

Short User Manual: RLAN Portal

rev. 21-06-28



The portal for radio station registration in the 60 GHz and 5 GHz band (<https://rlan.ctu.cz>, originally <https://60ghz.ctu.cz>) is operated by the Czech Telecommunication Office (<https://www.ctu.cz>). For questions or comments, please contact: 60ghz@ctu.cz

Disclaimer:

Terminology and technical description within this document and within the English website are simplified. More detailed and more relevant description can be found in the Czech version of this document.

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1. First step: Register the Operator first, then the Station

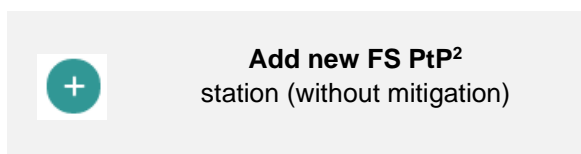
First, go to <https://rlan.ctu.cz>¹ and ...

Get registered as a user (**Registration** → **Personal Account** or → **Company Account**). If you already have registered, you can continue [to the next step](#). Your registration e-mail address needs to be verified. Please keep in mind that delivery of the verification e-mail may be prevented by your spam filter or antivirus protection settings. You can edit the Profile of the registered person anytime by clicking the person's initials.


The registration of new Station (NS) is done by one of these buttons:



Here, you can [register WiGig Stations \(incl. associated client stations\) one by one](#). E.g. for a PtP link, each Station must be registered separately.



Here, you can [register FS⁴ PtP Stations](#), always in pair.

Push one of the buttons and, first, choose a location for the Station on a map (tip: the map can be zoomed ) and add station [parameters](#). You can quit the data filling anytime and return later; your data will be saved as a [Draft](#) record. A successful registration is indicated by [Active](#) status. Please note that **registration is also mandatory for associated client stations in the 60 GHz band⁵** (usually, associated client stations are registered by the access point operator, or service provider).⁶

¹ This portal fully substitutes the original website <https://60ghz.ctu.cz>.

² PtP = Point to Point, directional link.

³ PtMP = Point to Multi Point, sector antenna.

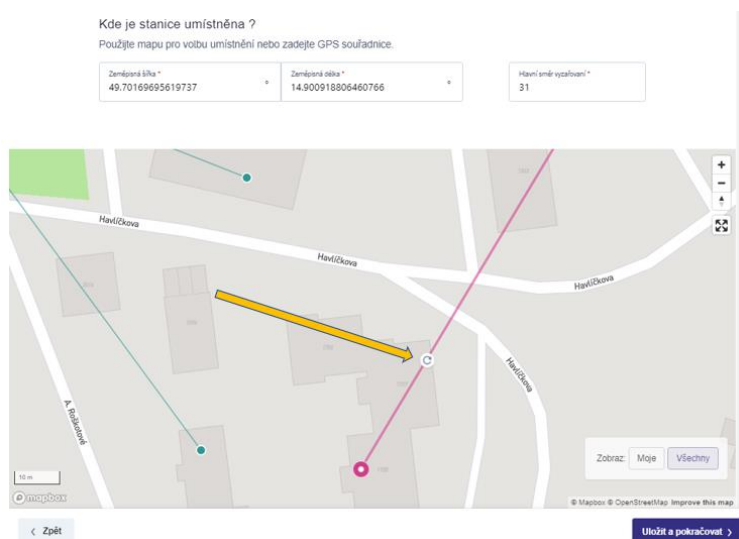
⁴ FS = Fixed Service, fixed radiocommunication services.

⁵ The reason for registering also the CPE (customer premise equipment) is that CPE technical data is necessary as an input for the Coordination Calculator. This results in a better protection of all users, including client stations.

⁶ See the General Authorisation VO-R/12.

2. Installation of WiGig Stations (PtP, PtMP, MGWS/802.11ad/ay, beamforming), 60 GHz


[WiGig Applications](#) are always installed separately (→ **Add new WiGig station**). After choosing the location for the Station on the map,⁷ choose a direction (azimuth) where the Station will “beam” (aim) with its [main lobe](#): you can set this with a circlet on a line determining the main direction:




In this step, you can [pair](#) the WiGig PtP Station with your other Station, as [described below](#).

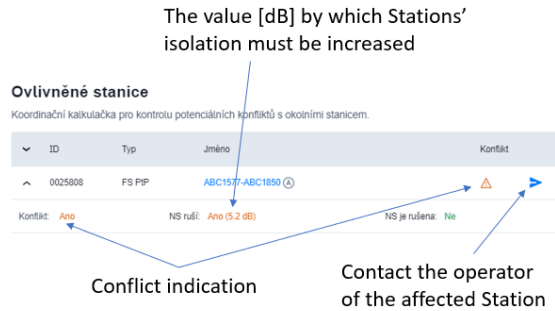
After clicking → **Save and continue** you can add the [parameters](#). We advise to fill in → **Antenna gain** and → **Input power** separately, i.e. by ticking → [Automatic calculation](#). If you do not know this data (e.g. they are not stated in the product's or radio equipment's description), enter [maximal parameters](#).

