4,765,320

Table 134: Price for reserving Type A and B frequency blocks by region¹⁵²

Region	Annual fee before CPI adjustment for a Type A block	Annual fee before CPI adjustment for a Type B block
Border, Midlands, West	114,000	22,800
East	64,000	12,800
South East	44,000	8,800
South West	72,000	14,400
Dublin City and Suburbs	178,000	35,600
Cork city and suburbs	34,000	6,800
Limerick city and suburbs	16,000	3,200
Galway city and suburbs	14,000	2,800
Waterford city and suburbs	8,000	1,600

Table 135: Annual spectrum usage fee, before CPI adjustment, for Type A and Type B frequency blocks by region

Region	Annual fee before CPI adjustment for Type A blocks	Annual fee before CPI adjustment for Type B blocks
Border, Midlands, West	17,670	3,534
East	12,800	1,984
South East	8,800	1,364
South West	14,400	2,232
Dublin City and Suburbs	35,600	5,518
Cork city and suburbs	6,800	1,054
Limerick city and suburbs	3,200	496
Galway city and suburbs	2,800	434
Waterford city and suburbs	1,600	248

Block type A is an unpaired 25 MHz block in the 3 410–3 435 MHz frequency band; block type B is an unpaired 5 MHz block in the 3 475–3 800 MHz frequency band.

Table 136: Annual fees (EUR) for fixed wireless access (FWALA) in the 3.6 GHz band

BW (paired channel)	Annual fee (Band Transition Protected Licence)	Annual fee (Band Transition Unprotected Licence)
Up to 7 MHz	1,500	1,783
7–14 MHz	2,000	2,378
14–28 MHz	2,800	3,329

¹⁵²<https://www.irishstatutebook.ie/eli/2016/si/532/made/en/print>

Fixed service¹⁵³

Licensing of fixed radio links

Table 137: Schedule of initial annual licence fees for point-to-point fixed radio links until 30 September 2024 (in EUR)

Frequency band	Bandwidth (BW) ≤ 3.5 MHz	3.5 MHz < BW ≤ 20 MHz	20 MHz < BW ≤ 40 MHz	BW > 40 MHz
1 GHz < F ≤ 17 GHz	1,000	1,100	1,200	1,500
17 GHz < F ≤ 37 GHz	750	825	900	1,125
37 GHz < F ≤ 39.5 GHz	550	605	660	825
F > 39.5 GHz	100	110	120	150

Table 138: Schedule of initial annual licence fees for fixed point-to-point radio links on routes with high utilisation or in areas with significant congestion until 30 September 2024 (in EUR)

Frequency band	Bandwidth (BW) ≤ 3.5 MHz	3.5 MHz < BW ≤ 20 MHz	20 MHz < BW ≤ 40 MHz	BW > 40 MHz
1 GHz < F ≤ 17 GHz	1,200	1,320	1,440	1,800
17 GHz < F ≤ 37 GHz	900	990	1,080	1,350
37 GHz < F ≤ 39.5 GHz	660	726	792	990
F > 39.5 GHz	120	132	144	180

The initial fee for a fixed point-to-multipoint radio link is four times the annual fees for a fixed point-to-point radio link.

From 1 October 2024 to 30 September 2026, the annual licence fee for point-to-point fixed radio link licences shall be calculated using the following formula:

$$splatný poplatek = \sum_{t=1}^n \left(\frac{n-t}{n} \right) \text{ basic fee} + \left(\frac{t}{n} \right) \text{ roční poplatek}$$

Where:

- **t** = the number of years from 1 October 2023, i.e. t=1 from 1 October 2024 and t=2 from 1 October 2025.
- **n** = represents the duration in years from 1 October 2023 to 30 September 2026, i.e. n=3.

The basic fees are those set out in the tables above. The annual fees are licence fees calculated in accordance with the tables below.

From 1 October 2026, the annual fee for a fixed point-to-point radio link shall be equal to the fee for that fixed point-to-point radio link in the base year 2023, multiplied by the consumer price index. The tables showing the base fees are as follows:

Table 139: Base fee for fixed point-to-point radio links in the 1.3/1.4 GHz and 1.3/1.5 GHz bands by bandwidth (MHz)

Bandwidth (MHz)	Frequency band (GHz)	
	1.3/1.5	1.3/1.4
0.25	100	100
0.5	100	100
1	100	100

Table 140: Basic fee for fixed point-to-point radio links in the 2 GHz, 6 GHz, 7 GHz and 8 GHz bands, by bandwidth (MHz)

Bandwidth (MHz)	Frequency band (GHz)
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¹⁵³<https://www.comreg.ie/media/2023/12/ComReg-23112.pdf>

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	2.0/2.3	L6	L7	L8	U6	U7	U8
3.5	170	-	-	-	-	-	131
7	310	-	-	-	-	296	210
14	495	-	434	-	-	538	420
20	-	-	-	-	786	-	-
28	-	-	868	-	-	861	841
29.65	-	947	-	901	-	-	-
40	-	-	-	-	1,257	-	-
56	-	-	1,736	-	-	1,722	1,682
59.3	-	1,894	-	1,802	-	-	-
80	-	-	-	-	2,514	-	-

Table 141: Basic fee for fixed point-to-point radio links in the 11–42 GHz bands, by bandwidth (MHz)

Bandwidth (MHz)	Frequency band (GHz)								
	11	13	15	18	23	26	28	38	42
3.5	-	134	102	-	100	100	100	100	-
7	-	262	201	-	145	145	104	100	100
14	-	502	393	-	285	263	203	100	100
27.5	-	-	-	641	-	-	-	-	-
28	-	913	753	-	544	421	389	136	100
40	1,105	-	-	-	-	-	-	-	-
55	-	-	-	1,166	-	-	-	-	-
56	-	1,461	1,368	-	990	-	706	247	100
80	2,210	-	-	-	-	-	-	-	-
110	-	-	-	1,865	-	-	-	-	-
112	-	-	2,189	-	1,584	-	1,130	396	108
220	-	-	-	3,730	-	-	-	-	-
224	-	-	-	-	3,167	-	2,261	792	-

Table 142: Basic fee for fixed point-to-point radio links in the 80 GHz band by bandwidth (MHz)

Bandwidth (MHz)	80 GHz band
125	100
250	100
375	118
500	150
625	178
750	203
875	223
1,000	240
1,250	300
1,500	360
1,750	420

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2,000	480
2,250	540

Charges for fixed radio links in a point-to-multipoint system are equal to the sum of the annual charges that would be payable for each equivalent point-to-point fixed link within the point-to-multipoint system up to the eighth link, plus 25 per cent for each link beyond the eighth in the point-to-multipoint system.

The fee for a fixed radio link is increased by:

- 200 per cent if the fixed radio link is an overloaded fixed radio link, and/or
- 20 per cent if the fixed radio link is a fixed link with high route utilisation.

Temporary licence fees are applied in all periods on a pro rata basis to the relevant fees payable, using the number of months for which the licence is granted.

Satellite service

Teleport fee¹⁵⁴

Total bandwidth utilised (MHz)	Licence fee for 5 years (EUR)
BW < 0.5	25,000
$0.5 \leq \text{BW} < 2$	31,250
$2 \leq \text{BW} < 11$	37,500
$11 \leq \text{BW} < 40$	43,750
$40 \leq \text{BW} \leq 80$	50,000
BW > 80, per MHz of bandwidth or part thereof	625

Satellite Earth Station Licence¹⁵⁵ Fee for an

exclusive band

EUR 100 for the first 10 satellite earth stations (SES) and EUR 25 for each additional station (SES).

Fee for a non-exclusive band

xx

Band (GHz)	Bandwidth (BW) (MHz)	eirp < 50 dBW	50 dBW ≤ eIRP ≤ 75 dBW	eIRP > 75 dBW
3–10	BW < 0.5	1000	1250	1500
	$0.5 \leq \text{BW} < 2$	1250	1,500	1750
	$2 \leq \text{BW} < 11$	1500	1750	2000
	$11 \leq \text{BW} < 40$	1,750	2000	2250
	$40 \leq \text{BW} \leq 80$	2000	2250	2500
	BW > 80	$2000 + (\text{BW} - 80) \times 25$	$2250 + (\text{BW} - 80) \times 25$	$2500 + (\text{BW} - 80) \times 25$
10–15	BW < 0.5	500	750	1,000
	$0.5 \leq \text{BW} < 2$	750	1,000	1250
	$2 \leq \text{BW} < 11$	1000	1250	1500
	$11 \leq \text{BW} < 40$	1250	1500	1750
	$40 \leq \text{BW} < 80$	1500	1750	2000

¹⁵⁴<https://www.comreg.ie/ga/tionsclaiocht/speictream-raidio/ceadunu/cuardaigh-cineal-ceadunais/satellite/>

¹⁵⁵<https://www.comreg.ie/media/2024/03/SI-96-of-2024.pdf>

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	BW > 80	$1500 + (BW - 80) \times 25$	$1750 + (BW - 80) \times 25$	$2000 + (BW - 80) \times 25$
15–20	BW < 0.5	125	375	625
	$0.5 \leq BW < 2$	375	625	875
	$2 \leq BW < 11$	625	875	1125
	$11 \leq BW < 40$	875	1125	1375
	$40 \leq BW < 80$	1125	1375	1625
	BW > 80	$1125 + (BW - 80) \times 25$	$1375 + (BW - 80) \times 25$	$1625 + (BW - 80) \times 25$
20–30	BW < 0.5	100	350	600
	$0.5 \leq BW < 2$	350	600	850
	$2 \leq BW < 11$	600	850	1100
	$11 \leq BW < 40$	850	1,100	1350
	$40 \leq BW < 80$	1100	1350	1600
	BW > 80	$1100 + (BW - 80) \times 25$	$1350 + (BW - 80) \times 25$	$1625 + (BW - 80) \times 25$
>30	BW < 0.5	50	300	550
	$0.5 \leq BW < 2$	300	550	800
	$2 \leq BW < 11$	550	800	1050
	$11 \leq BW < 40$	800	1050	1300
	BW > 80	$800 + (BW - 80) \times 25$	$1050 + (BW - 80) \times 25$	$1300 + (BW - 80) \times 25$

Licence for the 400 MHz band ¹⁵⁶

This band is used for smart grid equipment.

The reservation fee is set as follows:

- for the portion used to provide wireless connectivity for smart grids, it is EUR 240,000
- for each portion not used to provide wireless connectivity for the smart grid, the fee is EUR 8,000

The fee for the use of frequencies in the 400 MHz band (before the CPI adjustment) is equal to the sum of the spectrum usage fees for each block (2×3 MHz or 2×100 kHz) included in the licence. The fees are as follows:

- EUR 39,000 per block plus the 'CPI adjustment' for a licence for the 400 MHz band used to provide wireless connectivity for smart grids
- EUR 1,300 per block plus the 'CPI adjustment' for a licence for the 400 MHz band which is not used for the provision of wireless connectivity for smart grids.

The frequency usage fee is indexed to the Consumer Price Index (CPI)

GSM-R fee¹⁵⁷

The annual fee for GSM-R railway technology in the 800 MHz band is EUR 50,400 for 2×1 MHz.

¹⁵⁶<https://www.comreg.ie/media/2019/10/SI-489-of-2019.pdf>

¹⁵⁷https://www.comreg.ie/media/dlm_uploads/2015/12/SI_213_of_2013.pdf

Short-term licences for electronic communications services¹⁵⁸

Licences with a duration of less than 3 months are considered short-term licences.

The fee for a short-term licence for electronic communications services or for the renewal of a short-term licence for electronic communications services is the sum of the fees for the individual spectrum blocks in the licence:

- a 700 MHz Duplex band block (2x5 MHz) carries a fee of EUR 401,000 for a three-month period
- band block (2x5 MHz) at 2.1 GHz: the fee is EUR 212,000 for a three-month period.

Other fees

Table 143: Other fees by type of service

Type of service	Fee (EUR)
PMSE services ¹⁵⁹	12/equipment + 12/licence period (max. 6 months)
Air traffic services ¹⁶⁰	Registration fee 500, licence amendment 30
Automatic Identification System (AIS) ¹⁶¹	Registration fee 500, licence amendment 30
Private or corporate mobile radio networks and links (PMR)	22 per device + 22 per licence period
Community Repeaters	First year – 625 + 12 (handling fee), each subsequent year 1 000
Trunked radio systems	First year – 625 per channel (12.5 kHz) per base station, 1,000 for each subsequent year First year – 1,250 per channel (25 kHz) per base station; 2,000 for each subsequent year
Paging	No charge
Third-Party Business Radio ¹⁶²	5,000 per channel for five years
Telemetry service ¹⁶³	On-site 133, local area 531, wide area 1,062, the whole of Ireland 47,764 (before indexation)
Fixed Wireless Access Local Area (FWALA) ¹⁶⁴	Up to 7 MHz – 1,500, 7 to 14 MHz – 2,000, 14 to 28 MHz – 2,800
Maritime services	Registration fee 500, licence amendment 30
Amateur stations ¹⁶⁵	Registration fee 100, licence amendment 30
Radar	Registration fee 500, licence amendment 30
Wireless Public Address System (WPAS) ¹⁶⁶	Fee 100, licence amendment 30

¹⁵⁸ <https://www.comreg.ie/media/2022/09/SI-No-484-of-2022-Wireless-Telegraphy-Short-Term-Electronic-Communication-Services-Licences-Regulations-2022.pdf>

¹⁵⁹ <https://www.irishstatutebook.ie/eli/1949/si/320/made/en/print>

¹⁶⁰ https://www.comreg.ie/media/dlm_uploads/2015/12/SI369of2009.pdf

¹⁶¹ <https://www.irishstatutebook.ie/eli/2009/si/369/made/en/print?q=369&years=2009>

¹⁶² https://www.comreg.ie/media/dlm_uploads/2015/12/SI646of2005.pdf

¹⁶³ <https://www.irishstatutebook.ie/eli/2024/si/266/made/en/print>

¹⁶⁴ <https://www.irishstatutebook.ie/eli/2003/si/79/made/en/print>

¹⁶⁵ <https://www.irishstatutebook.ie/eli/2009/si/192/made/en/print?q=192&years=2009>

¹⁶⁶ https://www.comreg.ie/media/dlm_uploads/2015/12/SI304of2006.pdf

Annex 6 – Luxembourg¹⁶⁷

Every company is subject to an annual administrative fee, which is based on its turnover. For 2024, the fee has been set at 0.65 per cent of the company's turnover.¹⁶⁸

Luxembourg's fee policy was established by the regulation of 21 February 2013 and subsequently amended by amendments in 2016 and 2018.

The fees payable under this regulation are due annually and are levied for the entire calendar year. The fees are defined according to the type of service:

- Fixed service
- Public land communications network (mobile service)
- Mobile aeronautical service
- Mobile maritime service
- Amateur radio service
- Experimental licence
- Satellite service
- Radio positioning equipment

For the provision of spectrum in the frequency band allocated for railway networks or for a private/professional mobile network with shared frequency usage or a network with shared resources, the fee is set as follows:

- The fee for the frequency made available is set at EUR 9 per kHz of available bandwidth.

For the provision of spectrum for a private/professional mobile network with non-shared frequency use, the fee is set as follows.

- The fee for the allocated frequency is set at EUR 18 per kHz of allocated bandwidth.

Fixed service

For the provision of spectrum for **point-to-point** fixed service links, the fee is set as follows:

$$\text{Fee (EUR)} = B * F_b * F_m * R_b$$

This calculation applies to a one-way link. In the case of a return link, twice the one-way fee is charged, taking into account the relevant technical parameters. However, for either a one-way or return link, the final fee must not be less than 150 EUR or more than 2,000 EUR.

This charge also applies to connections originating abroad and terminating within the Grand Duchy.

Table 144: Definition of coefficients in the fixed-line service formula

Coefficient	Definition of the coefficient
B	Line bandwidth in MHz
F _b	Band factor
F _m	Modulation factor
R _b	Basic fee in EUR/MHz (40 EUR/MHz)

Table 145: Value of the F_b coefficient by frequency band

Band	F _b coefficient
F < 4.2 GHz	1.00
4.2 GHz ≤ F < 7.075 GHz	0.59

¹⁶⁷<https://web.ilr.lu/FR/Particuliers/Frequences-radioelectriques/Legislation>

¹⁶⁸<https://legilux.public.lu/eli/etat/leg/rilr/2023/11/17/a766/jo>

7.075 GHz ≤ F < 8.5 GHz	0.49
8.5 GHz ≤ F < 12.75 GHz	0.33
12.75 GHz ≤ F < 19.7 GHz	0.21
19.7 GHz ≤ F < 26.5 GHz	0.16
26.5 GHz ≤ F < 37 GHz	0.11
37 GHz ≤ F	0.08

Table 146: Value of the Fm coefficient according to the number of modulation levels

Number of modulation levels	Fm coefficient
2 or analogue modulation	2
4/8	1.3
16/32	0.9
≥ 64	0.7

Uplink, feeder links, remote control and space monitoring

- For this type of link, the fee is set at EUR 5,000 per station, regardless of the number and type of links passing through that station.
- In this specific case, a station is defined as a transmitter or a set of transmitters at a fixed location, i.e. not used whilst in motion, and connected to the same antenna.

Public terrestrial communications network (mobile service)

Table 147: Annual fee for a public terrestrial communications network by frequency band

Band (MHz)	Annual fee (EUR / MHz)
703–733 paired with 758–788	18,750
791 – 821 paired with 832 – 862	
880 – 915 paired with 925 – 960	
1,710 – 1,785 paired with 1,805 – 1,880*	18,750 (until 31 December 2020)
	9,000 (from 1 January 2021)
1,920–1,980 paired with 2,110–2,170*	12,000 (until 31 December 2020)
	8,000 (from 1 January 2021)
2,500 – 2,690	4,000
3,400 – 3,800	2,000

*Depending on the date of allocation of the frequency band.

If the fees for the use of frequencies resulting from a frequency auction exceed the fees defined above, they shall replace them – Article 7(1)(e) of the Act.

For the first year of frequency provision, these fees are payable in proportion to the number of months commenced.

For any period during which the frequencies are not in use, the fee is set at 50 per cent of the amounts stated above.

For frequencies in the 703–733 MHz band paired with 758–788 MHz (the 700 MHz band) and 3400–3800 MHz (the 3.6 GHz band), a fee amounting to 100 per cent of the amounts specified above is payable, regardless of spectrum usage.

Mobile Air Service

The charges take into account the following equipment:

- Fixed equipment in the VHF bands (fixed HF) €230
- Fixed equipment in the metric bands (fixed VHF) €100
- Portable equipment in the metre bands (portable VHF) €60

Mobile maritime service

The fees cover the following equipment:

- Fixed equipment in the hectometre bands (fixed MF) or fixed equipment in the HF bands (fixed HF) 230 EUR
- Fixed equipment in the metre bands (fixed VHF) 100 EUR
- Fixed equipment in the decametre bands (fixed UHF) 90 EUR
- Portable equipment in the metre bands (portable VHF) €60
- Portable equipment in the decimetre bands (portable UHF) €45

A fee of 20 EUR is charged for amendments to existing authorisations for aeronautical and maritime services. Fees for mobile aeronautical and maritime services are non-refundable.

A fee of up to 120 EUR is charged for an operator's certificate for radio equipment used for maritime and waterway communications.

The fee for the allocation of spectrum for fixed equipment in the aeronautical mobile service or the maritime mobile service is set at 200 EUR per frequency made available, regardless of bandwidth.

Amateur radio service

- EUR 100 for the issue of an amateur radio licence valid for 5 years.
- EUR 25 for the amendment of an amateur radio licence.
- A maximum of 120 EUR for an operator's certificate for amateur radio equipment.
- These fees are non-refundable.

Experimental Licence

Where frequencies are made available via an experimental licence, the fee is set at 200 EUR.

Satellite service

For the provision of spectrum for supplementary ground stations of the satellite mobile service (hereinafter referred to as 'CGC stations'), the fee is set at:

- EUR 2,000 per station, provided that the operator's total number of authorised stations is less than or equal to 10;
- EUR 6,000 for each additional station.

A CGC station is defined as a set of transmitters constituting an independent technical installation located at a defined geographical location. Where a licence comes into force during the course of a year, the calculation is adjusted on a pro rata basis.

In addition to the fee per station, a fee is also payable for the processing of applications for satellite services in accordance with the rules set out below.

When communicating with the ITU, administrative fees are payable for various initiated procedures as set out in the table below. The amount is the sum of a fixed and a variable fee. These amounts are charged regardless of the outcome of the initiated procedure.

Table 148: Administrative fees by process initiated and network type

Type of administration	Network type	Fixed fee (EUR)	Variable fee
Publications	Geostationary	550	N × 10 EUR
	Non-geostationary	150	N * 10 EUR
Coordination	Geostationary	1,750	N * 10 EUR
	Non-geostationary	350	N * 10 EUR
Notifications	Geostationary	1,750	N * 10 EUR
	Non-geostationary	350	N * 10 EUR
Planning	Geostationary	1,500	N * 10 EUR

$$N = N_{\text{sat}} * N_{\text{fr}}$$

- N_{sat} = number of satellites to be processed
- N_{fr} = number of allocated frequency bands per satellite

Radio positioning equipment

The fee for the provision of spectrum for fixed radio determination equipment is set at EUR 400 for each frequency made available, regardless of bandwidth.

According to its annual report, the regulatory authority collected EUR 5.62 million in fees for the use of frequencies in 2023, which is EUR 68,000 more than in the previous year (EUR 5.55 million).¹⁶⁹

¹⁶⁹<https://assets.ilr.lu/Documents/ILRLU-1797567310-350.pdf>

Annex 7 – Hungary

Three types of fees are levied in Hungary. Recurring radio spectrum fees include a radio spectrum reservation fee, a radio spectrum usage fee and a band fee.

1. The radio spectrum reservation fee is a one-off fee set by the authority in the frequency allocation decision.
2. The radio spectrum usage fee is a fee payable periodically throughout the term of the radio licence and is set by the authority in the radio licence.
3. The frequency band fee is a periodic fee payable at regular intervals (a fee set for frequency bands falling within block management).

Under the Act, fees are further divided into three categories according to the type of service:

- Fees for transmitting stations
- Fees for the mobile service
- Fees for the fixed service

The radio spectrum fee is payable on the basis of an invoice sent after the decision setting the fee has become final or after the contract has come into force, within the payment deadline stated on the invoice. Where there is an obligation to pay the fee on a regular basis, invoicing is carried out monthly. If the amount of the fee payable for a radio service in a given month is less than 50,000 HUF net, the invoice for the radio spectrum fee must be issued quarterly. For the purposes of the obligation to pay fees, any month that has commenced is considered a full month.

Fees are regularly updated by decrees of the Hungarian National Media and Communications Authority. Since 2011, the original decree has been updated fifteen times.

1 CZK = 16 HUF

Radio spectrum fee for broadcasting stations (radio)

Fees for the allocation of radio spectrum to broadcasters and PMSE application broadcasters in the 87.5–108 MHz frequency band

The calculation of the allocation fee in this category is based on two different parameters: the maximum permitted effective radiated power (ERP) and the maximum permitted transmitter power (Pa). These two parameters relate to the various types of services listed in Annex 1 to the Regulation.

If the authorised person has been allocated a frequency for shared use, the rate of the radio spectrum usage fee is 50 per cent of the fee.

Table 149: Radio spectrum usage fees (HUF/station) based on ERP

Maximum ERP	ERP ≤100 W	100 W < ERP ≤1 kW	1 kW < ERP ≤10 kW	10 kW < ERP ≤100 kW	ERP > 100 kW
TV and DVB-T stations	65,000	150,000	260,000	400,000	650,000
URH-FM radio broadcasting stations and PMSE application broadcasting stations	27,000	66,000	108,000	168,000	270,000
T-DAB radio stations	45,000	110,000	180,000	280,000	450,000

Table 150: Radio spectrum usage fees (HUF/station) based on Pa

Maximum transmitter power (Pa)	Pa ≤ 1 kW	1 kW < Pa ≤ 10 kW	10 kW < Pa ≤ 100 kW	Pa > 100 kW
KH radio stations	10,000	15,000	50,000	150,000
RH radio stations	5,000	10,000	15,000	40,000

Fees for the use of radio spectrum by broadcasting stations and PMSE application stations in the 87.5–108 MHz frequency band

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Table 151: Radio spectrum usage fees for television transmitters in the 174–230 MHz band (HUF/equipment/month)

Average effective radiated power (ERP)	Average effective antenna height							
	$h \leq 10 \text{ m}$	$10 \text{ m} < h \leq 30 \text{ m}$	$30 \text{ m} < h \leq 50 \text{ m}$	$50 \text{ m} < h \leq 100 \text{ m}$	$100 \text{ m} < h \leq 250 \text{ m}$	$250 \text{ m} < h \leq 350 \text{ m}$	$350 \text{ m} < h \leq 500 \text{ m}$	$500 \text{ m} < h$
ERP $\leq 3 \text{ W}$	500	1,500	2,600	4,400	8,750	14,900	25,400	68,300
$3 \text{ W} < \text{ERP} \leq 10 \text{ W}$	1,000	2,300	4,400	7,900	19,300	34,100	49,000	98,000
$10 \text{ W} < \text{ERP} \leq 100 \text{ W}$	1,800	3,900	8,800	19,300	42,000	68,300	77,900	175,000
$0.1 \text{ kW} < \text{ERP} \leq 1 \text{ kW}$	3,500	7,000	14,000	31,500	68,300	113,800	126,000	280,000
$1 \text{ kW} < \text{ERP} \leq 10 \text{ kW}$	8,800	14,000	22,800	49,000	107,600	175,000	199,500	448,000
$10 \text{ kW} < \text{ERP} \leq 100 \text{ kW}$	23,600	35,000	52,500	78,800	171,500	280,000	318,500	717,500
ERP $> 100 \text{ kW}$	64,800	91,000	127,800	178,500	274,800	446,300	510,100	1,146,300

Table 152: Spectrum usage fees for television transmitters and DVB-T transmitters in the 470–862 MHz band (HUF/device/month)

Average effective radiated power (ERP)	Average effective antenna height							
	$h \leq 10 \text{ m}$	$10 \text{ m} < h \leq 30 \text{ m}$	$30 \text{ m} < h \leq 50 \text{ m}$	$50 \text{ m} < h \leq 100 \text{ m}$	$100 \text{ m} < h \leq 250 \text{ m}$	$250 \text{ m} < h \leq 350 \text{ m}$	$350 \text{ m} < h \leq 500 \text{ m}$	$500 \text{ m} < h$
ERP $\leq 3 \text{ W}$	900	2,500	4,500	7,500	15,000	25,500	43,500	117,000
$3 \text{ W} < \text{ERP} \leq 10 \text{ W}$	1,800	3,900	7,500	13,500	33,000	58,500	84,000	168,000
$10 \text{ W} < \text{ERP} \leq 100 \text{ W}$	3,000	6,600	15,000	33,000	72,000	117,000	133,500	300,000
$0.1 \text{ kW} < \text{ERP} \leq 1 \text{ kW}$	6,000	12,000	24,000	54,000	117,000	195,000	216,000	480,000
$1 \text{ kW} < \text{ERP} \leq 10 \text{ kW}$	15,000	24,000	39,000	84,000	184,500	300,000	342,000	768,000
$10 \text{ kW} < \text{ERP} \leq 100 \text{ kW}$	40,500	60,000	90,000	135,000	294,000	480,000	546,000	1,230,000
ERP $> 100 \text{ kW}$	111,000	156,000	219,000	306,000	471,000	765,000	874,500	1,965,000

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Table 153: Radio spectrum usage fees for URH-FM transmitters and PMSE stations in the 87.5–108 MHz band (HUF/device/month)

Average effective radiated power (ERP)	Average effective antenna height							
	$h \leq 10 \text{ m}$	$10 \text{ m} < h \leq 30 \text{ m}$	$30 \text{ m} < h \leq 50 \text{ m}$	$50 \text{ m} < h \leq 100 \text{ m}$	$100 \text{ m} < h \leq 250 \text{ m}$	$250 \text{ m} < h \leq 350 \text{ m}$	$350 \text{ m} < h \leq 500 \text{ m}$	$500 \text{ m} < h$
$\text{ERP} \leq 3 \text{ W}$	800	2,100	3,800	6,300	12,500	21,300	36,300	97,500
$3 \text{ W} < \text{ERP} \leq 10 \text{ W}$	1,500	3,300	6,300	11,300	27,500	48,800	70,000	140,000
$10 \text{ W} < \text{ERP} \leq 100 \text{ W}$	2,500	5,500	12,500	27,500	60,000	97,500	111,300	250,000
$0.1 \text{ kW} < \text{ERP} \leq 1 \text{ kW}$	5,000	10,000	20,000	45,000	97,500	162,500	180,000	400,000
$1 \text{ kW} < \text{ERP} \leq 10 \text{ kW}$	12,500	20,000	32,500	70,000	153,800	250,000	285,000	640,000
$10 \text{ kW} < \text{ERP} \leq 100 \text{ kW}$	33,800	50,000	75,000	112,500	245,000	400,000	455,000	1,025,000
$\text{ERP} > 100 \text{ kW}$	92,500	130,000	182,500	255,000	392,500	637,500	728,800	1,637,500

Table 154: Radio spectrum usage fees for T-DAB transmitters in the 47–240 MHz frequency band (HUF/device/month)

Average effective radiated power (ERP)	Average effective antenna height							
	$h \leq 10 \text{ m}$	$10 \text{ m} < h \leq 30 \text{ m}$	$30 \text{ m} < h \leq 50 \text{ m}$	$50 \text{ m} < h \leq 100 \text{ m}$	$100 \text{ m} < h \leq 250 \text{ m}$	$250 \text{ m} < h \leq 350 \text{ m}$	$350 \text{ m} < h \leq 500 \text{ m}$	$500 \text{ m} < h$
$\text{ERP} \leq 3 \text{ W}$	600	1,800	3,100	5,300	10,500	17,800	30,400	81,900
$3 \text{ W} < \text{ERP} \leq 10 \text{ W}$	1,300	2,600	5,300	9,400	23,000	40,900	58,800	117,500
$10 \text{ W} < \text{ERP} \leq 100 \text{ W}$	2,000	4,500	10,500	23,000	50,400	81,900	93,400	210,000
$0.1 \text{ kW} < \text{ERP} \leq 1 \text{ kW}$	4,100	8,400	16,800	37,800	81,900	136,500	151,100	336,000
$1 \text{ kW} < \text{ERP} \leq 10 \text{ kW}$	10,500	16,800	27,300	58,800	129,100	210,000	239,400	537,500
$10 \text{ kW} < \text{ERP} \leq 100 \text{ kW}$	28,300	42,000	63,000	94,500	205,800	336,000	382,100	861,000
$\text{ERP} > 100 \text{ kW}$	77,600	109,100	153,300	214,100	329,600	535,500	612,100	1,375,500

Table 155: Radio spectrum usage fees for medium-wave radio stations (HUF/equipment/month)

Maximum transmitter power (Pa)	Fee (HUF/equipment/month)
$\text{Pa} \leq 1 \text{ kW}$	6,300
$1 \text{ kW} < \text{Pa} \leq 10 \text{ kW}$	12,500
$10 \text{ kW} < \text{Pa} \leq 100 \text{ kW}$	25,000
$0.1 \text{ MW} < \text{Pa} \leq 1 \text{ MW}$	75,000
$\text{Pa} > 1 \text{ MW}$	187,500

Table 156: Radio spectrum usage fees for shortwave radio transmitters (HUF/equipment/month)

Maximum transmitter power (Pa)	Fee (HUF/unit/month)
$\text{Pa} \leq 1 \text{ kW}$	1,900
$1 \text{ kW} < \text{Pa} \leq 10 \text{ kW}$	3,100
$10 \text{ kW} < \text{Pa} \leq 100 \text{ kW}$	12,500
$0.1 \text{ MW} < \text{Pa} \leq 1 \text{ MW}$	25,000

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Pa > 1 MW	62,500
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If the authorised person has been allocated a frequency for shared use, the rate of the radio spectrum usage fee is 50 per cent of the fee

For a transmitting station operated under a radio licence issued for a period of less than one month, the licence holder shall pay a one-off radio spectrum usage fee. The amount of the radio spectrum usage fee is:

- 15,000 HUF per station in the case of television broadcasting;
- 8,000 HUF per station in the case of radio broadcasting.

Radio spectrum fee for the mobile service

One-off fees for frequency allocation

Fees for the allocation of radio spectrum for terrestrial, inland and aeronautical mobile services and for the fixed service with frequencies higher than 30 MHz and lower than 960 MHz.

Table 157: Radio spectrum fee for mobile and fixed networks with frequency allocation without site allocation (HUF)

Geographical coverage	Micro	Local	Small	Large	Regional	National
Area in km ²	≤1	≤300	≤2,500	≤20,000	≤75,000	>75,000
Radio spectrum fee (HUF)	10,000	30,000	50,000	100,000	250,000	500,000

In the case of exclusive use of the radio spectrum for networks comprising only mobile stations and mobile stations operating outside the coverage area of fixed stations, the radio spectrum allocation fee is 50% of the fee set out in the table above, and the radio spectrum usage fee is 20,000 HUF per month per mobile station. In the case of shared use of the radio spectrum, no radio spectrum allocation fee is required; the radio spectrum usage fee is 1,000 HUF per month per station. No radio spectrum usage fee is payable for reserve stations.

Table 158: Radio spectrum subscription fees for mobile and fixed networks with site-specific frequency allocations (HUF)

Frequency band (F) in MHz	Maximum effective radiated power				
	ERP > 250 W	250 W ≥ ERP > 25 W	25 W ≥ ERP > 1 W	1 W ≥ ERP > 0.1 W	ERP ≤ 0.1 W
26 < F ≤ 47	68,000	40,000	15,000	7,500	4,500
47 < F ≤ 108	48,000	29,000	9,000	5,000	3,000
108 < F ≤ 240	60,000	36,000	12,000	6,500	4,000
240 < F ≤ 380	53,000	31,000	10,000	5,500	3,500
380 < F ≤ 790	48,000	29,000	9,000	5,000	3,000
790 < F ≤ 960	40,000	24,000	8,000	4,000	2,500
960 < F ≤ 10,000	25,000	15,000	5,000	2,500	1,500

Where there are multiple frequencies within the same frequency band, the fee must be multiplied by the number of frequencies. If the frequencies authorised for the network fall within different frequency bands, the procedure set out below must be repeated for each frequency and the resulting radio spectrum allocation fees must be added together.