The [Coordination calculator](#) is activated after clicking → **Save and continue** (or → **Save and recalculate**, if you are [additionally changing Station parameters](#)). [The difference in directivity between PtP and PtMP](#) is determined by antenna gain (the algorithm itself will assess this based on the entered numeric data). After finishing the calculation, the new Station finds itself in the [Waiting](#) status and the calculated results are displayed in [Table of affected stations](#). If no conflict has been found with other Stations, you can use the → **Publish** button and publish the new Station immediately on the map, thus finishing Station registration successfully. The Station [coordination status](#) will subsequently change to [Active](#).

If the Calculator indicates that your Station could interfere with a [directional fixed FS microwave link](#)⁴, a sign “conflict”  and indication “[NS](#) interferes“ will appear. For this case the Portal will offer [three possible solutions](#) by the following buttons:

- i. → [Edit your own parameters](#): With the button → **Back** you can return to your Station's [parameters](#) screen and apply changes such as decrease the dBm power, choose better placement (GPS) or adjust the direction of beaming, [etc.](#)
- ii. → [Contact the operator](#)  of the affected Station (i.e. the [fixed link](#), which might suffer from a possible [interference](#)) with a suggestion (request) to edit [parameters](#) of the affected Station so as to reduce the demanded [C/I value](#) (or generally, request a change of the parameters to meet you halfway):

⁷ You can enter the GPS coordinates also manually.



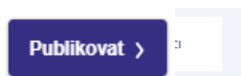
The operator of the affected Station can edit the parameters of his/her Station in order to allow your new Station to be installed, e.g. by decreasing the [C/I](#), adjusting the radiated power⁸ etc. The button → **Contact the operator** ➤ can also help reach mutual agreement before → **Declaration on isolation**. This button activates the Portal's in-built messaging system. The messaging

system can be used to contact the operator of any other Station, too, by opening the Station details and clicking on the button → **Contact the operator** ➤.

The communication with other users is anonymous, unless users de-anonymize themselves by ticking the checkbox → **Display my e-mail**. New incoming message is indicated in the upper bar by a sign ● **Konverzace**. The user will also receive new message notifications by e-mail (the sender is 60ghz@ctu.cz). The messages are kept in the system.

- iii. → **Declaration on isolation**: It may happen that the new Station is clearly [isolated](#) from the affected Station by a physical barrier, by frequency separation or by position, or that [mitigation techniques](#) are applied on the side of WiGig, and it is therefore clear the Stations cannot interfere with each other. For these (and similar) cases use the button → **Declaration on isolation**. By clicking on this button, the operator of the new Station assumes the responsibility for coordination. This Declaration is kept in the Portal system and the result of the decision is visible to affected Stations.⁹

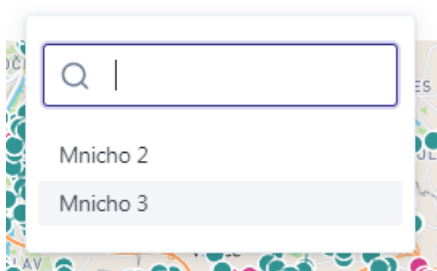
Only after resolving the conflicts, the button → **Publish (Station)** is activated:



After pushing this button, the Station becomes [Active](#) and is visible in the → **List of all Stations**.

For resolving conflicts, it is good to keep in mind that some of the stations with which your Station is in conflict may be operated by yourself. These stations will not be marked with the messaging icon ➤.

Stations pairing: This functionality facilitates determining the direction of antenna lobes of WiGig PtP Stations (which are always being installed separately). PtMP Stations are not paired. The threshold for distinguishing PtP station from PtMP station is 25 dBi, see [table below](#).



The pairing process is activated in the second step of choosing location of a new WiGig PtP Station (or of adjusting the parameters of an existing Station) when a field → **Pair Station** appears. Choose the requested counterpart in the rolling list of your unpaired Stations.

After that, you will receive information that the counterpart does not yet beam in direction of the new Station (i.e., that it is not yet paired, and you must adjust the azimuth of the counterpart).

⁸ The maximum power of a number of devices is lower than the limits stipulated by the relevant regulations; for these devices, the actual maximum power should be entered.

⁹ The displayed results are anonymized.

Poloha

GPS 14.70739629082138°, 49.93322664128615°

Hlavní směr vyzařování 136°

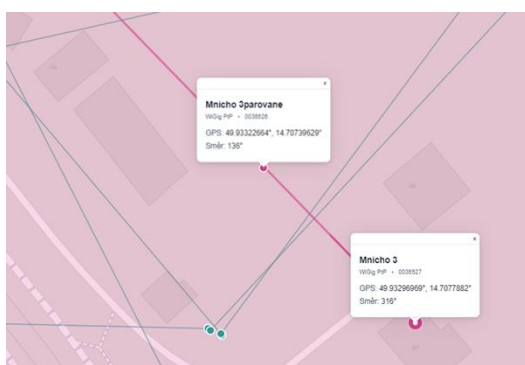
Spárovaná stanice **Mnicho 3 WiGig PtP #0036527**

i Spárovaná stanice má zatím nastavené původní parametry. Ke změně dojde po publikaci této stanice.