Recurring fees for the use of frequencies

Fees for the use of radio spectrum for terrestrial, inland waterway and aeronautical mobile services, and for fixed services with frequencies higher than 30 MHz and lower than 960 MHz

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Table 159: Unit charges for the use of radio spectrum per 1 kHz of bandwidth in networks with allocated frequencies for a given area (HUF/kHz/month)

Frequency band (F) in MHz	Area of use					
	Micro ≤1 km ²	Local ≤300 km ²	Small ≤2,500 km ²	Large ≤20,000 km ²	Regional ≤75,000 km ²	National > 75,000 km ²
26 < F ≤ 47	25	120	180	420	2,700	4,800
47 < F ≤ 108	15	80	120	280	1,800	3,200
108 < F ≤ 240	15	80	120	280	1,800	3,200
240 < F ≤ 380	10	40	60	140	900	1,600
380 < F ≤ 790	5	20	30	70	450	800
790 < F ≤ 960	3	15	22	50	300	450
960 < F ≤ 10,000	2	10	15	40	250	350

Table 160: Radio spectrum usage fees by category for stations and equipment in mobile service networks

Categories of stations and equipment	HUF / device / month
Mobile stations	100
Fixed stations	5,000
Stations with fixed and variable locations	3,000
Replacement equipment	100

Frequency usage fee

Table 161: Unit fees in the 26–47 MHz frequency band for the use of the radio spectrum per 1 kHz bandwidth (in HUF/month):

Average effective radiated power (ERP)	Average effective antenna height (h)							
	h ≤ 10 m	10 m < h ≤ 30 m	30 m < h ≤ 50 m	50 m < h ≤ 100 m	100 m < h ≤ 250 m	250 m < h ≤ 350 m	350 m < h ≤ 500 m	500 m < h
ERP ≤ 0.1 W	14	42	84	168	252	518	742	1,960
0.1 W < ERP ≤ 0.5 W	28	70	140	280	420	840	1,190	3,150
0.5W < ERP ≤ 3W	42	119	210	350	700	1,190	2,030	5,460
3 W < ERP ≤ 10 W	84	182	350	630	1,540	2,730	3,920	7,840
10 W < ERP ≤ 100 W	140	308	700	1,540	3,360	5,460	6,230	14,000
ERP > 100 W	280	560	1,120	2,520	5,460	9,100	10,080	22,400

Table 162: Unit charges in the 47–108 MHz frequency band for the use of radio spectrum per 1 kHz bandwidth (in HUF/month)

Average effective radiated power (ERP)	Average effective antenna height (h)							
	h ≤ 10 m	10 m < h ≤ 30 m	30 m < h ≤ 50 m	50 m < h ≤ 100 m	100 m < h ≤ 250 m	250 m < h ≤ 350 m	350 m < h ≤ 500 m	500 m < h
ERP ≤ 0.1 W	6	18	36	72	108	222	318	840
0.1 W < ERP ≤ 0.5 W	12	30	60	120	180	360	510	1,350
0.5W < ERP ≤ 3W	18	51	90	150	300	510	870	2,340
3 W < ERP ≤ 10 W	36	78	150	270	660	1,170	1,680	3,360
10 W < ERP ≤ 100 W	60	132	300	660	1,440	2,340	2,670	6,000
ERP > 100 W	120	240	480	1,080	2,340	3,900	4,320	9,600

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Table 163: Unit fees in the 108–240 MHz frequency band for the use of radio spectrum per 1 kHz bandwidth (in HUF/month)

Average effective radiated power (ERP)	Average effective antenna height (h)							
	$h \leq 10 \text{ m}$	$10 \text{ m} < h \leq 30 \text{ m}$	$30 \text{ m} < h \leq 50 \text{ m}$	$50 \text{ m} < h \leq 100 \text{ m}$	$100 \text{ m} < h \leq 250 \text{ m}$	$250 \text{ m} < h \leq 350 \text{ m}$	$350 \text{ m} < h \leq 500 \text{ m}$	$500 \text{ m} < h$
$\text{ERP} \leq 0.1 \text{ W}$	10	30	60	120	180	370	530	1,400
$0.1 \text{ W} < \text{ERP} \leq 0.5 \text{ W}$	20	50	100	200	300	600	850	2,250
$0.5 \text{ W} < \text{ERP} \leq 3 \text{ W}$	30	85	150	250	500	850	1,450	3,900
$3 \text{ W} < \text{ERP} \leq 10 \text{ W}$	60	130	250	450	1,100	1,950	2,800	5,600
$10 \text{ W} < \text{ERP} \leq 100 \text{ W}$	100	220	500	1,100	2,400	3,900	4,450	10,000
$\text{ERP} > 100 \text{ W}$	200	400	800	1,800	3,900	6,500	7,200	16,000

Table 164: Unit charges in the 240–380 MHz frequency band for the use of radio spectrum per 1 kHz of bandwidth (in HUF/month):

Average effective radiated power (ERP)	Average effective antenna height (h)							
	$h \leq 10 \text{ m}$	$10 \text{ m} < h \leq 30 \text{ m}$	$30 \text{ m} < h \leq 50 \text{ m}$	$50 \text{ m} < h \leq 100 \text{ m}$	$100 \text{ m} < h \leq 250 \text{ m}$	$250 \text{ m} < h \leq 350 \text{ m}$	$350 \text{ m} < h \leq 500 \text{ m}$	$500 \text{ m} < h$
$\text{ERP} \leq 0.1 \text{ W}$	8	22	43	87	130	267	382	1,008
$0.1 \text{ W} < \text{ERP} \leq 0.5 \text{ W}$	15	36	72	144	216	432	612	1,620
$0.5 \text{ W} < \text{ERP} \leq 3 \text{ W}$	22	61	108	180	360	612	1,044	2,808
$3 \text{ W} < \text{ERP} \leq 10 \text{ W}$	43	94	180	324	792	1,404	2,016	4,032
$10 \text{ W} < \text{ERP} \leq 100 \text{ W}$	72	158	360	792	1,728	2,808	3,204	7,200
$\text{ERP} > 100 \text{ W}$	144	288	576	1,296	2,808	4,680	5,184	11,520

Table 165: Unit fees for the use of radio spectrum in the 380–790 MHz frequency band per 1 kHz of bandwidth (in HUF/month)

Average effective radiated power (ERP)	Average effective antenna height (h)							
	$h \leq 10 \text{ m}$	$10 \text{ m} < h \leq 30 \text{ m}$	$30 \text{ m} < h \leq 50 \text{ m}$	$50 \text{ m} < h \leq 100 \text{ m}$	$100 \text{ m} < h \leq 250 \text{ m}$	$250 \text{ m} < h \leq 350 \text{ m}$	$350 \text{ m} < h \leq 500 \text{ m}$	$500 \text{ m} < h$
$\text{ERP} \leq 0.1 \text{ W}$	6	17	34	67	101	207	297	784
$0.1 \text{ W} < \text{ERP} \leq 0.5 \text{ W}$	11	28	56	112	168	336	476	1,260
$0.5 \text{ W} < \text{ERP} \leq 3 \text{ W}$	17	48	84	140	280	476	812	2,184
$3 \text{ W} < \text{ERP} \leq 10 \text{ W}$	34	73	140	252	616	1,092	1,568	3,136
$10 \text{ W} < \text{ERP} \leq 100 \text{ W}$	56	123	280	616	1,344	2,184	2,492	5,600
$\text{ERP} > 100 \text{ W}$	112	224	448	1,008	2,184	3,640	4,032	8,960

Table 166: Unit charges in the 790–960 MHz frequency band for the use of radio spectrum per 1 kHz bandwidth (in HUF/month)

Average effective radiated power (ERP)	Average effective antenna height (h)							
	$h \leq 10 \text{ m}$	$10 \text{ m} < h \leq 3.0 \text{ m}$	$30 \text{ m} < h \leq 50 \text{ m}$	$50 \text{ m} < h \leq 100 \text{ m}$	$100 \text{ m} < h \leq 250 \text{ m}$	$250 \text{ m} < h \leq 350 \text{ m}$	$350 \text{ m} < h \leq 500 \text{ m}$	$500 \text{ m} < h$
$\text{ERP} \leq 0.1 \text{ W}$	4	12	24	48	72	148	212	560
$0.1 \text{ W} < \text{ERP} \leq 0.5 \text{ W}$	8	20	40	80	120	240	340	900
$0.5 \text{ W} < \text{ERP} \leq 3 \text{ W}$	12	34	60	100	200	340	580	1,560
$3 \text{ W} < \text{ERP} \leq 10 \text{ W}$	24	52	100	180	440	780	1,120	2,240
$10 \text{ W} < \text{ERP} \leq 100 \text{ W}$	40	88	200	440	960	1,560	1,780	4,000
$\text{ERP} > 100 \text{ W}$	80	160	320	720	1,560	2,600	2,880	6,400

Table 167: Unit fees for the use of radio spectrum in the 960–10,000 MHz frequency band per 1 kHz bandwidth (in HUF/month)

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Average effective radiated power (ERP)	Average effective antenna height (h)							
	$h \leq 10 \text{ m}$	$10 \text{ m} < h \leq 30 \text{ m}$	$30 \text{ m} < h \leq 50 \text{ m}$	$50 \text{ m} < h \leq 100 \text{ m}$	$100 \text{ m} < h \leq 250 \text{ m}$	$250 \text{ m} < h \leq 350 \text{ m}$	$350 \text{ m} < h \leq 500 \text{ m}$	$500 \text{ m} < h$
$\text{ERP} \leq 0.1 \text{ W}$	3	10	19	38	58	118	170	448
$0.1 \text{ W} < \text{ERP} \leq 0.5 \text{ W}$	6	16	32	64	96	192	272	720
$0.5 \text{ W} < \text{ERP} \leq 3 \text{ W}$	10	27	48	80	160	272	464	1,248
$3 \text{ W} < \text{ERP} \leq 10 \text{ W}$	19	42	80	144	352	624	896	1,792
$10 \text{ W} < \text{ERP} \leq 100 \text{ W}$	32	70	160	352	768	1,248	1,424	3,200
$\text{ERP} > 100 \text{ W}$	64	128	256	576	1,248	2,080	2,304	5,120

Radio spectrum fee for maritime, special-purpose inland waterway and aeronautical mobile stations

The licence holder is not required to pay a radio spectrum allocation fee for on-board telecommunications stations, coastal stations and ship stations of the maritime mobile service, nor for the inland mobile service licensed on its frequencies, nor for aeronautical and airborne stations of the aeronautical mobile service. The fee for the use of the radio spectrum is **1,000 HUF per station per month**.

Fixed service

No radio spectrum allocation fee is payable for stations with a fixed or variable location that are operated within the mobile service and whose frequency bandwidth is less than 30 MHz. The rate of the radio spectrum usage fee is then 1,000 HUF per station per month.

Radio spectrum usage fees for fixed service stations and equipment operating at frequencies above 30 MHz and below 960 MHz

Table 168: Radio spectrum usage fees for stations and equipment in the fixed service operating at frequencies above 30 MHz and below 960 MHz

Categories of stations and equipment	Frequency band (MHz)		
	$30 < F \leq 440$	$440 < F \leq 450$	$450 < F < 960$
Fixed and mobile stations, with the exception of stations with a star point	5000	100	5000
Stations with a star point (including collection stations)	5,000	1,000	5,000
Spare equipment	100	100	100

Where there are multiple authorised stations or devices, the radio spectrum usage fee determined on the basis of the point must be multiplied by the number of stations or devices belonging to the same category, and the resulting radio spectrum usage fees must be added together.

Radio spectrum usage fees for point-to-point and point-to-multipoint systems in the frequency band above 960 MHz

For radio and television news stations and radio and television programme broadcasting systems with a licence valid for less than one month, the rate of the radio spectrum usage fee is 4,000 HUF per station.

Table 169: Unit fees for the use of radio spectrum for point-to-point stations and point-to-multipoint stations with a star node, per 1 kHz of bandwidth (Ft/kHz/month)

Frequency band	Point-to-point links	Omnidirectional stations for point-to-multipoint links
$960 \text{ MHz} < F \leq 10 \text{ GHz}$	0.672	2.8
$10 \text{ GHz} < F \leq 13.25 \text{ GHz}$	0.336	1.4
$13.25 \text{ GHz} < F \leq 21.2 \text{ GHz}$	0.267	1.12
$21.2 \text{ GHz} < F \leq 30 \text{ GHz}$	0.202	0.84
$30 \text{ GHz} < F \leq 55 \text{ GHz}$	0.161	0.67
$55 \text{ GHz} < F$	0.08	0.335

The unit fee for the use of the radio spectrum as specified in this point must be multiplied by the sum of the channel spacing of the frequencies authorised for the station, expressed in kHz.

Satellite service

Radio spectrum fee for satellite service earth stations

For central earth stations of satellite services, space telecommunications HUB stations, coastal earth stations, control stations, CGC aeronautical stations and transmitting stations, the authorised person is not required to pay the radio spectrum pre-payment fee. The fee for the use of radio spectrum is calculated in accordance with the following table:

Table 170: Radio spectrum fee for satellite service earth stations by frequency band

Frequency band	Fee (HUF/kHz/month)
960 MHz < F ≤ 10 GHz	0.5
10 GHz < F ≤ 15.4 GHz	0.25
F > 15.4 GHz	0.13

The unit fee for the use of the radio spectrum specified in this point must be multiplied by the sum of the channel spacing of the frequencies authorised for the station, expressed in kHz.

Fee for the use of radio spectrum by terminal equipment of satellite services

Fee for the use of radio spectrum by ground stations (terminal equipment) of fixed satellite services which are also licensed for transmission from Earth to space:

- a) per VSAT terminal: 1,000 HUF per unit per month;
- b) per SNG (transportable earth station) terminal: 10,000 HUF per unit per month.

The fee for the use of the radio spectrum is 250 HUF per unit per month for terminal equipment of terrestrial and maritime satellite mobile services.

Fees for auctioned frequency blocks

In the case of frequency bands sold and acquired, the unit fee is 7,500 HUF/kHz/month where the right to use the radio spectrum in a frequency band sold under a tender procedure launched before 15 March 2019 is acquired, and 6,500 HUF/kHz/month for procedures launched after that date. The unit fee is then multiplied by the number of sold or acquired bands, expressed in kHz, and by the relevant multiplier.

Table 171: Multiplier based on frequency band

Frequency band	Multiplier
450–470 MHz	0.4
694–790 MHz	1
790–960 MHz	1
1710–2200 MHz for bands in use as at 1 January 2014	0.25
1710–2200 MHz for bands not in use as at 1 January 2014	0.5
2500–2690 MHz	0.4
3400–3800 MHz	0.12
24.5–26.5 GHz	0.002
31.8–33.4 GHz	0.0017

Annex 8 – Germany

Fees for the use of frequencies are set out in three Acts, namely the Electromagnetic Compatibility of Equipment Act (EMVG)¹⁷⁰, the Telecommunications Act (TKG)¹⁷¹ and the Radio Equipment Act (FuAG)¹⁷². Fees for the allocation of frequencies are levied in accordance with the Federal Network Agency's specific fee regulation – Frequency Allocation (BNetzA BGebV-Freq-Zut)¹⁷³. Exemptions from fees are granted on the basis of Section 8 of the Federal Fees Act (BGebG)¹⁷⁴ and Section 4 of the BNetzA BGebV-Freq-Zut. Allocation fees are regulatory charges. The actual amount of the fee is calculated on the basis of the specific parameters of the allocation.

Frequency allocation holders are obliged to pay¹⁷⁵:

- One-off fees for the allocation of services by the Federal Network Agency which can be specifically attributed to the user;
- Annual fees for the use of frequencies, determined retrospectively on the basis of the costs incurred by the Federal Network Agency (BNetzA) for each year, broken down by individual radio services.

These annual contributions serve to finance certain tasks and services carried out and provided by BNetzA on the basis of statutory provisions. **Tasks and services under the Telecommunications Act (TKG)** include spectrum planning, spectrum coordination, harmonisation and standardisation; **tasks under the Electromagnetic Compatibility of Equipment Act (EMVG)** and the Radio Equipment Act (FuAG) include ensuring electromagnetic compatibility and measures relating to equipment inspections.¹⁷⁶

Detailed information on who is obliged to pay contributions, the amount of the contributions, how they are calculated, and how they are invoiced and paid out is set out in the Regulation on Contributions for the Protection of Uninterrupted Spectrum Use (FSBeitrV).¹⁷⁷

The annual contribution, which is determined retrospectively for each reference unit, is calculated by dividing the relevant administrative expenditure for the service in question for the reference year by the number of reference units in the user group. These fees are set separately for each year on the basis of actual costs, usually with a multi-year delay.

Of the personnel and material costs to be covered by the contributions, the Federal Government pays 20 per cent as a contribution towards the general interest in the undisturbed and efficient use of frequencies pursuant to Section 224(1) of the Telecommunications Act, 35 per cent as a contribution towards the public interest in ensuring the electromagnetic compatibility of equipment in accordance with Section 31(1) of the Electromagnetic Compatibility Act, and 50 per cent as a deduction to compensate for the public interest in ensuring radio equipment in accordance with Section 35(1) of the Radio Equipment Act.

Annual fees for 2021¹⁷⁸:

Public mobile radio

Table 172: Fees for public mobile radio:

Service	Unit	Annual fee (EUR)	
		TKG	EMVG
Paging	Frequency	0.00	0.00
UMTS	Per 100 kHz bandwidth or a fraction thereof	0.00	0.00

¹⁷⁰https://www.gesetze-im-internet.de/emvg_2016/

¹⁷¹https://www.gesetze-im-internet.de/tkg_2021/

¹⁷²<https://www.gesetze-im-internet.de/fuag/>

¹⁷³<https://www.gesetze-im-internet.de/bnetzafreqzuitbgebv/>

¹⁷⁴<https://www.gesetze-im-internet.de/bgebv/>

¹⁷⁵<https://www.bundesnetzagentur.de/DE/Fachthemen/Telekommunikation/Frequenzen/Grundlagen/Frequenzschutzbeitraege/start.html>

¹⁷⁶https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Telekommunikation/Unternehmen_Institutionen/Frequenzen/GebuehrenBeitraege/InfoKostenforderung_EN.pdf?__blob=publicationFile&v=1

¹⁷⁷<https://www.gesetze-im-internet.de/fsbeitrv/>

¹⁷⁸<https://www.gesetze-im-internet.de/fsbeitrv/anlage.html>

Broadcasting service:

Table 173: Fees for broadcasting services:

Service	Unit ¹⁷⁹	Annual fee (EUR)	
		TKG	EMVG
Transmission of audio and data signals using analogue and digital modulation in the band 148.4–283.5 kHz (long waves)	Frequency	0.00	0.00
Transmission of audio and data signals using analogue and digital modulation in the frequency band 526.5 – 1,606.5 kHz (medium wave)	Frequency	0.00	0.00
Transmission of audio and data signals using analogue and digital modulation in the frequency bands specified in the Frequency Regulation (FreqV) and the Frequency Plan (FreqP) 3,950 – 26,100 kHz (short waves)	Frequency	0.00	29.35
Transmission of analogue audio broadcasting signals (audio and data) in the frequency band 87.5–108.0 MHz (VHF)	For every 10 km or part thereof ²	0.12	0.13
Transmission of digital audio and data signals in accordance with the DAB standard in the band 174–230 MHz (T-DAB)	For every 10 km or part thereof ²	0.77	0.12
Transmission of digital video, audio and data signals based on DVB-T or DVB-T2 in the 470–694 MHz frequency band (Frequency band IV/V)	For every 10 km ² or part thereof	0.19	0.19

Fixed radio services/radio with standard frequency and time signal

Table 174: Charges for fixed radio services/radio with standard frequency and time signal:

Service	Unit	Annual fee (EUR)	
		TKG	EMVG
Point-to-point directional radio	Transmitter radio system	3.62	0.00
WLL-PMP radio link	Transmitter radio system	0.00	0.00
Territorial allocation of directional radio links	Transmitter radio system	0.00	0.00
Fixed radio service below 30 MHz, standard radio frequency and time signal	Frequency	18.09	0.74
Point-to-multipoint radio transmissions (excluding WLL-PMP radio transmissions)	Transmitter radio system	0.00	0.00

Private land mobile radio:

Table 175: Fees for non-public land mobile radio:

Service	Unit	Annual fee (EUR)	
		TKG	EMVG
PMR, land mobile radio, private radio data network for remote control and warning	Radio transmitter system	0.69	0.18

¹⁷⁹ Based on international agreements, the contour of the minimum useful field strength for a radio transmitter is calculated. The result is the distance r from the transmitter's location to the point at which the minimum useful field strength is achieved for each 10° segment. From this, the area element A can be calculated for each of the $36 \cdot 10^\circ$ sectors: $A = \pi r^2 / 36$. The theoretical coverage area of the transmitter in square kilometres is calculated by

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summing the 36 area elements.