The situation may appear, e.g., as follows (New Station is located in the upper part of the map):




In this moment, the counterpart (in the lower part of the map) is not beaming in a proper direction and its azimuth must be adjusted.



After first click on → **Publish**, the new Station is placed on the map and, at the same time, and the beam of the counterpart forms into one straight line with the New Station, while the counterpart comes into “**Waiting**” (the azimuth was changed) mode and is not publicly visible. You must confirm the change of the parameter (the azimuth), which can be done either by another click on → **Publish** or anytime later in the main list of Stations.



Note: Changing the azimuth of the counterpart (the original, already installed WiGig Station) will cause change of parameters that might [influence the original coordination](#).

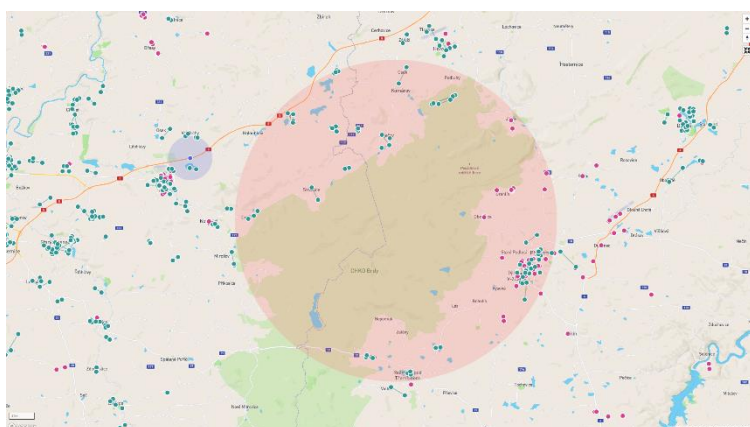
3. Installation of a fixed link (FS⁴) PtP (without mitigation techniques), 60 GHz

[Stations of fixed microwave links FS PtP](#)¹⁰ are installed with the button → **Add new PtP Station (Fixed Services, fixed links without mitigation techniques only)**. These Stations must always be registered in pair (Station **A**, Station **B**). Similar to WiGig Stations, first select the location of your FS PtP Stations by clicking on the map⁷. The application will then calculate antenna direction of both Stations automatically. After that, add Station [parameters](#) and press → **Continue**, thus starting the [Coordination calculator](#). Similarly as with WiGig, [try to reach](#) the [Active](#) status of both Stations. In case the Calculator shows your Station is causing interference, or it would be potentially suffering interference, the application (similarly as with WiGig) will offer [buttons](#) to solve the situation. The FS PtPs are marked in green  on the map.

¹⁰ In this band, FS PtP installations are usually operating in duplex mode with guaranteed latency and availability (incl. QoS) under given conditions, or alternatively they can be using the IEEE 1588 synchronisation and other specific parameters.

4. RLAN registration in 5.5 GHz and 5.8 GHz and protective areas

Registration is mandatory for outdoor AP Stations in the bands 5150–5250 MHz and 5725–5850 MHz. The registration procedure is similar as for [WiGig](#), although Stations in the 5 GHz bands are not subject to coordination and the frequencies are shared. There is no limit set for the number of Stations. Stations are not being paired. Until 15 June 2021, only GPS coordinates must be entered for each Station; after this date, it is obligatory to add the MAC address as well. Station location can be selected in a map similarly to the 60 GHz band. Stations data may be imported, as [described below](#). Colour signs for Stations on the map: for 5,2 GHz , for 5,8 GHz .



Protective areas:

To comply with the conditions set for 5 GHz bands⁶, it is not possible to place a Station in circular protective areas around road toll frames (radius 1.8 km) and military areas (radius 13 km).⁶

Note: There is neither coordination of Stations nor limits of their number in the 5 GHz bands.

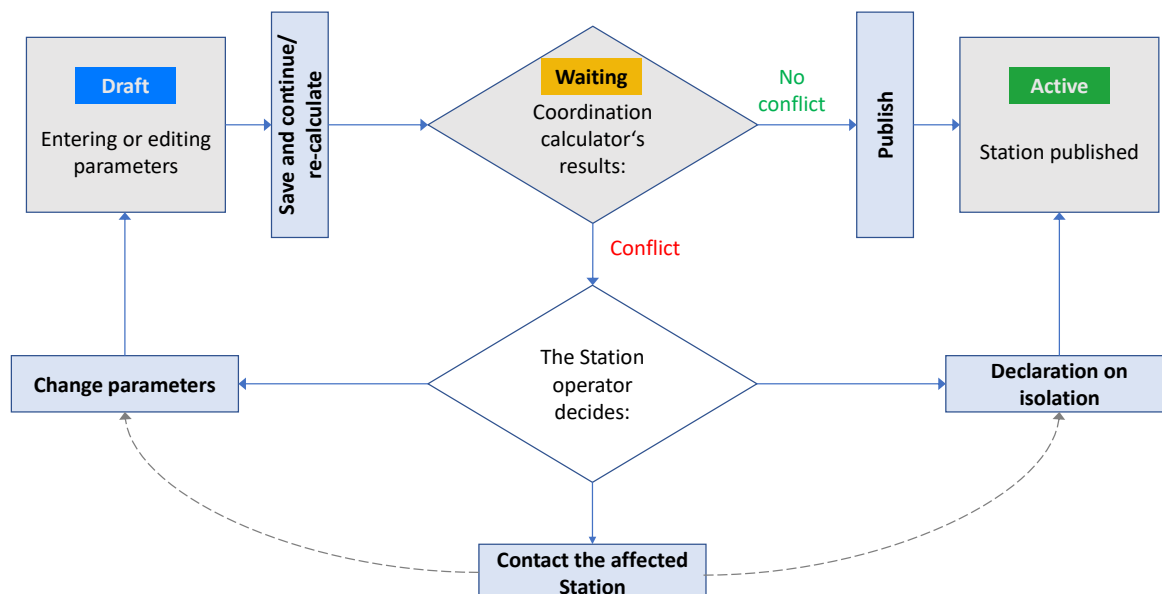
5. Indication of the registration status (for all bands) or coordination status (in 60 GHz)

When entering data for a new Station, the status of entered parameters is always indicated in → **List of Stations (My/All)**:

- **“Draft”**: **Koncept** a status following [clicking on one of the buttons for registering a New Station](#) and entering Station location, but still before Coordination calculator gets activated. The data will remain saved even in case of Internet connection failure, etc. Neither the number of Draft records nor the period for keeping the records is limited.
- **“Waiting”**: **Čeká** a status used after the [Coordination calculator](#) has finished the calculation with either of the two following results:
 - ✓ The Calculator found no potential conflict and you can just click the button → **Publish**, or
 - ✓ The Calculator indicated a [possible interference](#) from your Station towards another Station or vice versa; in this case, it is necessary to change the parameters of the new Station, or alternatively of the affected/existing Station.
- **“Active”**: **Aktivní** the Station is published on the map and a [time period](#) of 18 months begins, over which the Station’s record is being kept on the Portal.

- “Expired”: if the Station’s record has not been [updated](#) for 18 months from installation or from the last update, the record is automatically deleted. See the [Time period for keeping the data](#).

Diagram of basic operations and statuses during coordination process of a new Station (NS) in the 60 GHz band (note: Stations in the 5 GHz bands are not subject to coordination):



In order for a Station registration to remain valid, it is required that the user regularly check the Station data for accuracy and perform updates as needed. The portal automatically monitors the dates when a Station record is due for update and sends the operator in advance a notification e-mail containing a link to the screen where the record can be updated, and Station registration validity renewed. It is possible to renew the validity period of a group of Stations operated by the same user: after signing in, click on → **User and Stations’ Profile** and tick the checkbox (on the left) at stations that need to have their validity period extended. The extension can be also performed when [changing parameters](#) of a published Station. The Stations with already extended validity period and Stations in the “Waiting” and “Draft” status shall not be extended and the Portal only returns back a harmless notification “The validity period of some of the selected Stations could not be extended.”

Notes:

- The maximum number of Stations in the “Waiting” status for a single user is currently 110. This limit may be further adjusted in the future based on the experience with the Portal’s operation.
- Changes in Stations’ status (such as moving a Station from “Waiting” to “Active” status) are fully in the hands of the Stations operators – CTU does not intervene in the coordination and registration.

6. Later changes of parameters of the published Stations

After a Station has been published, its [parameters](#) can be changed manually by clicking on the Station (in the main list) and using the button → **Adjust**. The procedure in the 60 GHz band is similar to installing new [WiGig Station](#) or [FS PtP](#), with the exception that the [Coordination calculator](#) is not activated as long as the parameters updates [do not change the original coordination results](#). Once the Coordination calculator is activated and the Station is [published](#) anew, this is considered as a [Station record update](#).

The change of parameters during import is described below, in the [chapter on data import](#).

7. Entered parameters in 60 GHz

Field (entered data)	Allowed scope		An example of usual value, notes
	Min.	Max.	
Antenna gain [dBi], WiGig	0	+60	WiGig PtMP: ≈ 13 up to <25 dBi WiGig PtP: 25 dBi up to ≈ 37 dBi. The higher the number, the more directional the antenna.
Antenna gain [dBi], FS PtP	+30	+60	≈ 30 up to 37 dBi
E.I.R.P. [dBm], WiGig PtMP	-20	+40	In case of Automatic calculation the values will be added up as follows: Ant. gain [dBi] + delivered power [dBm] ≤ 40 dBm The recommended value is 20 to 40 dBm.
E.I.R.P. [dBm], WiGig PtP	-20	+55	The recommended value is ≈ 35 dBm.
Occupied bandwidth, [MHz]	+50	+2200	E.g. 200 MHz for FS PtP, or 2160 MHz for WiGig; in case of aggregation, enter the basic bandwidth.
Central frequency, [MHz]	+57000	+66000	
Modulation	4QAM	512QAM	Usually max. 16QAM. Higher modulation => higher transmission capacity => link more prone to interference

8. Technical Annex for 60 GHz

8.1. Technical-regulatory summary of the Portal concept

The RLAN Portal is designed as a tool for shared use of frequencies in the 60 MHz band. The concept is based, first, on determining the geographical placement of the Stations using this band, and second, on performing an internal calculation of radio link budget estimation during installation of a new Station. The result of this calculation is a recommendation, whether the new Station can be installed, or whether it is necessary to change parameters either on the side of the new Station, or on the side of the affected Stations ([Coordination calculator](#)). For the purpose of coordinating the changes, the Portal allows mutual [anonymous communication](#) between Stations operators (chat).