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purposes, radio equipment for auxiliary purposes, remote radio control			
Paging calls (networks without a confirmation transmitter)	Call receivers		
	Up to 2	4.87	0.00
	Up to 5	9.73	0.00
	Up to 10	19.46	0.00
	Up to 50	38.93	0.00
	Up to 150	77.86	0.00
	Up to 400	155.72	0.00
	Up to 1,000	311.44	0.00
	More than 1,000	467.16	0.00
Paging calls (networks with confirmation transmitter)	Call receivers		
	Up to 2	3.97	0.31
	Up to 5	7.94	0.63
	Up to 10	15.87	1.25
	Up to 50	31.74	2.51
	Up to 150	63.49	5.01
	Up to 400	126.98	10.02
	Up to 1,000	190.47	15.04
	More than 1,000	253.96	20.05
Off-site paging calls	Call receivers		
	Up to 2	0.00	0.00
	Up to 5	0.00	0.00
	Up to 10	0.00	0.00
	Up to 50	0.00	0.00
	Up to 150	0.00	0.00
	Up to 400	0.00	0.00
	Up to 1,000	0.00	0.00
	More than 1,000	0.00	0.00
Television and radio broadcasting, small mobile directional radio equipment, radio equipment for the temporary installation of television, audio or signalling transmission	Radio equipment	13.10	1.42
Public address systems (wireless microphones, radio equipment for coordination, equipment for coordinating reports	Public address equipment	1.47	0.00

Aeronautical radio service

Table 176: Charges for the aeronautical radio service:

Service	Unit	Annual fee (EUR)	
		TKG	EMVG
Fixed terrestrial radio stations, fixed aeronautical navigation radio stations	Radio station	3.09	26.58
Mobile aircraft radio (aircraft radio stations), aircraft navigation radio (mobile radio stations)	Radio station	2.52	4.49
Mobile aircraft radio (other land-based radio stations)	Radio station	0.00	0.00

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Amateur radio service

Table 177: Fees for the amateur radio service:

Service	Unit	Annual fee (EUR)	
		TKG	EMVG
Amateur radio	Licence holders for participation in the amateur radio service	3.28	7.96

Radiotelephone services for the maritime mobile service and inland waterways

Table 178: Fees for radiotelephone services for the maritime mobile service and inland waterways:

Service	Unit	Annual fee (EUR)	
		TKG	EMVG
Radiotelephone services for the maritime mobile service and inland waterways	Radio station	2.53	0.39

Non-navigational positioning radio service

Table 179: Fees for the non-navigational positioning radio service:

Service	Unit	Annual fee (EUR)	
		TKG	EMVG
Low-power tracking transmitter (up to 50 W effective radiated power (ERP)), radio motion detector, transmitter for meteorological assistance	Equipment	0.00	0.00
High-power location transmitter (with an power output of more than 50 watts (ERP))	Equipment	0.00	389.29

Other radio applications

Table 180: Fees for other radio applications:

Service	Unit	Annual fee (EUR)	
		TKG	EMVG
Demonstration radio	Equipment	0.00	0.00

Railway radiocommunications service

Table 181: Fees for the railway radiocommunications service:

Service	Unit	Annual fee (EUR)	
		TKG	EMVG
Analogue railway radio communication service (stationary use of frequencies)	Equipment	6.79	3.64
Analogue railway radio communication service (mobile use of frequencies)	Equipment	0.00	0.31
Digital railway radio communication service using GSM-R technology	per sector and frequency pair	9.51	3.21

Trunked radio system

Table 182: Charges for the trunked radio system:

Service	Unit	Annual fee (EUR)	
		TKG	EMVG

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Trunked radio system	Bandwidth of 12.5 kHz per sector and frequency pair at a single location, or bandwidth of 12.5 kHz per frequency in direct mode of operation	0.07	0.45
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Satellite radio service

Fees for satellite radio services:

Table 183: Fees for satellite radio services:

Service	Unit	Annual fee (EUR)	
		TKG	EMVG
Coordinated satellite radio link	Frequency	0.00	0.00
Satellite radio link without coordination	Frequency	0.00	0.00
Satellite radio network	Frequency	0.00	0.00
Orbital systems (following the transfer of usage rights)	Satellite system	23.14	0.00
SNG – Satellite news gathering	Allocation	5.67	0.00

Wireless network access (mobile service)

Charges for wireless network access:

Table 184: Charges for wireless network access:

Band	Unit	Annual fee (EUR)	
		TKG	EMVG
450 MHz	12.5 kHz	0.00	0.00
700 MHz	100 kHz	0.90	9.49
800 MHz	100 kHz	219.14	171.57
900 MHz	100 kHz	677.83	146.52
1.5 GHz	100 kHz	0.90	0.00
1.8 GHz	100 kHz	99.22	23.99
2.0 GHz	100 kHz	10.41	21.00
2.6 GHz	100 kHz	42.04	0.46
3.4 GHz to 3.7 GHz	100 kHz	0.90	0.91
3.5 GHz and 3.7 GHz	100 kHz	0.00	0.00
3.7 GHz to 3.8 GHz	100 kHz	0.00	0.00
26 GHz	100 kHz	0.00	0.00

One-off fees ¹⁸⁰

One-off fees for the allocation of frequencies are set out in a separate regulation on fees as follows:

Table 185: One-off fees for the allocation of frequencies:

Type of fee		Fee in EUR
A	General fees	
A.1	Issuing an additional copy of a decision on the allocation of radio frequencies in non-electronic form	25
A.2	Amendment to a frequency allocation, where the amendment does not affect the parameters based on the intended use of the frequency (in particular, it does not involve a change of frequency or an extension of the allocation)	25
A.3	Withdrawal of an application after substantive processing has commenced and before the completion of an individually allocated public service	up to 75 per cent of the relevant fee item under Section B, limited to a period of three months
A.4	Rejection of an application for reasons other than lack of eligibility	up to the amount corresponding to the fee item under Section B, limited to a period of three months
A.5	Decision on an application for amendment due to the transfer of rights to use frequencies pursuant to Section 55(8) of the Telecommunications Act	based on time-of-use
A.6	Revocation or cancellation of an allocation, where the allocation holder is responsible for this	on a time-based basis, up to the amount of the relevant fee item under Section B
B	Fees for the allocation of frequencies	The amount of the fee is determined in accordance with the formula set out below, where: B = Allocated bandwidth in MHz t = duration of the allocation in years. If the duration of the allocation is not specified in whole years, a fee amounting to one twelfth of the annual fee shall be charged for each month or part thereof.
B.0	Wireless network access for the provision of telecommunications services	
B.0.1	Allocation of frequencies for nationwide use for access to wireless networks in the 451 MHz to 455.74 MHz and 461 MHz to 465.74 MHz frequency bands for each frequency (including the specification of technical parameters of the radio signal)	$600,000 \cdot t \cdot B$
B.0.2	Allocation of frequencies for nationwide use for access to wireless networks in the 703 MHz to 788 MHz frequency band for individual frequencies (including the specification of technical parameters for radio transmission)	$950,000 \cdot t \cdot B$
B.0.3	Allocation of frequencies for nationwide use for access to wireless networks in the 791 MHz to 862 MHz frequency band for individual frequencies (including the specification of technical parameters for radio transmission)	$860,000 \cdot t \cdot B$
B.0.4	Allocation of frequencies for nationwide use for access to wireless networks in the 880 MHz to 960 MHz frequency band per frequency (including the specification of technical parameters for radio transmission)	$770,000 \cdot t \cdot B$
B.0.5	Allocation of frequencies for nationwide use for access to wireless networks in the 1 452 MHz to 1 492 MHz frequency band per frequency (including the specification of technical parameters for radio transmission)	$480,000 \cdot t \cdot B$
B.0.6	Allocation of frequencies for nationwide use for access to wireless networks in the 1 710 MHz to 1 880 MHz frequency band for individual frequencies (including the specification of technical parameters for radio transmission)	$400,000 \cdot t \cdot B$

¹⁸⁰<https://www.gesetze-im-internet.de/bnetzafreqzutbgebv/>

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B.0.7	Allocation of frequencies for nationwide use for access to wireless networks in the 1,920 MHz to 2,170 MHz frequency band per frequency (including the specification of technical parameters for radio transmission)	$300,000 \cdot t \cdot B$
B.0.8	Allocation of frequencies for nationwide use for access to wireless networks in the 2,500 MHz to 2,690 MHz frequency band per frequency (including the specification of technical parameters of radio transmissions)	$270,000 \cdot t \cdot B$
B.0.9	Allocation of frequencies for local use for access to wireless networks in the 3 400 MHz to 3 700 MHz frequency band, by frequency (including specification of technical radio parameters)	$200,000 \cdot t \cdot B$
B.0.10	Allocation of frequencies for local use for access to wireless networks in the 3,700 MHz to 3,800 MHz frequency band per frequency (including specification of technical radio parameters)	$1,000 + 5 \cdot t \cdot B \cdot (a_1 + a_2)$
		a_1 = the area of the allocated region in km ² , to be allocated to the settlement and transport area a_2 = the area of the allocation zone in km ² , which is not to be allocated to residential and transport areas
B.0.11	Allocation of frequencies for local use for access to wireless networks in the 24.25 GHz to 27.5 GHz frequency band per frequency (including specification of technical radio parameters)	$1,000 + 0.63 \cdot t \cdot B \cdot (a_1 + a_2)$
		a_1 = the area of the allocated region in km ² , to be allocated to residential and transport areas a_2 = the area of the allocation zone in km ² , which is not allocated to residential and transport areas
B.1	Public paging	
B.1.1	Allocation of paging frequencies (including the setting of radio communication parameters)	$0.42 \cdot t \cdot B \cdot A$ A = allocated area in km ²
B.2	Microwave links	
B.2.1	Frequency allocation in the 0.4 GHz radio relay band by frequency and polarisation	$5,000 \cdot t \cdot B \cdot D$
		for radio field lengths
		< 5 km (D = 2.0)
		≥ 5 km < 20 km (D = 1.0)
B.2.2	Frequency allocation in the 4 GHz to 7.5 GHz radio relay bands by frequency and polarisation	$6 \cdot t \cdot B \cdot D$
		for radio field lengths
		< 15 km (D = 2.0)
		≥ 15 km < 40 km (D = 1.0)
B.2.3	Allocation of frequencies in the 13 GHz to 18 GHz radio-relay bands by frequency and polarisation	$3 \cdot t \cdot B \cdot D$
		for radio field lengths
		< 4 km (D = 2.0)
		≥ 4 km < 15 km (D = 1.0)
B.2.4	Frequency allocation in the 23 GHz to 28 GHz radio relay bands by frequency and polarisation	$2 \cdot t \cdot B \cdot D$
		for radio field lengths
		< 2 km (D = 2.0)
		≥ 2 km < 8 km (D = 1.0)
B.2.5	Frequency allocation in the 32 GHz to 52 GHz radio relay bands by frequency and polarisation	$1 \cdot t \cdot B$
B.2.6	Frequency allocation in radio relay bands above 52 GHz by frequency and polarisation	$0.04 \cdot t \cdot B$
B.3	Satellite broadcasting	
B.3.1	Frequency allocation for satellite earth stations, by frequency and for every 15 MHz or part thereof of allocated bandwidth	$0.80 \cdot t \cdot B$

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B.3.2	SNG frequency allocation per frequency band per transmitter	$0.08 \cdot t \cdot B$
B.3.3	Frequency allocation for the operation of a satellite radio network per frequency and 15 MHz or a portion of the allocated bandwidth	$3.50 \cdot t \cdot B \cdot NU$ Scope of use: fixed use $NU = 1$ Mobile and stationary use $NU = 3$
B.3.4	Allocation of frequencies for GNSS repeater operation within the frequency range of the satellite navigation system in the airport protection zone	$4.50 \cdot t \cdot B$
B.3.5	Frequency allocation for GNSS repeater operation within the frequency range of the satellite navigation outside airport protection zones	$0.45 \cdot t \cdot B$
B.4	Professional Mobile Radio (PMR)	
B.4.1	Frequency allocation for PMR per frequency	Base amount $\cdot t \cdot B \cdot A \cdot E \cdot N$ Base amount per frequency band: < 30 MHz: 0.11 30 MHz to 68 MHz: 0.42 68 MHz to 87.5 MHz: 0.56 87.5 MHz to 174 MHz: 1.12 174 MHz to 380 MHz: 2.24 380 MHz to 470 MHz: 4.20 470 MHz to 694 MHz: 3.36 694 MHz to 862 MHz: 2.80 862 MHz to 1,000 MHz: 2.10 1,000 MHz to 1,500 MHz: 1.40 1,500 MHz to 1,900 MHz: 1.12 1,900 MHz to 3,000 MHz: 0.84 3 GHz to 5 GHz: 0.56 5 GHz to 10 GHz: 0.28 10 GHz to 30 GHz: 0.14 > 30 GHz: 0.07 A = allocation area in km^2 Special features: Notional minimum value for A: A = 200 km^2 for stationary use A = 50 km^2 for power up to 1 watt ERP A = 1 km^2 for use in buildings (indoors) A = 50 km^2 for mobile use A = 50 km^2 for terrestrial use (terrestrial mobile radio) A = defined area of use in km^2 for DMO in long-range broadcasting E = 1 exclusive use E = 0.5 shared use If the frequency is allocated using the time-slot method, E is determined by the number of allocated time slots in relation to the number of time slots available for this frequency usage, e.g. for 2 out of 10 time slots, E = 0.2 N = utilisation coefficient Fixed usage or DMO = 1 Flexible usage band up to national level = 10 up to 100,000 km^2 = 8

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		up to 10,000 km ² = 6
		up to 1,000 km ² = 4
		up to 100 km ² = 2
B.4.2	Allocation of PMR frequencies for remote control purposes, by frequency	Base amount · t · B · E · N
		Base amount per frequency band:
		< 30 MHz: 0.11
		30 MHz to 68 MHz: 0.42
		68 MHz to 87.5 MHz: 0.56
		87.5 MHz to 174 MHz: 1.12
		174 MHz to 380 MHz: 2.24
		380 MHz to 470 MHz: 4.20
		470 MHz to 694 MHz: 3.36
		694 MHz to 862 MHz: 2.80
		862 MHz to 1 000 MHz: 2.10
		1,000 MHz to 1,500 MHz: 1.40
		1,500 MHz to 1,900 MHz: 1.12
		1,900 MHz to 3,000 MHz: 0.84
		3 GHz to 5 GHz: 0.56
		5 GHz to 10 GHz: 0.28
		10 GHz to 30 GHz: 0.14
		> 30 GHz: 0.07
		Exclusive use E = 1
		Shared use E = 0.5
		If the frequency is allocated using the timeslot method, E is determined by the number of allocated timeslots in relation to the total number of timeslots available for this frequency usage, e.g. for 2 out of 10 time slots, E = 0.2
		N = utilisation coefficient
		Frequency utilisation > 1 GHz = 1
		Frequency utilisation between 87.5 MHz and 470 MHz = 100
		Frequency utilisation up to and including 87.5 MHz = 10
B.4.3	Allocation of frequencies for wireless cameras or allocation of frequencies for wireless microphones, per frequency range per radio transmission system.	Base amount · t · B
		Base amount per frequency band:
		< 30 MHz: 0.11
		30 MHz to 68 MHz: 0.42
		68 MHz to 87.5 MHz: 0.56
		87.5 MHz to 174 MHz: 1.12
		174 MHz to 380 MHz: 2.24
		380 MHz to 470 MHz: 4.20
		470 MHz to 694 MHz: 3.36
		694 MHz to 862 MHz: 2.80
		862 MHz to 1,000 MHz: 2.10
		1,000 MHz to 1,500 MHz: 1.40
		1,500 MHz to 1,900 MHz: 1.12
		1,900 MHz to 3,000 MHz: 0.84
		3 GHz to 5 GHz: 0.56
		5 GHz to 10 GHz: 0.28
		10 GHz to 30 GHz: 0.14
		> 30 GHz: 0.07

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		Wireless microphone systems for the hearing impaired are provided free of charge.
B.4.4		Base amount $\cdot t \cdot B \cdot E$
	Allocation of frequencies for ultra-wideband (UWB) transmission to the frequency band for each radio transmitter	Base amount per frequency band: < 30 MHz: 0.11 30 MHz to 68 MHz: 0.42 68 MHz to 87.5 MHz: 0.56 87.5 MHz to 174 MHz: 1.12 174 MHz to 380 MHz: 2.24 380 MHz to 470 MHz: 4.20 470 MHz to 694 MHz: 3.36 694 MHz to 862 MHz: 2.80 862 MHz to 1,000 MHz: 2.10 1,000 MHz to 1,500 MHz: 1.40 1,500 MHz to 1,900 MHz: 1.12 1,900 MHz to 3,000 MHz: 0.84 3 GHz to 5 GHz: 0.56 5 GHz to 10 GHz: 0.28 10 GHz to 30 GHz: 0.14 > 30 GHz: 0.07 Exclusive use $E = 1$ Shared use $E = 0.1$
B.4.5	Frequency allocations for non-navigation positioning radio or frequency allocations for meteorological aid radio, per frequency and per radio transmission system	Base amount $\cdot t \cdot B \cdot E$ Base amount per frequency band: < 30 MHz: 0.11 30 MHz to 68 MHz: 0.42 68 MHz to 87.5 MHz: 0.56 87.5 MHz to 174 MHz: 1.12 174 MHz to 380 MHz: 2.24 380 MHz to 470 MHz: 4.20 470 MHz to 694 MHz: 3.36 694 MHz to 862 MHz: 2.80 862 MHz to 1 000 MHz: 2.10 1,000 MHz to 1,500 MHz: 1.40 1,500 MHz to 1,900 MHz: 1.12 1,900 MHz to 3,000 MHz: 0.84 3 GHz to 5 GHz: 0.56 5 GHz to 10 GHz: 0.28 10 GHz to 30 GHz: 0.14 > 30 GHz: 0.07 exclusive use $E = 1$ for safety-related radio applications for Intelligent Transport Systems (ITS) and radio meteorological aids shared use $E = 0.1$ for radio motion detectors, radio applications for surveying purposes, wall and surface radars For bandwidth B, the frequency range in which the maximum average power density (EIRP) exceeds -51.3 dBm/MHz is used for wall and surface radars.
B.5	Aviation and aeronautical navigation radio stations; high-power positioning radio stations (EIRP greater than or equal to 50 W)	

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B.5.1	Frequency allocations for the operation of ground stations of aeronautical or aeronautical navigation radio stations below 30 MHz, per frequency	$8\,000 \cdot t \cdot B$
B.5.2	Frequency allocation for the operation of a ground-based radio station in aeronautical navigation radio communications in	$2,000 \cdot t \cdot B \cdot D$ The range factor is determined for radii $\leq 20\text{ km}$ ($D = 1$) $> 20\text{ km}$ or for mobile use ($D = 2$)
B.5.3	Frequency allocation for VOR (VHF omnidirectional radio range) operation in the 108 MHz to 118 MHz frequency band, per frequency	$6 \cdot t \cdot B$
B.5.4	Frequency allocation for the operation of ground-based aeronautical radio stations in the 118 MHz to 137 MHz frequency band, per frequency	$1\,400 \cdot t \cdot B \cdot D$ The range factor is determined for radii $\leq 20\text{ km}$ ($D = 1$) $> 20\text{ km}$ or mobile use ($D = 2$)
B.5.5	Allocation of frequencies for ILS (Instrument Landing System) codes to frequency	$2\,000 \cdot t \cdot B$
B.5.6	Frequency allocation for ground station operation within the aeronautical navigation system in the frequency range of 960 to 1 215 MHz per frequency	$20 \cdot t \cdot B$
B.5.7	Frequency allocation for the operation of a ground station in the aeronautical navigation system or the high-power radar service in the 1.2 GHz frequency band, per frequency	$12 \cdot t \cdot B$
B.5.8	Frequency allocation for the operation of a ground station in the aeronautical navigation system or the high-power radar service in the 2.8–5.8 GHz, per frequency	$4 \cdot t \cdot B$
B.5.9	Frequency allocation for the operation of a ground station in the aeronautical navigation system or the high-power radar service in the frequency range $> 8.5\text{ GHz}$ per frequency	$2 \cdot t \cdot B$
B.6	Maritime/inland waterway radiotelephone service	
B.6.1	Frequency allocation for the operation of a coastal radio station in the maritime radio service or a fixed radio station in the inland navigation radio service in the ultra-shortwave band, per frequency	$400 \cdot t \cdot B \cdot D$ The range factor applies to radii $\leq 40\text{ km}$ ($D = 1$) $> 40\text{ km}$ ($D = 1.5$)
B.6.2	Frequency allocation for the operation of a coastal radio station in the maritime radio service in the medium and short waves to the frequency	$5\,000 \cdot t \cdot B$
B.6.3	Frequency allocation for the operation of a coastal radio station in the maritime radio service in the border wave band at a frequency of	$1,500 \cdot t \cdot B$
B.7	Fixed radio service, radio service with a standard frequency and time signal below 30 MHz	
B.7.1	Frequency allocations in the fixed radio service, normal frequency service and time signal radio service below 30 MHz per frequency	$40,000 \cdot t \cdot B$
B.8	Radio applications in rail transport	
B.8.1	Frequency allocation for railway radio applications in the 873 MHz to 880 MHz, 918 MHz to 925 MHz and 1 900 MHz to 1 910 MHz frequency bands per frequency (including the specification of technical radio parameters).	$0.39 \cdot t \cdot B \cdot D$ $D = \text{Railway line-km}$ The length of the railway infrastructure to be covered, as specified by the applicant (to be submitted using the appropriate form).
B.8.2	Allocation of frequencies for railway radio applications in the frequency bands 68.62 MHz to 69.56 MHz; 78.42 MHz to 78.70 MHz per frequency (including the specification of technical radio parameters).	$0.26 \cdot t \cdot B \cdot D$ $D = \text{Railway line-km}$ The length of the railway infrastructure to be covered, as specified by the applicant (must be submitted in a format suitable for the use of a fixed frequency).

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		For mobile applications, the following operational range D applies: handheld radio transmitters with a transmission power of up to 2.5 W: 3 km; vehicle-mounted radio transmitters with a transmission power of up to 8 W: 10 km.
B.8.3	Frequency allocations for railway radio applications in the frequency bands 146.36 MHz to 171.78 MHz per frequency (including the specification of technical radio parameters).	$0.52 \cdot t \cdot B \cdot D$ D = Railway line-km The length of the railway infrastructure to be covered, as specified by the applicant (must be submitted in a format suitable for the use of a fixed frequency). For mobile applications, the following functional range D applies: handheld radio transmitters with a transmission power of up to 2.5 W: 3 km vehicle-mounted radio stations with a transmission power of up to 8 W: 10 km.
B.8.4	Allocation of frequencies for railway radio applications in the 419.72 MHz to 468.320 MHz frequency bands on a per-frequency basis (including the specification of technical radio parameters).	$1.03 \cdot t \cdot B \cdot D$ D = Railway line-km The length of the railway infrastructure to be covered, as specified by the applicant (must be submitted in a format suitable for the use of a fixed frequency).
		For mobile applications, the following functional range D applies: handheld radio transmitters with a transmission power of up to 2.5 W: 3 km vehicle-mounted radio transmitters with a transmission power of up to 8 W: 10 km.
B.9	Broadcasting service	
B.9.1	Frequency allocation to meet the requirement for continuous coverage in the long-wave band using analogue or digital transmission technology	$40\,000 \cdot t \cdot B \cdot \frac{EW_G \cdot R \cdot V_f}{EW_{BRD}}$ EW_G = Population within the service coverage area and adjacent areas EW_{BRD} = Population of the Federal Republic of Germany $V_f = 1$ for fixed reception* $V_f = 1.25$ for mobile reception* $V_f = 1.5$ for portable indoor reception* $R = 0.9$, unless otherwise specified in the coverage requirement, with a minimum of 0.5**
B.9.2	Frequency allocation to meet the requirement for continuous coverage in the medium-wave band using analogue or digital transmission technology	$40\,000 \cdot t \cdot B \cdot \frac{EW_G \cdot R \cdot V_f}{EW_{BRD}}$ EW_G = Population within the service coverage requirement and in adjacent areas EW_{BRD} = Population of the Federal Republic of Germany $V_f = 1$ for fixed reception* $V_f = 1.25$ for mobile reception* $V_f = 1.5$ for portable indoor reception* $R = 0.9$, unless otherwise specified in the coverage requirement, with a minimum of 0.5**
B.9.3	Allocation of frequencies to meet the requirement for continuous coverage in the short-wave band using analogue or digital transmission technology, or allocation of frequencies in the short-wave band using analogue or digital transmission technology to cover one or more overseas target areas, including the specification of technical radio parameters within the allocated period	$40\,000 \cdot t \cdot B \cdot \frac{EW_G \cdot R \cdot V_f}{EW_{BRD}}$ EW_G = Population within the service coverage requirement and in adjacent areas EW_{BRD} = Population of the Federal Republic of Germany $(EW_G \cdot R \cdot V_f) / EW_{BRD} = 1$ for target areas exclusively abroad $V_f = 1$ for fixed reception* $V_f = 1.25$ for mobile reception* $V_f = 1.5$ for portable indoor reception*

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		R = 0.9, unless otherwise specified in the coverage request, with a minimum of 0.5** R = 1 only for destinations abroad
B.9.4	Allocation of frequencies in Band II (VHF) to meet the requirement for continuous coverage	$400\,000 \cdot t \cdot B \cdot \frac{EW_G \cdot R \cdot V_f}{EW_{BRD}}$ EW_G = Population within the service coverage requirement and in adjacent areas, but at least 20,000 people EW_{BRD} = Population of the Federal Republic of Germany V_f = 1 for fixed reception* V_f = 1.25 for mobile reception*
		V _f = 1.5 for portable indoor reception*
		R = 0.9, unless otherwise specified in the coverage requirement, with a minimum of 0.5**
B.9.5	Allocation of frequencies in Band III (T-DAB/T-DAB+) to meet the requirement for continuous coverage	$80\,000 \cdot t \cdot B \cdot \frac{EW_G \cdot R \cdot V_f}{EW_{BRD}}$ EW_G = Residents in the area to be covered by the service and in neighbouring areas, but at least 10,000 people EW_{BRD} = Population of the Federal Republic of Germany V_f = 1 for fixed-line reception* V_f = 1.25 for mobile reception* V_f = 1.5 for portable indoor reception*
		R = 0.9, unless otherwise specified in the coverage requirement, with a minimum of 0.5**
B.9.6	Allocation of frequencies in Band IV/V (DVB-T/DVB-T2) to meet the requirement for continuous coverage	$70\,000 \cdot t \cdot B \cdot \frac{EW_G \cdot R \cdot V_f}{EW_{BRD}}$ EW_G = Population within the service coverage requirement and in adjacent areas, but at least 5,000 people EW_{BRD} = Population of the Federal Republic of Germany V_f = 1 for fixed reception* V_f = 1.25 for mobile reception* V_f = 1.5 for portable indoor reception*
		R = 0.9, unless otherwise specified in the coverage requirement, with a minimum of 0.5**
B.9.7	Allocation of frequencies or amendment of frequency allocations for the full implementation or further extension of an existing or amended coverage requirement, for which at least one frequency allocation necessary for its implementation was issued before 1 October 2021 and for which the same deadline applies to all frequency allocations issued for its implementation.	The fee in accordance with points B.9.1 to B.9.6, on the assumption that the coverage requirement for the calculation is the area that can be additionally covered by amendments to existing frequency allocations and, where applicable, by new frequency allocations. Coverage via unlimited allocations is not taken into account in the calculation.
B.9.8	The allocation of frequencies or a change to frequency allocations for the full implementation or further extension of an existing or amended coverage requirement, for which all frequency allocations necessary for its implementation were issued after 30 September 2021 and for which the same deadline applies to all frequency allocations issued for its implementation.	The fee under points B.9.1 to B.9.6, against which the fee already set for the allocation of frequencies under this coverage requirement, for which the same expiry date applies, is set off, up to a fee of 0.
B.10	Experimental radio and short-term frequency allocations	
B.10.1	Frequency allocations for one year, used by industry for the development and testing of radio equipment and radio systems, by allocation area.	$60 \cdot A \cdot t_N$ t_N = the total number of years of frequency use since the initial allocation Area factor A with an allocation area ≤ 10 km² (A = 1) > 10 km² up to 10,000 km² (A = 2) > 10,000 km² (A = 3)
	Allocation of frequencies for one year, used by	60 · A

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B.10.2	industry for the development, testing and repair of military equipment in frequency bands used and managed by the armed forces, by allocation area	Area factor A with allocation area
		$\leq 10 \text{ km}^2$ (A = 1)
		$> 10 \text{ km}^2$ up to $10,000 \text{ km}^2$ (A = 2)
		$> 10,000 \text{ km}^2$ (A = 3)
B.10.3	Allocation of frequencies for one year, used by industry for research purposes in collaboration with universities and higher education institutions, for each allocation area	$60 \cdot A \cdot t_N \cdot 0.5$
		t_N = the total number of years of frequency use since the initial allocation
		Area factor A with an allocation area
		$\leq 10 \text{ km}^2$
		$> 10 \text{ km}^2$ to $10,000 \text{ km}^2$
		$> 10,000 \text{ km}^2$
B.10.4	Allocation of frequencies for short-term use (short-term frequency allocation) to frequency	$30 \cdot A \cdot Z_{Ant}$
		Area factor A with allocation area
		$\leq 10 \text{ km}^2$ (A = 1)
		$> 10 \text{ km}^2$ up to $10,000 \text{ km}^2$ (A = 2)
		$> 10,000 \text{ km}^2$ (A = 3)
		Date of application submission prior to the first day of use
		≥ 15 days ($Z_{Ant} = 1$)
		4 to 14 days ($Z_{Ant} = 2$)
		1 to 3 days ($Z_{Ant} = 3$)
		on the first day of use ($Z_{Ant} = 4$)
B.11	Changes to frequency allocation	
B.11.1	A change to a frequency allocation made between 1 October 2006 and 1 October 2021 which affects the parameters relating to the intended use of the frequency – with the exception of the duration – for the remaining period of validity of that frequency allocation, per frequency (with the exception of points B.9 and B.10)	The fee specified under the relevant fee item in sections B.0 to B.8, against which the fee to be deemed to have been set from 1 October 2021 for a frequency allocation for which the same expiry date applies shall be set off, up to a fee of 0. Fees for unlimited allocations are not taken into account
B.11.2	A change to a frequency allocation made from 1 October 2021 which affects parameters based on the intended use of the frequency – with the exception of the duration – for the remaining period of validity of that frequency allocation, for each frequency (with the exception of points B.9 and B.10)	A fee in accordance with the relevant fee item in items B.0 to B.8, against which the fee already set for the allocation of a frequency for which the same expiry date applies shall be set off, up to a fee of 0.
C	Fees for measures taken as a result of unlawful conduct	
C.1	Fees for measures taken as a result of a breach of Sections 52 to 60 of the Telecommunications Act which was committed intentionally, has not been rectified or has been repeatedly detected despite advice	based on time of use

BNetzA has set the spectrum fee for the 3.7–3.8 GHz band for local applications using the formula ¹⁸¹:

Fee (EUR) = $1000 + B \cdot t \cdot 5 \cdot (6 \cdot a_1 + a_2)$ Where:

1000: base amount in EUR

B: bandwidth in MHz (from 10 MHz to 100 MHz) t:

duration of the allocation in years

a: area in square kilometres (km^2)

a_1 : residential and transport land

a_2 : other types of land

Fee for local use in the 24.25–27.5 MHz band:¹⁸²

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$$\text{Fee (EUR)} = 1000 + B \cdot t \cdot 0.63 \cdot (6 \cdot a^1 + a^2)$$

¹⁸¹https://www.bundesnetzagentur.de/SharedDocs/Downloads/EN/Areas/Telecommunications/Companies/TelecomRegulation/FrequencyManagement/FrequencyAssignment/LocalBroadband3,7GHz.pdf?__blob=publicationFile&v=1

¹⁸²https://www.bundesnetzagentur.de/SharedDocs/Downloads/EN/Areas/Telecommunications/Companies/TelecomRegulation/FrequencyManagement/FrequencyAssignment/LocalBroadband26GHz.pdf?__blob=publicationFile&v=1

Annex 9 – Poland

In Poland, there is an annual fee index based on turnover, which currently stands at 0.05 per cent. This fee is set individually each year by the Ministry for Digitalisation.¹⁸³

The 2013 Regulation on Annual Fees for the Right to Use Frequencies sets out the amounts, deadlines and method of payment of annual fees for the right to use frequencies by entities that have been granted the right to use a frequency.¹⁸⁴

In Poland, the amount of annual spectrum fees is broken down according to the following services:

- satellite and radiolocation services
- mobile terrestrial service
- fixed service
- terrestrial broadcasting service
- aeronautical service, maritime and inland waterway service

The annual fee is payable in quarterly instalments amounting to one quarter of the annual fee, by 15 April, 15 July, 15 October and 31 December of the relevant year.

Fees are payable into the current account of the Office for Electronic Communications.

The annual fee is reduced by 50 per cent if the frequencies are used exclusively for:

- the provision of emergency assistance to save human life and protect health by medical services and mountain, water and mine rescue services;
- operations carried out by organisational units whose statutory duty is to plan, carry out and participate in operations to prevent and mitigate the consequences of natural disasters and catastrophes;
- radio communication systems used in maritime and inland navigation by the maritime and inland navigation authorities and the maritime search and rescue service in the field of navigation safety and coastal protection;
- the performance of tasks relating to rail transport within the framework of the European Rail Traffic Management System (ERTMS);
- the broadcasting or distribution of radio or television programmes that do not contain commercial communications.
- Specific activities in the energy sector, ensuring the security of energy supplies

Satellite and radar services

The fee for the right to use frequencies by a single satellite station in systems utilising satellite telecommunications infrastructure is set as follows:

¹⁸³<https://sip.lex.pl/akty-prawne/mp-monitor-polski/wysokosc-wskaznika-rocznej-oplaty-telekomunikacyjnej-w-2024-r-21895297>

¹⁸⁴<https://sip.lex.pl/akty-prawne/dzu-dziennik-ustaw/roczne-oplaty-za-prawo-do-dysponowania-czestotliwoscia-18051738>

Table 186: Fee amounts by type of satellite and radar service

Service	Fee (PLN)
Fixed satellite service (Earth–space)	12,000
Fixed satellite service (space–Earth)	20,000
Satellite Earth Observation Service	1,200
satellite meteorological service	3,000
Satellite radio navigation service	1,200
space operations service	3,000
space research service	3,000
Satellite Broadcasting Service	40,000
Satellite mobile service (Earth–space)	12,000
satellite mobile service (space–Earth)	40,000

In the mobile satellite service sector, the fee for the use of frequencies with a total bandwidth of 1 MHz utilised by supplementary ground components of mobile satellite systems, where such frequencies are used within the boundaries of a single municipality or a smaller area, is PLN 250.