The algorithms used are simplified and the influence of the terrain, barriers, polarisation discrimination, elevation angles and altitude, aggregated effect of interfering transmitters, and undesirable rebounds are not reflected. Also, the radiation diagrams are simplified.¹¹ Due to this simplification, some parameters and methodologies are designed so that in certain situations, the coordination results offer conservative estimates (i.e. with better protection).

In the 60 GHz band, the Portal application distinguishes two groups of technologies and operating transmission modes, which can utilize the band. These technologies are distinguished at registration of [new Station](#) by choosing one of these [buttons](#):

[→ NEW WiGig PtP/PtMP Station \(with mitigation\)](#), [→ NEW pair of FS PtP Stations \(without mitigation\)](#).

These buttons will start the process of [registration of a new Station](#) using [WiGig](#) technologies, or of a pair of Stations with [FS PtP](#) technologies.

¹¹ The radiation diagrams are designated for horizontal level only.

8.2. WiGig PtP, PtMP technologies (incl. MGWS, 802.11ad, beamforming), 60 GHz

Stations from this category are operated either in the point-to-point (PtP) mode or in the point-to-multiple point (PtMP¹²) mode and may be equipped with functionalities that contribute to decreasing the possibility of mutual [interference](#) (so-called mitigation techniques). The mitigation techniques are typically the following:

- Communication protocol principally designed for sharing,
- LBT: carrier-sense multiple access with collision avoidance, CCA/ED,
- RF channel selection,¹³
- Beamforming.

Especially the last two mitigation techniques are essential for the correct result of the Coordination calculator. If they are active, or available for activation (in manual or automatic mode), these techniques contribute to the operational stability of WiGig Stations, but on the other hand, their effect can negatively influence other FS PtP Stations in some situations. Detailed description of these technologies is provided, e.g., in the following documents issued by the Radiocommunication Sector of the [International Telecommunication Union](#): [Report ITU-R M.2227-2](#) (Use of multiple gigabit wireless systems in frequencies around 60 GHz) and [Recommendation ITU-R M.2003-2](#) (Multiple gigabit wireless systems in frequencies around 60 GHz).

Given the use of mitigation techniques, it is not required that Station operators enter the [central operation frequency for WiGig Stations](#) into the Portal (nevertheless, it is required that they enter the occupied bandwidth¹⁴). The [Coordination calculator](#) presumes the conservative situation, namely that in case of coexistence with FS PtP systems, the frequency is shared. If the Stations operators are sure that there is frequency separation (for instance in cases where there is no overlap between the WiGig channel and the frequencies used by FS PtP), but the Coordination calculator indicates possible [conflict](#), the Stations operators can solve the situation by using the → [Declaration on isolation](#) button.

WiGig Stations are always registered one by one (e.g., the access point separately, and the associated client stations separately), even in case of PtP operation. Also, the respective [time periods for keeping Station records](#) are administered separately.

8.3. Distinguishing the WiGig PtP and WiGig PtMP, 60 GHz

The operation of WiGig [PtP](#)² has a directional character, while the operation of [PtMP](#)³ has a sector character. Distinguishing these two kinds of operation is determined in the [Coordination calculators](#)' algorithm by the antenna gain G_{dBi} , which the user enters in the second step of parameters entering ([Automatic calculation](#)), just after placing the Station. The threshold value is as follows:

For $G_{dBi} > 25$ dBi the Station is considered as PtP (= directional antenna)

For $G_{dBi} \leq 25$ dBi the Station is considered as PtMP (= sector antenna)

¹² The Multi-point (MP)" variant includes also MESH communications of MP-MP Stations.

¹³ It is possible to select from 4 channels in total (for channel bandwidth 2 160 MHz).

¹⁴ Channel bandwidth.