Where the area of use exceeds that of a single municipality, the fee is calculated as the product of 250 PLN and the number of municipalities in which the frequencies are used. If this product exceeds the maximum value specified below for a specific band, the calculation is adjusted as follows:

Table 187: Calculation of the fee for satellite and radar services by frequency band

Band	Max. value	Equation (if the product exceeds the maximum)
<1 900 MHz	PLN 200,000	$\text{PLN } 200,000 + \text{PLN } 100,000 \times (n / N_{\text{max}})$
1900–2300 MHz	PLN 70,000	$\text{PLN } 70,000 + \text{PLN } 45,000 \times (n / N_{\text{max}})$
2300 – 2690 MHz	PLN 70,000	$\text{PLN } 70,000 + \text{PLN } 30,000 \times (n / N_{\text{max}})$
2,690 – 3,400 MHz	PLN 50,000	$\text{PLN } 50,000 + \text{PLN } 12,000 \times (n / N_{\text{max}})$

n = the number of municipalities covered by the right to use the frequencies

N_{max} = the total number of municipalities in Poland.

The fee in the radiolocation service for the right to use frequencies by a single radar station is 300 PLN.

Land mobile service

The fee for the use of frequencies with a total bandwidth of **1 kHz** within the territory of a single municipality or fewer, in the range **up to 470 MHz**, used by radio equipment operating on radio channels with a bandwidth of less than 200 kHz, is set out in the table below.

Table 188: Fee for the land mobile service in the frequency band up to 470 MHz by type of municipality

Type of municipality	Fee per 1 kHz (PLN)
rural municipality	0.8
Urban-rural municipality	4
Municipality, excluding towns with county rights.	12
Town with district rights with a population of less than 100,000	48
A town with district rights with a population of at least 100,000	96

The fee amount specified in the previous paragraph, where the area covers more than one municipality, is calculated as the sum of the fees for the individual municipalities. If this sum exceeds PLN 40 in the case of frequencies being used throughout the area solely by mobile stations, or PLN 300 in other cases of frequency use, the fee for the right to use the frequencies listed above the table is calculated according to the following formula:

1) in the case of frequency use by mobile stations only:

$$40 \text{ PLN} + 16 \text{ PLN} \times (n / N_{\text{max}}),$$

2) in other cases:

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$$\text{PLN } 300 + \text{PLN } 100 \times (n / N_{\text{max}})$$

The fee for the use of frequencies with a total bandwidth of **1 MHz** in the range up to **470 MHz**, which are used by radio equipment operating on radio channels with a bandwidth of 200 kHz or more, where such frequencies are used within the territory of a single municipality or a smaller area, is 130 PLN.

The amount of the fee for the use of the frequencies referred to in the previous paragraph, where such frequencies are used within an area larger than that of a single municipality, is calculated as the product of the fee of 130 PLN and the number of municipalities within whose territory these frequencies are used. If this product exceeds PLN 100,000, the fee is calculated using the following formula:

$$\text{PLN } 100,000 + \text{PLN } 60,000 \times (n / N_{\text{max}}).$$

The fee for the right to use frequencies with a total bandwidth of **1 kHz** within the territory of a single municipality or less, in the range **from 470 MHz to 3,400 MHz**, which are used by radio equipment utilising radio channels with a bandwidth of less than 200 kHz, is set out in the following table.

Table 189: Fee for the land mobile service in the frequency band from 470 MHz to 3,400 MHz by type of municipality

Type of municipality	Fee per 1 kHz (PLN)
Rural municipality	0.08
Urban-rural municipality	0.4
Municipality, excluding towns with county rights.	1.2
Town with district rights	9.6

The fee for the use of frequencies with a total bandwidth of **1 MHz** in the range **from 470 MHz to 3,400 MHz**, which are used by radio equipment utilising radio channels with a bandwidth of 200 kHz or more, where such frequencies are used within the territory of a single municipality or a smaller area, amounts to PLN 250.

The amount of the fee for the use of the frequencies referred to in the previous paragraph, which are used within an area larger than that of a single municipality, is calculated as the product of the fee of 250 PLN and the number of municipalities within whose territory these frequencies are used. If this product exceeds the maximum amount, it is calculated as follows:

Table 190: Alternative calculation of the fee in the 470–3400 MHz band where the maximum amount is exceeded

Band	Calculation
470 MHz to 960 MHz	200,000 PLN + 100,000 PLN × (n / N _{max})
960 MHz to 1,900 MHz	PLN 200,000 + PLN 100,000 × (n / N _{max})
1,900 MHz to 2,300 MHz	PLN 70,000 + PLN 45,000 × (n / N _{max})
2,300 MHz to 2,690 MHz	PLN 70,000 + PLN 30,000 × (n / N _{max})
2,690 MHz to 3,400 MHz	PLN 50,000 + PLN 12,000 × (n / N _{max})

The fee for the use of frequencies with a total bandwidth of **1 MHz** within the territory of a single municipality or a smaller area in the band **above 3400 MHz** is set out in the table below.

Table 191: Fee for the land mobile service in the 3400 MHz frequency band by type of municipality

Type of municipality	Fee per 1 MHz [PLN]
Rural municipality	10
Urban-rural municipality	25
Municipality, excluding towns with county rights.	125
Town with district rights	250

The amount of the fee for the use of the frequencies referred to in the previous paragraph, which are used across an area larger than that of a single municipality, shall be calculated as the sum of the fees for the individual municipalities set out in the table above. If this amount exceeds 50,000 PLN, the fee for the right to use the frequencies referred to in the previous paragraph shall be calculated using the following formula:

$$\text{PLN } 50,000 + \text{PLN } 12,000 \times (n/N_{\text{max}})$$

The fee for the use of frequencies with a total bandwidth of **1 MHz** for a **wireless reporting system** is PLN 400.

Fixed service

The fee for the right to use frequencies with a total bandwidth of **1 kHz** in the frequency band **below 30 MHz** is PLN 1,000.

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The fee for the right to use frequencies with a total bandwidth of **1 kHz** used in point-to-multipoint and multipoint-to-multipoint systems within the territory of a single municipality or smaller area is:

Table 192: Fixed service fee in PLN per 1 kHz

Band	Rural municipality (PLN)	Urban-rural municipality (PLN)	Municipality, excluding towns with county rights (PLN)	Town with county rights (PLN)
30 MHz – 470 MHz	0.01	0.025	0.125	0.250
470 MHz – 3,400 MHz	0.01	0.025	0.125	0.250
3,400 MHz – 4,200 MHz	10	25	125	250
4,200 MHz – 39,500 MHz	5	12.5	62.5	125
Above 39,500 MHz	1	2.5	12.5	25

For the bands specified in the table, the fee for the right to use frequencies throughout the country is calculated as the product of the total number of municipalities in the country and the relevant fees.

The fee for the right to use frequencies with a total bandwidth of **1 kHz** in a single point-to-point radio link in the range **from 30 MHz to 1 GHz** is 2 PLN.

The fee for the right to use frequencies with a total bandwidth of **1 MHz** in a single point-to-point radio link in the range **above 1 GHz** is set out in the following table.

Table 193: Fee per 1 MHz in the range above 1 GHz for point-to-point links

Frequency band f [GHz]	Fee per 1 MHz [PLN]
1	2
$1 < f < 7.11$	450
$7.11 \leq f < 10.70$	270
$10.70 \leq f \leq 11.70$	360
$11.70 < f < 22.00$	180
$22.00 \leq f < 26.50$	90
$26.50 \leq f < 39.50$	36
$39.50 \leq f < 57.00$	18
$f \leq 57.00$	1

The fee for the right to use frequencies within a single frequency band of a point-to-point radio link, where one station is located within the territory of a town with district-level rights, is 150 per cent of the fee specified in the two paragraphs immediately above the table.

The fee for the right to use frequencies in a single point-to-point radio link, where both stations are situated within the territory of a town with district-level rights, is 200 per cent of the fee set out in the two paragraphs immediately above the table.

Terrestrial broadcasting service

- 1) The fee for the right to use frequencies with a total bandwidth of 1 kHz within the territory of a single municipality or fewer, in the range up to 174 MHz, is set out in the table below.

Table 194: Fee for terrestrial broadcasting services by type of municipality and frequency range

Frequency range f [kHz]	Type of municipality	Fee per 1 kHz [PLN]
<300	Any type of municipality	0.5
	Rural municipality	5
300 – 3,000	Urban-rural municipality	5
	Municipality (excluding towns with district rights)	14.5
	Town with district rights	110
3,000 – 30,000	Any type of municipality	400
	Rural municipality	0.7
30,000 – 174,000*	Urban-rural municipality	0.7
	Municipality (excluding towns with district rights)	2
	Town with district rights	15

*In the 30,000–174,000 kHz frequency range, the radio channel width is 250 kHz.

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Where a decision on the allocation of frequencies, granting the right to use a frequency within a territory smaller than the territory of the whole country, includes the right to use a frequency within a territory in which there are at least six towns with district rights in the relevant voivodeship, the fee for the right to use frequencies with a total bandwidth of 1 kHz within the territory of the sixth and subsequent towns with district status in that voivodeship, up to 174 MHz, shall be calculated as the product of the number of such towns and the fee per 1 kHz set out in the table above for a municipality, with the exception of towns with district status.

The fee for the right to use one television channel by a single analogue television station in the band above 174 MHz is set out in the table below.

Table 195: Fee for the right to use one television channel by one analogue television station

Antenna mounting height h [m]	Radiated power P [kW]	Fee [PLN]
h ≤ 50	P ≤ 0.1	2,250
	0.1 < P ≤ 0.5	4,500
	P > 0.5	9,000
50 < h ≤ 100	P ≤ 0.1	4,500
	0.1 < P ≤ 1.0	12,000
	1.0 < P ≤ 10.0	18,000
	P > 10.0	27,000
h > 100	P ≤ 1.0	15,000
	1.0 < P ≤ 10.0	26,250
	10.0 < P ≤ 100.0	40,500
	P > 100.0	49,500

3) The fee for the right to use frequencies with a total bandwidth of 1 MHz utilised by a digital system within the territory of a single municipality or a smaller area in the range from 174 MHz to 862 MHz is set out in the table below.

Table 196: Fee for the right to use frequencies with a total bandwidth of 1 MHz utilised by a digital system, by type of municipality

Frequency range f [MHz]	Type of municipality	Fee per 1 MHz [PLN]
over 174 to 230	Rural municipality	11.5 until 31 December 2032 / 115 from 1 January 2033
	Urban-rural municipality	11.5 until 31 December 2032 / 115 from 1 January 2033
	Municipality, excluding towns with district rights.	33 until 31 December 2032 / 330 from 1 January 2033
	Town with district rights	250 until 31 December 2032 / 2,500 from 1 January 2033
over 230 to 470	Rural municipality	115
	Urban-rural municipality	115
	Municipality, excluding towns with district rights.	330
	Town with district rights	2,500
over 470 to 862	Rural municipality	230
	Urban-rural municipality	230
	Municipality, excluding towns with district rights.	660
	Town with district rights	5,000

4) The fee for the right to use frequencies with a total bandwidth of 1 MHz utilised by a digital system within the territory of a single municipality or a smaller area in the band above 862 MHz is set out in the table below.

Table 197: Fee for the use of frequencies utilised by a digital system in the band above 862 MHz

Type of municipality	Fee per 1 MHz [PLN]
Rural municipality	23
Urban-rural municipality	23
Municipality, excluding towns with district rights.	66
Town with district rights	500

Air transport and maritime and inland waterway transport

1) The fee for the right to use frequencies with a total bandwidth of 1 kHz by a single airport system in the air navigation service is 16 PLN.

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2) The amount of the fee in the maritime and inland navigation service for the right to use frequencies with a total bandwidth of 1 kHz by a single coastal station in communications between the coast and a vessel is set out in the table below:

Table 198: Fee amounts for maritime and inland navigation services by a single station, by frequency range

Frequency range		Fee per 1 kHz [PLN]
156–174 MHz – VHF band		16
1,605 – 27,500 kHz - MF band and HF band	Radiotelephony	100
	Radio telex	80

3) The fee for the right to use frequencies with a total bandwidth of 1 kHz by each mobile or portable land station in the maritime and inland services for shore-to-ship communications is set out in the table below.

Table 199: Fee rates in the maritime and inland services for each mobile or portable land station

Station location	Fee per 1 kHz [PLN]
Within range of a coastal station	12
Outside the range of a coastal station Coastal station or, in its absence	16

Annex 10 – Austria

The costs of frequency allocation and use consist of one-off fees or charges and of ongoing fees payable for the duration of frequency use.

One-off costs

Where frequencies are allocated through a tender procedure organised by the regulatory authority (the Telecommunications Supervisory Commission at the RTR), allocation fees must be paid. These fees may, for example, be determined in a competitive tender (auction). In all other cases, allocation fees must be paid.

Ongoing fees

In addition to the fees arising in connection with the allocation of frequencies, the holder of the allocations must also pay ongoing fees (fees for the use of frequencies). These fees, like the allocation fees mentioned above, are set by the regulator on the basis of the **Telecommunications Fees Regulation** (Telekommunikationsgebührenverordnung – TKGV).¹⁸⁵

Fee structure

Under this regulation, fees in Austria are divided into the following groups:

- Frequency usage fees for the fixed radio service and the mobile terrestrial radio service
- Fees for the use of frequencies for combined radio systems
- Fees for the use of frequencies for telephone networks
 - c) Fees for the use of frequencies for digital broadband wireless mobile or fixed communications networks (excluding point-to-point systems)
 - d) Fees for the use of frequencies for digital data radio networks in the frequency range from 29.7 MHz to 450 MHz
- Fees for the use of frequencies for satellite radio systems
- Fees for the use of frequencies for radar systems
- Licence fees for the establishment and operation of radio systems for all other radio services

Annual fees are payable on a pro rata basis per calendar month. The full monthly fee is payable for any part of a calendar month that has commenced.

Fixed Radio Service and Mobile Radio Service

Fees for the use of frequencies for the fixed radio service and the land mobile radio service

1. Where an exclusive frequency has been allocated for mobile radio services and fixed radio services used exclusively for internal or private purposes with an approved high-frequency transmitter output power, the **monthly** fee shall be calculated in accordance with the following table. The fee shown is per radio transmitter and per channel unit (as specified in the second table).

Table 200. Fees for the use of frequencies for the fixed radio service and the mobile terrestrial radio service:

Power	Duplex, semi-duplex (EUR/month)	Simplex (EUR/month)
Up to 1 W	3.63	2.18
Up to 6 W	7.99	4.36
Up to 25 W	10.90	5.81
Up to 150 W	22.53	11.63
Up to 1 kW		22.53
Over 1 kW		44.33

However, the charge may not exceed 131.54 EUR per route. The channel

unit is determined according to the frequency band as follows:

Table 201: Channel units:

Band (MHz)	Channel unit
< 29.7	10 kHz

¹⁸⁵<https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=10012777>

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29.7 – 960	25 kHz
960 – 2,690	250 kHz
2,690 – 9,800	500 kHz
9,800 – 15,350	750 kHz
15,350 – 43,500	1,000 kHz
43,500 – 57,000	10,000 kHz
> 57,000	100 MHz

If the allocated frequency bandwidth exceeds the above values, each multiple of the excess and each commenced multiple of the excess shall be treated as a further channel unit for the purposes of calculating fees. Where authorisation is granted for the operation of a radio transmitter on multiple frequencies, with different services or different bandwidths, the highest amount from the first table shall be payable. The monthly fee for community-allocated frequencies is 50 per cent of the original amount. The monthly fee for commercially used frequencies is 300 per cent of the original amount from the first table.

Fees for the use of frequencies for digital broadband wireless mobile or fixed communications networks (excluding point-to-point systems)

Table 202: Monthly licence fee for the establishment and operation of public communications networks used to provide digital broadband wireless communications services (EUR)

Frequency band	Bandwidth (kHz)	Area of use		
		Local area of operation (max. 500,000 inhabitants)	Nationwide use	Other area of use
450–870 MHz	200	116.28	581.38	348.83
870–2,500 MHz	400	116.28	581.38	348.83
2,500–3,800 MHz	1,000	58.14	581.38	116.28

Where the licence is used exclusively for internal or private purposes, the fee is only one-third of the amount stated above.

Combined radio systems

Fees for the use of frequencies for shared radio systems

The allocated frequencies are combined into a single frequency package and allocated to individual users by computer.

1) The fee for a licence to install and operate shared radio systems used exclusively for internal purposes is, per month for each channel (frequency pair):

- a) for the first 12 channels: EUR 363.36
- b) for channels 13–24: EUR 290.69
- c) for channels 25 and above: EUR 236.19

For radio systems used commercially to provide telecommunications services, the fee per channel, in addition to the fees set out in point 1, is:

- a) for the first 12 channels: EUR 36.34
- b) for channels 13 to 24: EUR 109.01
- c) for channels 25 and above: EUR 163.51

Mobile networks (radio)

Fees for the use of frequencies for telephone networks pursuant to Section 3(18) of the Telecommunications Act (TKG 2003) for the provision of public services via mobile networks.

The fee for a licence to install and operate telephone networks for the provision of public services via mobile networks is, per month for each channel (frequency pair):

1) For analogue systems

- a) for a local service area (up to 500,000 inhabitants served) EUR 14.53
- b) for nationwide use: EUR 72.67
- c) for an area other than (a) or (b): EUR 43.60

2) For a digital system, for each allocated 200 kHz bandwidth

- a) for a local service area (maximum of 500,000 residents served) €116.28
- b) for nationwide use: 581.38 EUR
- c) for areas other than (a) or (b) EUR 348.83

Data radio networks

Fees for the use of frequencies for digital data radio networks in the frequency range from 29.7 MHz to 450 MHz

Fee for a licence to install and operate digital radio networks in fixed and mobile radio services within the 29.7–450 MHz frequency range, in which no radio station exceeds the approved high-frequency output power of 0.5 W, is payable monthly as a shared frequency fee for every 12.5 kHz of spectrum allocated:

1) in the 29.7–87.5 MHz frequency range

- a) for a local service area (up to a maximum of 500,000 inhabitants served) EUR 43.61
- b) for nationwide use: 218.02 EUR
- c) for other areas of use: 130.81 EUR

2) in the 87.5–174 MHz frequency band

- a) for a local service area (up to a maximum of 500,000 residents served) €29.07
- b) for nationwide use: EUR 145.35
- c) for other areas of use: EUR 87.21

3) in the 174–450 MHz frequency band

- a) for a local area of operation (up to a maximum of 500,000 inhabitants) €14.54
- a) for nationwide use: EUR 72.67
- b) for other areas of use: EUR 43.60

If the allocated spectrum exceeds 12.5 kHz, each multiple and sub-multiple of 12.5 kHz must be used as the basis for calculating the fee. If an exclusive frequency is allocated, the fee is double the fee calculated in accordance with points 1–3(a)–(c).