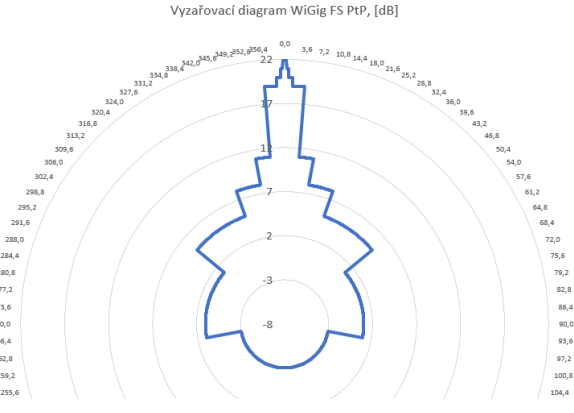
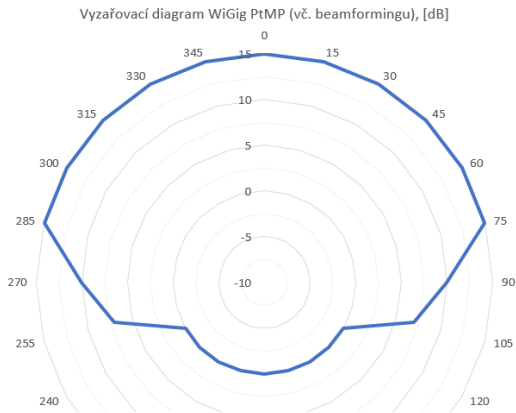
These are the WiGig antenna parameters of used in the [Coordination calculator](#):

Sector (PtMP) antennas:

Radiation angle: $\pm 85^{\circ}$ for -3dB ;
 $\pm 120^{\circ}$ for -15dB ; front-to-back ratio: 15 dB

Directional (PtP) antennas:

Radiation angle: $\pm 2^{\circ}$ for -3dB ;
 front-to-back ratio: 25 dB



The [direction of main lobe](#) as entered in the Station record corresponds to the radiation angle of 0° .

8.4. The FS⁴ PtP technology (Fixed Service, without mitigation techniques), fixed point-to-point links, 60 GHz

The parameters and computation procedures for these technologies on the 60 GHz Portal are based on planning procedures for the fixed radiocommunication service. The FSPL (free-space path loss) formula was used, together with the procedures and antenna characteristics according to [Recommendation ITU-R F.699](#). Radiation characteristics of antennas are set for antennas with diameters up to 0.5 m, with 8 representative antenna samples for the following intervals of antenna gain G_{dBi} [dBi]:

<30; 32), <32; 35), <35; 40), <40; 45), <45; 47,7), <47,7; 50), <50; 55) and <55; 60).

For each FS PtP Station, the algorithm will use the radiation characteristics corresponding to the antenna gain declared by the operator when [entering Station parameters](#).

In order to ensure that the allowed error rate of BER = $10e-6$ is not exceeded for PtP technologies without mitigation techniques, the required signal-to-interference ratio (C/I) varies based on the type of modulation scheme used by the fixed PtP link. The C/I (Carrier to Interference) value expresses the demand for interference-free operation of a fixed Station. The higher the value, the higher the demanded protection from interference:

Modulation	C/I for BER 10e-6	Modulation	C/I for BER 10e-6
4QAM ¹⁵	12	128QAM	28
16QAM	18	256QAM	31
32QAM	21	512QAM	34
64QAM	25	---	---

It is advised to select lower modulations¹⁶, because the practical benefit of modulations with constellations exceeding 64QAM is usually limited for outdoor installations in the 60 GHz band. If a Station operator sends a [request](#) (suggestion) to another operator to decrease his/her C/I demand, the requested value will most likely correspond to 64QAM. The default setting is 4QAM.

¹⁵ The C/I value in this case includes both QPSK and BPSK.

¹⁶ A number of devices are equipped with automatic choice of coding and modulation; for these devices, it is possible to tick the highest possible modulation according to the catalogue list at Station registration.

For fixed point-to-point FS PtP links, both central frequency and occupied bandwidth (channel bandwidth) are entered.

These Stations are registered always in pair (FS-A ↔ FS-B). The paired Stations are always displayed side by side, and treated inseparably together in case of a change of parameters or Station record deletion. Also, the paired Stations will be handled together regarding the [time period for keeping Station records](#).



8.5. Common parameters and used methodologies for 60 GHz

At the moment of clicking on the first [button](#), each Station receives a unique identification number (ID) . Even after deleting the Station record (manually or [automatically by the Portal](#)), the number is not used again.

Some basic formulas for radio link budget (especially the free-space path loss) can be found on CTU website as well: <http://spektrum.ctu.cz/en> (bookmark "Calculations"). The atmosphere attenuation (oxygen absorption) is adopted from [Recommendation ITU-R P.676](#).

The Coordination calculator, integrated in the Portal, will perform the overall assessment of mutual coexistence (the radio link budget) during installation of a new Station. The following diagram provides a matrix of situations and scenarios that can occur during installation of a new Station:

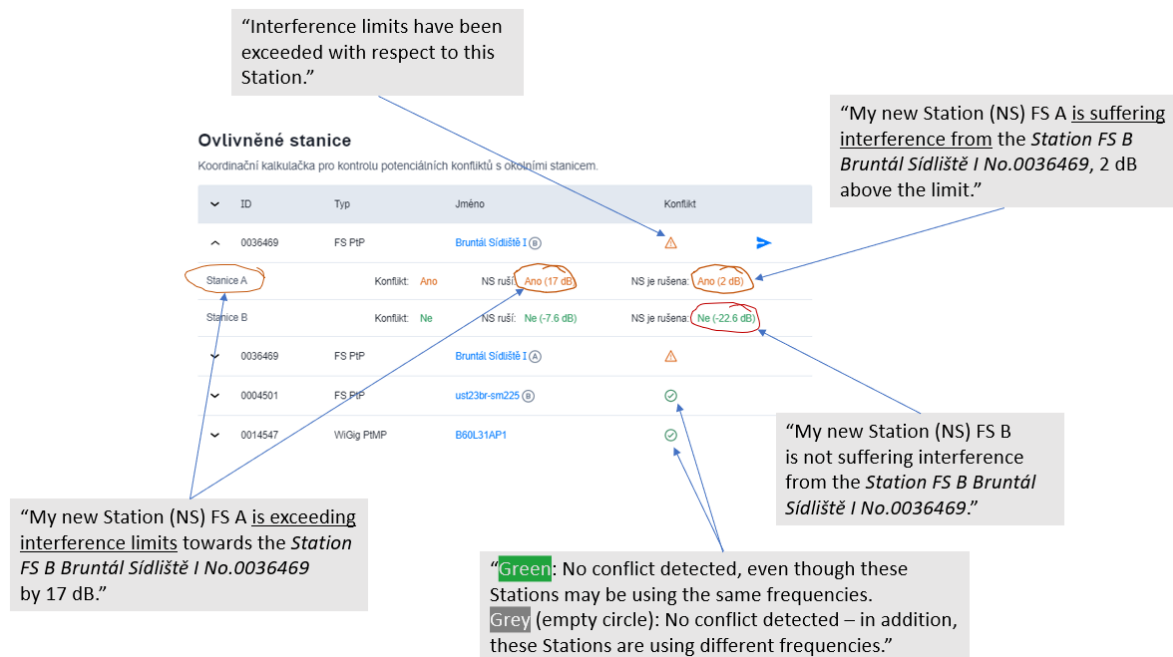
		New Station being installed		
		WiGig PtMP	WiGig PtP	FS PtP (Fixed Service)
Protected (already existing) Stations:	WiGig PtMP	Scenario ZERO: Coordination is in the hands of the operators. Operators must only enter Stations position in the Portal.		Scenario 2: <u>Coordination calculator:</u> Check interference <i>from</i> another WiGig Station.
	WiGig PtP			
	FS PtP (Fixed Service)	Scenario 1: <u>Coordination calculator:</u> Check interference <i>towards</i> another FS PtP Station.		Scenario 3: <u>Coordination calculator:</u> a) Check interference <i>towards</i> another FS PtP Station. b) Check interference <i>from</i> another FS PtP Station

Around each new installed Station (NS), a circle of 3.5 km in diameter¹⁷ is searched in order to assess mutual influence with other Stations. On the map, the search area is highlighted with pink colour  for WiGig, or aqua blue  for FS PtP. The visualization includes Stations in the [Active](#) mode only. The result of this assessment is summed in the Table of affected Stations with the following columns:

ID	Type	Name	Conflict	NS interferes	NS interferes by [dB]	NS is interfered by [dB]
----	------	------	----------	---------------	-----------------------	--------------------------

¹⁷ The size of this area is based on results of simulations presented for the worst case in case studies in [ECC Report 288](#) Conditions for the coexistence between Fixed Service and other envisaged outdoor uses/applications in the 57-66 GHz range.

The figure below provides an example of results for a new Station (NS), listed in a Table of affected Stations, and including suggested interpretation of the results:



Based on the assessment of scenarios (including results of the Coordination calculator), the Portal will offer relevant further steps for installing the new Station (see [Diagram of basic operations and statuses](#)):

- If no potential conflict has been found, the button [Publish Station](#) is activated;
- If a possible conflict has been found with one or more existing Stations, this is indicated with orange colour and a value L [dB] expressing by how much the protective criteria have been exceeded ($L > 0$ dB). The following [relevant buttons](#) are activated according to the situation:

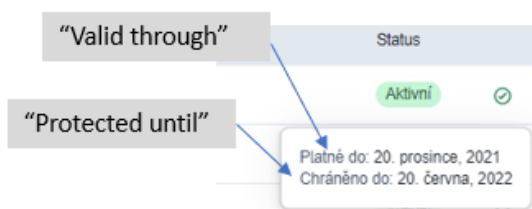
i.	→ Edit my own parameters (button → Back), which will return the user back to editing the new Station's configuration. In this case, the parameters need to be edited so as to decrease the effect of the new Station on the protected Station/s by L (e.g. by decreasing the input power, adjusting the antenna's placement, etc.). It is also possible to eliminate the potential interference from another Station by editing the parameters.
ii.	→ Contact the operator (button ➤) of the affected Station (fixed FS PtP link) with a suggestion (request) to change parameters ; the request should be aimed, e.g., at lowering the demanded C/I in the Table of modulations . The new Station remains in the Draft status and waits for the affected Station's parameters to be edited – of which the new Station's operator will learn either through in-built chat communication or by checking the Station status at → List of all Stations . There is no time limit set by the Portal for the operators to reach mutual agreement.
iii.	→ Declaration on isolation button is designated for situations, which are not covered by the current version of the Coordination calculator, and which require human intervention, such as: <ul style="list-style-type: none"> The presence of an "isolating" barrier between the new and the affected Station (buildings, trees etc.), Frequency separation between a fixed PtP link and a WiGig Station ensured by Station operators themselves, e.g. by preventing the WiGig Station from automatically

	<p>switching to a channel which is overlapping with a frequency used by the FS PtP Station,</p> <ul style="list-style-type: none">• Separation in elevation angle or altitude separation,• In-house coordination, when the operator of the new Station is the same as the operator of the affected Station,• And many other situations. <p>Note: Hereby, the term “isolation” stands for radio path attenuation between Stations.</p>
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The basic operations and statuses during Stations coordination can be found in [Diagram of basic operations and statuses](#).