Satellite radio systems

Fees for the use of frequencies for satellite radio systems

For a licence to establish and operate satellite radio systems, the monthly fee for each transmitter and for each operational spare transmitter, with the maximum high-frequency output power of the transmitter, is set as follows:

Table 203: Fees for the use of frequencies for satellite radio systems:

Transmitter power	Fee (EUR)
Up to 1 W	14.53
Up to 6 W	36.34
Up to 30 W	50.87
Up to 150 W	109.01
Up to 1,000 W	327.03
Over 1,000 W	654.06

Radar systems

Fees for the use of frequencies for radar systems

The fee for a licence to install and operate radar equipment is 36.34 EUR per month.

Other radio services

Licence fees for the establishment and operation of radio systems for all other radio services

The fee for a licence to install and operate radio equipment for all other radio services, in accordance with the Radio Regulations, is EUR 10.90 per month for each transmitter.

Annex 11 – Slovakia

The Regulatory Authority (Úrad pre reguláciu elektronických komunikácií a poštových služieb) publishes the amounts of fees for the use of the radio spectrum in its gazette¹⁸⁶, which is governed by Section 47(3) of Act No. 452/2021 Z. z. on Electronic Communications¹⁸⁷. In its gazette, the Authority classifies services as follows:

- Land mobile service
 - nationwide radio networks and campus networks
 - fixed stations, mobile stations and shared frequencies
 - mass electronic communications networks
- Fixed service
 - point-to-point up to 1 GHz
 - point-to-multipoint up to 1 GHz
 - point – point above 1 GHz
 - point – multipoint from 1 to 11 GHz
 - point-to-point – point-to-multipoint above 11 GHz
- Satellite service
 - Mobile service – supplementary ground station
 - Mobile satellite service
 - Mobile service – nationwide radio networks
 - Fixed satellite service
- Radio and television service – terrestrial broadcasting
- Other radiocommunication services
 - Amateur service, aeronautical and maritime mobile service
 - Aviation and maritime radar equipment
 - Terrestrial radar and radio navigation equipment
 - wireless microphones
 - identification mark
 - reporting and transmission equipment

The amount of each fee varies according to the formulae set out in the Official Journal. These formulae use coefficients, which are also explained in the aforementioned Official Journal and below in the text.

The Authority has set an administrative fee at 0.08 per cent of the previous year's turnover, subject to a minimum of EUR 150, even if the undertaking had no turnover.¹⁸⁸

For stations belonging to healthcare facilities, emergency services intended to save human lives, fire brigades and the municipal police, a fee of 50 per cent is payable.

Changes to the fees, published in the Regulatory Authority's Gazette, have occurred five times since 2012, namely in 2012, 2017, 2021 and 2022 (in the latter year, there were two changes).

Land-based mobile service (mobile service)

Table 204: Monthly fees for land mobile services

Type of fee	Formula
Nationwide radio networks and campus networks	$1/12 \times S1 \times Y1 \times 1/KF \times Km$
Fixed stations, mobile stations and shared frequencies	$K2 \times Kp \times KK \times Km$
Mass electronic communications networks	$2/3 \times Y1 \times K4 \times Km$

Where shared frequencies are allocated, the fee is 50 per cent of the original amount

¹⁸⁶https://www.teleoff.gov.sk/files/urad/odbory-oddelenia/odbor-spravy-frekvencneho-spektra/sprava-frekvencii-regulacia/sadzobnik-uhrad/51975_vestnik-c06_2022.pdf

¹⁸⁷<https://www.slov-lex.sk/pravne-predpisy/SK/ZZ/2021/452/>

¹⁸⁸https://www.teleoff.gov.sk/files/urad/odbory-oddelenia/odbor-spravy-frekvencneho-spektra/sprava-frekvencii-regulacia/vseobecne-povolenia/vseobecne-povolenie-1_2023-zneni-1_2024.pdf

Fixed-line service

Table 205: Monthly charges for landline services

Type of fee	Formula
Point-to-point service up to 1 GHz	$KK \times KV \times Km$
Point-to-multipoint service up to 1 GHz	$2/3 \times Y1 \times P \times Km$
Point-to-point service above 1 GHz	$Y3 \times K5 \times Km \times (1 + P1/10)$
Point-to-multipoint service from 1 to 11 GHz	$1/12 \times Y3 \times P2 \times ES \times K5 \times K6 \times Km$
Point-to-multipoint service above 11 GHz	$1/60 \times Y3 \times P2 \times ES \times K5 \times K6 \times Km$
Terrestrial fixed service stations for unidirectional propagation of unmodified television and radio programmes	$1/12 \times X1 \times K6 \times Km$

Satellite service

Table 206: Monthly fees for the satellite service

Type of fee	Formula
Mobile satellite service	$Y3 \times ED \times Km$
Supplementary earth station for the mobile satellite service	$1/12 \times Y3 \times P2 \times ES \times K5 \times K6 \times Km$
Nationwide radio network for the mobile satellite service	$5/6 \times Y1 \times Km$
Fixed-satellite service	$Y3 \times KD \times Km$

The daily, monthly or annual fee shall apply, whichever is the lowest.

Radio and television service

Table 207: Monthly charges for radio and television services

Type of fee	Formula
Radio and television broadcasting	$1/12 \times K9 \times Y2 \times Km \times V^2$

Where the average radiated power is less than 50 W, a fee of 3 EUR is payable for the use of the frequencies.

Other radiocommunication services

Table 208: Monthly fee for aeronautical and maritime mobile services (EUR)

Equipment power	Fee (EUR)
Up to 10 W	3
10–25 W	4
25–100 W	7
100–500 W	10
More than 500 W	19

Table 209: Monthly fee for wireless microphones (EUR)

Number of radio devices	Price (EUR)
Up to and including 10 with a maximum power of 1 W	3
More than 10 with a maximum power of 1 W	4
Up to and including 5 with a maximum power of 5 W	5
5–10 inclusive, with a maximum power of 1–5 W	6
More than 1, with a maximum power of 1–5 W	9

Other monthly charges:

Table 210: Other monthly charges by type

Type of charge	Price (EUR)
On-board radar equipment, unless part of the aircraft's or ship-based mobile station	3
Radio altimeter, unless it forms part of an aircraft mobile station	3
Radar equipment	3
Radio navigation equipment	3
For the identification code assigned to a single base station, a fixed station or a mobile station	0.80
Per frequency for a reporting device	3
Per frequency for mobile transmission equipment	6

The fee for frequencies and an amateur station call sign for the entire duration of the individual licence is 3 EUR. The fee for a temporary call sign is 0 EUR.

Coefficients:

Table 211: Coefficients used to calculate fees for the use of frequencies

Name coefficient	Description of the	
ED	Coefficient for the period for which the frequency is allocated to a mobile station in the satellite service (5 = daily payment, 50 = monthly payment, 350 = annual payment)	
ES	$X \times Z$	
hefstr	1/36 of the sum of the effective heights h_{ef} calculated in 10-degree azimuth intervals and defined by the GE06 Agreement. If h_{ef} is less than 0, the value 1 is used. If h_{ef} is less than 10, the value 10 is used.	
K2	Service area coefficient	Area radius
	1	up to and including 4 km
	1.2	4 to 10 km inclusive
	1.5	10 to 30 km inclusive
	1.8	30 to 50 km inclusive
	2	50 to 100 km inclusive
	3	Over 100 km
K4	Territorial allocation coefficient (for multiple regions, the coefficients are added together)	Region
	1.0	the whole of Slovakia
	0.3	Bratislava Region
	0.2	Košice Region
	0.12	Banská Bystrica Region
	0.08	Nitra Region
	0.08	Trenčín Region
	0.08	Trnava Region
	0.08	Žilina Region
	0.06	Prešov Region
K5	Frequency band coefficient	Frequency band
	1.20	Up to and including 5 GHz
	1.00	5 – 10 GHz inclusive
	0.91	10.1 – 12.5 GHz inclusive
	0.89	12.5 – 14.0 GHz inclusive
	0.87	14.0 – 16.0 GHz inclusive
	0.84	16.0 – 21.0 GHz inclusive
	0.81	21.0 – 24.0 GHz inclusive
	0.79	24.0 – 27.0 GHz inclusive
	0.78	27.0 – 30.0 GHz inclusive

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	0.75	30.0 – 34.0 GHz inclusive
	0.72	34.0 – 40.0 GHz inclusive
	0.65	More than 40 GHz
K6	Attractiveness coefficient based on population coverage	Population coverage
	1.15	More than 100,000
	1.00	More than 75,000
	0.85	More than 50,000
	0.70	More than 20,000
	0.50	More than 10,000
	0.30	More than 5,000
	0.20	More than 2,000
	0.10	2,000 inhabitants or fewer
K9	Broadcasting coefficient	Broadcast type
	0.11	Analogue radio broadcasting
	0.05	Digital radio broadcasting
	0.23	Local digital terrestrial television broadcasting
	0.12	Nationwide digital terrestrial television broadcasting
KD	Coefficient for a satellite service earth station (25 = frequency band width up to and including 4 MHz, 22 = band width greater than 4 MHz)	
KF	Frequency band coefficient – KF = frequency band in GHz (e.g. 900 MHz band -> KF=0.9)	
KK	Frequency channel width coefficient (1 for a frequency channel of 12.5 kHz – 25 kHz; 0.5 for a frequency channel up to 12.5 kHz)	
Km	Modification coefficient = 0.3	
KP	Number of radio stations coefficient	Number of radio stations
	6	Up to 15 radio stations with a power output of up to 1 W
	9	15–50 radio stations with a power output of up to 1 W
	12	More than 50 radio sets with a power output of up to 1 W
	9	Up to 5 radio sets with a power output of up to 5 W
	12	5–15 radio sets with a power output of up to 5 W
	15	15–50 radio units with a power output of up to 5 W
	16	More than 50 radio sets with a power output of up to 5 W
	12	Up to 5 radio sets with a power output of up to 10 W
	15	5–15 radio sets with a power output of up to 10 W
	18	15–50 radio sets with a power output of up to 10 W
	20	More than 50 radio sets with a power output of up to 10 W
HF	Radio transceiver output power factor	Radio transmitter output power
	1.0	Up to and including 0.1 W
	0.3	0.1 – 1 W inclusive
	0.2	1 – 10 W inclusive
	0.12	10 – 100 W inclusive
	0.08	100 – 500 W inclusive
	0.08	500 – 1,000 W inclusive
	0.08	More than 1,000 W
P	Output power of the device's final stage in watts (if P is less than 1, the value 1 is used)	
P1	Output power of the device's final stage in dBm (if P1 is less than 0, the value 0 is used)	
P2	Output power of the device's final stage in dBm (if P2 is less than 1, the value 1 is used)	
S1	Rate per 1 kHz of allocated frequency bandwidth: 35 EUR for public networks 3.50 EUR for non-public networks 1 EUR for networks deployed in enclosed premises	
V	1/36 of the sum of e.r.p. (dBW) in 10-degree azimuth intervals from 0 to 360 degrees	
X	Number of sector antennas	

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	Output power coefficient of the device's final stage	Output power per channel
X1	3	Up to 0.5 W
	7	0.5 – 1 W inclusive
	14	1 – 2 W inclusive
	28	2 – 10 W inclusive
	44	10–20 W inclusive
	57	More than 20 W
Y1	Frequency range in kHz	
Y2	$\sqrt{(0.1 \times h_{efstr})}$	
Y3	Frequency range in MHz	
Z	Sector value ($\leq 45^\circ = 1$; $\leq 90^\circ = 2$; $\leq 120^\circ = 3$; $\leq 180^\circ = 4$)	

Annex 12 – Slovenia

At present, fees for the use of radio frequencies in Slovenia are governed by two laws – the General Act on the Method of Calculating Payments for the Use of Radio Frequencies (Official Gazette of the Republic of Slovenia, No. 163/22 of 27 December 2022) and the General Act Amending that Act (Official Gazette of the Republic of Slovenia, No. 130/23 of 21 December 2023).

Payments stipulated by these general laws are expressed in terms of points. The amount of the payment is calculated as the product of the number of points and the value of a point for that type of payment. The value of a point is set by the agency via a schedule of rates for a specific year. For 2024, the value of one point is set at EUR 0.66.¹⁸⁹

The payment is made as a one-off sum. If a payer is assessed a payment totalling more than 1,000 points for a single type of service, they may settle this obligation in two equal instalments, the first within 30 days of receipt of the decision and the second by 5 September of the relevant year at the latest.

In the case of frequencies allocated by auction, frequency holders are obliged to pay a fee relating to the effective use of the allocated frequencies. This fee constitutes revenue for the state budget and its amount is set out in the auction terms and conditions.

The amount of the fee depends on classification into the following groups:

7. Fixed number of points
8. Radio frequencies for broadcasting
9. Analogue broadcasting
10. Digital broadcasting
11. Other radio frequencies
12. Special cases of use

Individual operators are also required to pay 0.1 per cent of their annual turnover from the provision of public communications networks and public communications services.¹⁹⁰

Fixed number of points

For radio frequencies, a fee of **60 points** is set:

- for the maritime mobile service;
- for the aeronautical mobile service;
- for the aeronautical mobile service;
- aerial radionavigation stations;
- maritime radio navigation stations;
- base stations of the local one-way paging system.

A fee of **700 points** is set for the radio frequencies of a medium-wave transmitter.

A fee of **600 points** is set for radio frequencies and for each ground station in a satellite system (satellite communications), as well as for SNG/OB.

A one-off fee of **60 points** is set for the issue, amendment or renewal of an amateur radio licence.

Notwithstanding the provisions of the previous paragraph, a one-off fee of **30 points** is set for the issue, amendment or renewal of an amateur radio licence for those call sign sequences which amateur radio organisations or amateur radio clubs use to identify amateur radio stations and which form part of the amateur radio support infrastructure.

No fees are payable for radio frequencies for receivers.

¹⁸⁹ <https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina/2023-01-3896/tarifa-2024-on-the-value-of-points-for-fees-based-on-the-notice-on-fees-for-the-use-of-radio-frequencies-and-fees-for-the-use-of-radiation-elements>

¹⁹⁰ <https://pisrs.si/pregledPredpisa?id=ZAKO8611>

Radio frequencies for broadcasting

For the use of radio frequencies for broadcasting, the number of points is determined as follows:

- for radio frequencies 174–230 MHz, which are designated for digital television broadcasting: **$500 + 300 \times D(3) \times D(4)$ points**;
- for radio frequencies 174–230 MHz, which are designated for digital audio broadcasting: **$500 + 100 \times D(3) \times D(4)$ points**;
- for radio frequencies 470–790 MHz designated for digital television broadcasting: **$500 + 150 \times D(3) \times D(4)$ points**.

Where radio frequencies for radio broadcasting are shared on a time-sharing basis by two or more holders of a decision on the allocation of radio frequencies, each of them is obliged to pay a proportionate share based on the duration of use, with the sum of these shares equalling the full amount of the fee for full-day use.

Analogue broadcasting

For radio frequencies 87.5–108 MHz, which are defined by the 1984 Geneva Convention for analogue audio broadcasting, the calculation is as follows:

$628 \times D(1) \times D(2)$ points

- Factor D(1)** depends on the size of the coverage area, as specified in the decision on the allocation of radio frequencies. The value of the factor is determined as follows:

Table 212: Value of factor D(1) by coverage area

Area of coverage	Factor D(1)
$X \leq 20 \text{ km}^2$	0.5
$20 \text{ km}^2 < X \leq 50 \text{ km}^2$	0.6
$50 \text{ km}^2 < X \leq 100 \text{ km}^2$	0.8
$100 \text{ km}^2 < X \leq 200 \text{ km}^2$	1
$200 \text{ km}^2 < X \leq 500 \text{ km}^2$	1.5
$500 \text{ km}^2 < X \leq 1,000 \text{ km}^2$	2
$1,000 \text{ km}^2 < X \leq 2,000 \text{ km}^2$	3
$X > 2,000 \text{ km}^2$	6

- Factor D(2)** depends on the coverage of urban areas. In this case, it is assumed that radio frequencies for broadcasting cover a given urban area if they cover more than half of that urban area.

Table 213: Value of factor D(2) by urban area

Urban area	Factor D(2)
Ljubljana	5.0
Maribor	2.5
Kranj	1.4
Celje	1.4
Koper	1.2
Velenje	1.2
Novo Mesto	1.2
No urban area	1

If more than one of the above urban areas is covered, the factor D(2) is equal to the sum of the values of the urban areas included.

Digital broadcasting (television, radio)

For radio frequencies 174–230 MHz allocated to digital television broadcasting: **$500 + 300 \times D(3) \times D(4)$ points** For radio frequencies 174–230 MHz allocated to digital audio broadcasting: **$500 + 100 \times D(3) \times D(4)$ points**; For radio frequencies 470–790 MHz, which are designated for digital television broadcasting: **$500 + 150 \times D(3) \times D(4)$ points**.

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- **The factor D(3)** depends on the bandwidth of the radio frequencies => the bandwidth of the allocated radio frequencies / 1 MHz.
- **The factor D(4)** is equal to one hundred times the ratio of the population within the coverage areas to the total population of Slovenia, rounded to three decimal places.

Where the coverage area is not explicitly specified in the decision on the allocation of radio frequencies, it is defined as the area where the calculated impact of the radio station exceeds the reference value below:

Table 214: Reference values for individual radio frequency bands

Frequencies	Type of transmission	Reference value for electric field strength
174–230 MHz	for digital television broadcasting	50 dB(μV/m)
	for digital audio broadcasting	60 dB(μV/m)
470–582 MHz	for digital television broadcasting	54 dB(μV/m)
582–790 MHz	for digital television broadcasting	58 dB(μV/m)

Other radio frequencies (Mobile service, fixed service, fixed-satellite service and mobile-satellite service)

(1) Number of points for other radio frequencies not mentioned above: **B x C x E points**.

- C = total bandwidth of allocated radio frequencies / 25 kHz
- B = depends on the radio frequency range used:

Table 215: Value of factor B according to frequency range

Radio frequency range	Value of factor B
$X \leq 470$ MHz	10
470 MHz < $X \leq 960$ MHz	2
960 MHz < $X \leq 2,300$ MHz	1
2,300 MHz < $X \leq 3,400$ MHz	0.6
3,400 MHz < $X \leq 5,000$ MHz	0.5
5,000 MHz < $X \leq 10,000$ MHz	0.4
10,000 MHz < $X \leq 17,700$ MHz	0.3
17,700 MHz < $X \leq 23,600$ MHz	0.2
23,600 MHz < $X \leq 40,000$ MHz	0.1
40,000 MHz < $X \leq 71,000$ MHz	0.01
$X > 71,000$ MHz	0.001

- E = depends on geographical coverage as per the table below

Table 216: Value of the E factor depending on geographical coverage

Geographical coverage	Value of the E-factor
The whole territory of the Republic of Slovenia	50
Local coverage – up to 130 municipalities	25
Local coverage – up to 65 municipalities	10
Local coverage – up to 5 municipalities	5
Local coverage – one base station	10
Point-to-point link	1
For the band above 2000 MHz for the purposes of the event	1
Use of radio frequencies for directional (point-to-point) links throughout Slovenia	32

The E-factor for frequencies allocated for the provision of terrestrial wireless broadband electronic communications services, including for own use and public communications services to end-users, which are allocated for part of the territory of Slovenia, and for point-to-point links allocated on the basis of a public tender, regardless of the radio frequency band, shall be determined depending on the population (P) of the coverage areas, in accordance with the equation:

$E = 15 \times 10^{-6} \times P$, rounded to the nearest whole number greater than or equal to 1.

- P = is equal to the population of the coverage areas.

Annex 13 – United Kingdom

The regulatory authority levies charges in accordance with the 2003 Roads Act, which is updated at irregular intervals (e.g. in 2010, 2011 and twice in 2017 and 2024)¹⁹¹.

Licence and administrative fees are regularly updated by the regulatory authority at the start of the financial year. Administrative fees apply to all entities with a relevant turnover exceeding GBP 5 million in a calendar year. These fees are summarised in the table below:

Table 217: Administrative fees based on turnover:

Turnover (thousand GBP)	Fee amount
5,000 – 10,000	5,350
10,000 – 25,000	10,700
25,000 – 50,000	26,750
50,000 – 75,000	53,500
75,000 – 100,000	80,250
100,000 – 150,000	107,000
150,000 – 200,000	160,500
200,000 – 300,000	214,000
300,000 – 400,000	321,000
400,000 – 500,000	428,000
500,000 – 600,000	535,000
600,000 – 750,000	642,000
750,000 – 1,000,000	802,500
More than 1,000,000	0.1070%

If the calculated annual administrative fee exceeds GBP 75,000, Ofcom will automatically allow the amount due to be paid in monthly instalments.

Administrative Incentive Pricing (AIP), used to set spectrum fees, is intended to reflect the economic value calculated using an administrative method. It typically estimates the opportunity cost of the spectrum for a specific use, but may also include monopoly rent and the value of options. In the United Kingdom, according to the regulator, more than half of the spectrum is valued using AIP methods.

Licence fees are governed by the Wireless Telegraphy Regulations 2020¹⁹² and their amendments of 2021¹⁹³, 2022¹⁹⁴ and 2023¹⁹⁵ under the Wireless Telegraphy Act 2006.¹⁹⁶ These fees may consist of a fixed and a variable amount.

¹⁹¹<https://www.legislation.gov.uk/ukpga/2003/21/section/400>

¹⁹²<https://www.legislation.gov.uk/uksi/2020/1068/contents/made>

¹⁹³ <https://www.legislation.gov.uk/uksi/2021/1117/regulation/2/made>, <https://www.legislation.gov.uk/uksi/2021/1412/contents/made>

¹⁹⁴<https://www.legislation.gov.uk/uksi/2022/1310/contents/made>

¹⁹⁵<https://www.legislation.gov.uk/uksi/2023/400/made/data.pdf>

¹⁹⁶<https://www.legislation.gov.uk/ukpga/2006/36/contents>

Air navigation service charges

Table 218: Charges for air navigation services:

Service	Fee (GBP)
Air Ground Station (Air Traffic /Ground Movement Control)	150
Aviation ground station (Aviation/ground communication services)	100
Air ground station (Airport flight information service)	100
Aviation Ground Station (Air Traffic Control)	250
Regional Aviation Station (General Aviation)	25
Aviation ground station (High Frequency)	350
Aviation ground station (offshore platform)	250
Airport Station (Airport Surface and Operations Control)	116.67 for each licence
Aviation station (Aviation broadcasting, air traffic addressing and reporting system, air-to-ground, airport flight information service and control tower, landing, airspace control)	75 – 3,300 per licence to use the 8.33 kHz channel for a base station 75 – 9,900 for a licence to use a 25 kHz channel for a base station
Aeronautical station (Offshore)	If the licence does not authorise the use of one or more associated mobile stations, the applicable fee is 116.67 for each authorisation under the licence to use the 8.33 kHz channel for a base station, with excluded channels not being taken into account. If the licence permits the use of one or more associated mobile stations, the applicable fee is a total of 75 plus 116.67 for each use of an 8.33 kHz, with excluded channels not being taken into account.
Aeronautical station (Recreational aviation)	75
Aeronautical station (Very High Frequency data link)	75 – 9,900 for a licence to use a 25 kHz channel for a base station 75 – 19,800 for a licence to use a 50 kHz channel for a base station
Aviation radar	50
Aeronautical navigation aid station	50 (for each navigation station)
Aircraft	20–350 ¹⁹⁷
Transport aircraft	15 ¹⁹⁸

Amateur radio transmission

Table 219: Fees for amateur radio broadcasting:

Service	Fee (GBP)
Amateur radio broadcasting	20 for each licence not applied for electronically; no fee for persons aged 75 and over

Broadcasting services

Table 220: Fees for broadcasting services:

Service	Fee amount (GBP)
Services with restricted access ¹⁹⁹	40 per day, provided the ERP does not exceed 2 watts (200 max) 40 per day, provided the ERP exceeds 2 watts (1,200 max)

¹⁹⁷ Three-year licence, depending on the aircraft's weight

¹⁹⁸ Three-year licence

¹⁹⁹<https://www.legislation.gov.uk/uksi/2022/1310/regulation/2/made>

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Provision of nationwide and local radio broadcasting services	For any number of transmitters in the medium-wave band (226 if coverage is less than 100,000 inhabitants; 339 if coverage is more than 100,000 inhabitants) For any number of transmitters in the VHF band (339 if coverage is less than 100,000 inhabitants; 509 if coverage is more than 100,000 inhabitants)
National DTT Multiplex	188,000
Local DTT Multiplex	23,900
Northern Ireland DTT Multiplex	3,360
Community radio	250
Self-help TV	75 for each digital relay Self-help ²⁰⁰

Business Radio

Table 221: Fees for Business Radio:

Service	Fee (GBP)
Business Radio (GSM-R Railway)	158,400 per channel (2 x 200 kHz)
Business Radio (Simple UK, Suppliers Light, Simple Site)	75 ²⁰¹
Business Radio (Defined area)	By region
Business Radio (Technically allocated)	18.75 – 370 (depending on population and coverage area)
Public Safety Radio (380–385 MHz paired with 390–395 MHz)	15,578 per channel for the Great Britain area, 3,647 per channel for the Greater London area, 107 per channel in the Greater London area
Public Safety Radio (Jersey)	610
Public Safety Radio (Guernsey)	378
Public Safety Radio (Isle of Man)	1,372

Fixed links

Table 222: Charges for fixed connections:

Service	Charge (GBP)
Point-to-point security, CCTV services	720 for each splitter with a bandwidth of 56 MHz or less 885 for each splitter with a bandwidth of 56–140 MHz 1,030 for each splitter with a bandwidth of 140–250 MHz 1,155 for each splitter with a bandwidth of 250–308 MHz
Fixed point-to-point links (excluding the 71.125–73.125 GHz and 81.125–83.125 GHz bands)	$Sp \times Bwf \times Bf \times Plf \times Avf$ ²⁰² 50 % for each coordinated two-way fixed link added after the licence is issued, provided that further links are operated parallel and across the poles, 75% for each unidirectional fixed link
Point-to-point fixed link (bands 71.125–73.125 GHz and 81.125–83.125 GHz)	100 for each two-way channel pair with a bandwidth of less than 250 MHz 225 for every 250 MHz of bandwidth within a two-way channel pair, provided the two-way channel pair has a bandwidth of 250 MHz or more
Individually coordinated links	50 for each fixed link in the 71–76 GHz and 81–86 GHz bands
Scanning telemetry	410 for each 2 × 12.5 kHz channel used in a of a base station which is not subject to national channel arrangements; 7,920 for each national 2 × 12.5 kHz channel

²⁰⁰ The licence is valid for 60 months

²⁰¹ The licence is valid for 60 months

²⁰² Sp = spectrum price (a fixed amount of GBP 88 per 2 × 1 MHz bandwidth for each coordinated two-way fixed link), Bwf = bandwidth factor, Bf = band factor, Plf = path length factor, Avf = availability factor

Fixed Wireless Access (FWA) network

Table 223: Charges for the Fixed Wireless Access (FWA) network

Service	Fee (GBP)
Fixed Wireless Access (FWA) network (3.5, 3.6, 10 GHz—Guernsey, Isle of Man, Jersey)	5,000 ²⁰³
Access to radio spectrum (3.9 GHz) ²⁰⁴	8,436 for each 1 MHz national slot in the 3925.0–4009.0 MHz band where coordination with terrestrial stations is required 2,226 for each 1 MHz national slot in the 3925.0–4009.0 MHz band where coordination with terrestrial stations is required and fixed connections
Fixed wireless access network (5.8 GHz)	1 per terminal (minimum charge of 50)
Fixed wireless access network (28 GHz, Guernsey)	1,800 per channel (2 x 112 MHz)
Fixed wireless access network (28 GHz Isle of Man)	2,133 per 2 x 112 MHz channel
Fixed wireless access network (28 GHz Jersey)	2,533 per 2 x 112 MHz channel

Maritime services

Table 224: Fees for maritime services:

Service	Fee (GBP)
Coastal radio station (port)	75 for each base station and associated mobile stations
Coastal radio station (international)	18.75 – 125 (depending on coverage area and congestion levels)
Coastal radio station (international – defined area)	0–125 (depending on coverage area and congestion levels), 2 318.75 in the United Kingdom
Coastal radio station (United Kingdom)	18.75 – 185 (depending on population and coverage area)
Coastal radio station (United Kingdom – defined area)	3 – 247.50 (depending on population), 2,062.50 in the United Kingdom
Coastal radio station (Training School)	20
Differential GPS (D-GPS)	1,000 for each channel at a medium-frequency station
Marine navigation aids and radar	40 for each frequency on a navigation aid or radar station
Marine radio (suppliers and demonstrations)	75
Portable marine radio	20 for each licence not applied for electronically
Marine radio	20 for each licence not applied for electronically

Programme and Special Events Services (PMSE)

Table 225: Fees for programme and special event services (PMSE):

Service	Fee (GBP)
Services relating to programmes and special events – Fixed Site	28 per channel per site for single-channel back-to-talk or single-channel radio microphone 68 per channel per site for multi-channel back-to-stage link, multi-channel radio microphone or broadband channel
Services relating to programmes and special events – Link	-
Services associated with programmes and special events – Audio distribution services	14 for each 12.5 kHz channel in the 26–65 MHz band 43 for each 12.5 kHz channel in the 65–470 MHz band 14 for each 12.5 kHz channel in the 470–1,000 MHz band 120 per 0.5 MHz channel in the 1,517–1,525 MHz band
Programme-related and special event services – Low Power	-
Wireless microphone	75 for each shared multi-channel or wideband channel in the British Isles, provided the licence holder has applied for a licence

²⁰³ The licence is valid for 60 months

²⁰⁴<https://www.legislation.gov.uk/uksi/2022/1310/regulation/2/made>

	using the online application and payment facilities on the designated website 85 in other cases
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Public wireless network

Table 226: Fees for the public wireless network:

Service	Fee (GBP)
Public wireless network (Guernsey, Jersey, Isle of Man)	80 per channel or 100 kHz slot

Satellite services

Table 227: Fees for satellite services:

Service	Fee (GBP)
Global Navigation Satellite System (GNSS) – Repeaters	75
2 GHz network	For each base station using 2 x 1 MHz in the 1980–2010 MHz and 2170–2200 MHz bands, the following fee applies: • 64,000 in a densely populated area • 8,025 in areas with a medium population density • 825 in sparsely populated areas For each base station using 2 x 15 MHz in the 1980–2010 MHz and 2170–2200 MHz bands, the following fee applies: • 960,000 in densely populated areas • 120,375 in areas with a medium population density • 12,375 in sparsely populated areas
Satellites (Earth Station Network)	200; a further 200 for each terminal requiring technical coordination by Ofcom
Satellites (Earth Station – satellite service without a fixed connection)	500
Satellite (Earth Station – Other than geostationary)	500
Satellite (Permanent earth station) ²⁰⁵	$AS = \sum_{bands} [28 \times BF_{band} \times \sqrt{\sum_{pathsband} (P_{path} \times BW_{path})}]$
Satellites (Portable earth station)	200 – 7,400 (depending on frequency band and maximum operating power)
Satellites (CGC – complementary ground components of the satellite mobile system)	554,400 per channel (2 x 1 MHz)

Science and technology

Table 228: Fees for the science and technology category:

Service	Fee (GBP)
Demonstration and testing	50 per location per month
Innovation and research	50 per station or instrument at a single site
Other items within 12 months	20
Other: from 12 to 60 months	50
Ground-based survey radar	50 ²⁰⁶
High Duty Cycle Network Relay Points	75
Manually configurable devices for utilising unlicensed spectrum	1,500

²⁰⁵ Details of the calculation formula: <https://www.ofcom.org.uk/siteassets/resources/documents/manage-your-licence/satellite-earth-stations/guidance/fees.pdf?v=330683>

²⁰⁶ 3-year licence

Access to the radio spectrum

Table 229: Fees for access to the radio spectrum:

Service	Fee (GBP)
Access to radio spectrum (Extremely High Frequency) ²⁰⁷	75 ²⁰⁸
Local access	950
Access to radio spectrum (Low power)	80 for each authorisation to use a 2 x 3.3 MHz channel in the 1800 MHz band 80 for each licence to use a 10 MHz channel in the 2390–2400 MHz band 80 for each 10 MHz channel for use in the 3.8–4.2 GHz band; 320 for each licence to use the 26 GHz band
Access to the radio spectrum (medium power)	80 for each authorisation to use a 2 x 3.3 MHz channel in the 1800 MHz band 80 for each authorisation to use a 10 MHz channel in the 2390–2400 MHz band 80 for each 10 MHz channel for use in the 3.8–4.2 GHz band
Access to the radio spectrum (Offshore Mobile)	5,000 ²⁰⁹

Fees from the 2021 Addendum²¹⁰ :

Table 230: Fees from the 2021 Addendum:

Service	Fee amount (GBP)
412 MHz band (412.0 – 414.0 MHz and 422.0 – 424.0 MHz)	396,000 for each licence to use a 1 MHz national channel

Fees from the 2023 Supplement²¹¹ :

Table 231: Fees from the 2023 Supplement:

Service	Fee amount (GBP)
10 GHz band	5,676 for each licence to use a 2 x 1 MHz national channel
28 GHz band	$R \times (LA / RA)^{212}$
32 GHz band	3,432 for each licence to use a national 2 x 1 MHz channel

Mobile cellular service fees:

Most mobile spectrum licences are still in the initial periods granted under the licensing processes and are not subject to further spectrum fees until these periods expire. For other licences, an annual fee has been calculated to reflect opportunity costs (or market values, where applicable) where there is excess demand for spectrum.

Table 232: Fees for mobile cellular services:

Service	Fee amount (GBP)
900 MHz band ²¹³	1,093,000 per MHz before CPI adjustment
1 800 MHz band ²¹⁴	805,000 per MHz before CPI adjustment
2,100 MHz band ²¹⁵	560,000 per MHz before CPI adjustment

²⁰⁷<https://www.legislation.gov.uk/uksi/2022/1310/regulation/2/made>

²⁰⁸ Licence for 60 months

²⁰⁹ Licence valid for 60 months

²¹⁰<https://www.legislation.gov.uk/uksi/2021/1117/contents/made>

²¹¹<https://www.legislation.gov.uk/uksi/2023/400/made/data.pdf>

²¹² R = fee for a 2 x 1 MHz channel in the region concerned, LA = area of the relevant area specified in the licence, RA = total area of the region in which the relevant area specified in the licence is located

²¹³<https://www.legislation.gov.uk/uksi/2018/1368/contents>

²¹⁴<https://www.legislation.gov.uk/uksi/2018/1368/contents>

²¹⁵<https://www.legislation.gov.uk/uksi/2021/1412/contents/made>

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3.5 GHz band ²¹⁶	435,000 per MHz before CPI adjustment
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Ofcom assesses its approach to setting annual fees in the following steps: It estimates the flat-rate market value of spectrum bands in the United Kingdom that have been auctioned in recent years and takes into account the auction prices of bands in European countries, from which it derives the relative value of spectrum in these reference countries for the United Kingdom. It uses these relative values in combination with internal estimates of market value in the UK to derive a set of reference values for the flat-rate market value in the UK. Using these comparisons, it assesses the flat-rate market value of spectrum in the UK. To convert the lump-sum value into an equivalent annual payment, it uses an annual rate derived from the after-tax discount rate, which takes into account the degree of risk-sharing between licence holders and the government, and a tax adjustment factor that reflects the more favourable tax treatment of annual fees compared with lump-sum auction payments. Taking into account its statutory obligations, the regulator also considers the likely impact of the level of these fees and the reasons for setting a different fee level.

²¹⁶<https://www.legislation.gov.uk/uksi/2019/1004/made>

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