8.6. The time period for keeping Station records

The Portal is equipped with an automatic system providing alerts on time period for which the Station record has not been [updated](#):



Station records are being kept for a time period of 1 year (“Valid through”) from the date of first data entry, or the last update. It is necessary to update the record before this time period expires. If the record has not been updated, an extra protective time period of 6 months (“Protected” status) begins. When the protective period expires, the Station record is [automatically deleted \(expiration\)](#). Before the expiration of both “Valid” and “Protected” time period, the Portal automatically sends an

information e-mail (sender is 60ghz@ctu.cz) to Station operators with an [alert to update the Station record](#). After each record update the overall time period for keeping the Station records extends again by 18 months (i.e. 1 year plus extra 6 months of protective time period).

There are no expiration time periods for Station [operators' registration](#).

8.7. Findings regarding Stations in 60 GHz installation and facilitating the shared use of frequencies

The prioritized way of solving the coexistence (or possible [interference](#)) of Stations is mutual communication between Station operators (self-regulation). The following findings are preliminary and generalized. They are based especially on theoretical calculations and simulations performed before the publication of the first edition of this Manual, and they do not describe concrete individual situations. The findings are listed here to provide a basic picture only and will be gradually specified.

- If the Stations (fixed FS PtP link and WiGig) are separated by ca. hundreds of meters (≈ 1 km), the probability of mutual interference is minimal.
- In case of (potential) interference between two directional Stations (PtP, no matter the technology) where frequency separation cannot be used, the most effective way to ensure coexistence is to increase angle separation – even a change of ca. $3^\circ - 5^\circ$ of the angle is very effective (the isolation increases by ca. 10 to 40 dB, depending on the antenna type). It is also possible to use more directional transmitter.
- Long directional FS PtP links are more vulnerable to interference.
- To resolve interference between main beams of directional PtP links (no matter the technology), increasing spatial distance is not very effective: doubling the distance corresponds to as little as 6 dB.
- PtMP WiGig Station with a sector antenna at full allowed E.I.R.P. (40 dBm) can affect fixed FS PtP links in certain directions up to the distance of ca. 0.8 km. The most effective mitigation usually seems to be a change of the antenna radiation direction or decreasing the E.I.R.P.
- WiGig Stations are allowed to change operational frequency (see [mitigation](#)) any time after placement; nevertheless, in doing so it is suitable to take into consideration the conditions under which the → [Declaration on isolation](#) was confirmed.
- When entering WiGig PtMP parameters, it is useful to [enter both antenna gain and input power separately](#), if possible; having this data available can help [make the calculation more precise, for instance by improving the insight into antenna directivity](#).
- When installing Stations, secure a good Internet connection to load the map faster.
- It is not necessary to start the [Coordination calculator](#) after implementing certain parameters changes which do not alter the results of coordination, such as:
 - ✓ Change of a Station's name, MAC address, or serial number.
 - ✓ [WiGig](#): decreasing the E.I.R.P. (or decreasing the power and/or antenna gain, with the exception of cases leading to Station type change from [WiGig PtP to WiGig PtMP](#) and vice versa) and increasing the channel width (MHz).
 - ✓ [Fixed PtP link](#): decreasing the *C/I* (i.e. decreasing [modulation](#)).

9. Data import and export (60, 5.8 and 5.2 GHz)

After logging in, users may access data import and export functionalities in the bookmark → **User and Stations' Profile**.

9.1. Import

The **import** XLS template is available in the Information bookmark. At present, the number of Stations in one batch is limited to 100. It is possible to combine entries from various bands in one XLS file. To pair a couple of **FS PtP** Stations (in 60 GHz), the entries must follow in lines one after another. After the import, all imported Stations are in **"Waiting"** mode and the user must confirm them manually. **Important:** If entering data for a new Station, use the indication "nova" (*new*); if updating an existing entry (i.e., changing other parameters while MAC address and/or GPS remain the same), use the indication "uprava" (*change*) – this will change the status of the station to **"Waiting"**. MAC address (and/or GPS coordinates) are used to identify Stations and prevent duplication of records for existing and "updated" Stations. An example of XLS import table:

Docasne ID uzivatele (nepovinne)	GPS LAT stupne	GPS LON stupne	Vyska nad morem [m] (nepovinne)	MAC (v 5 GHz povinne od 15. 6. 2021)	vyr.cislo (pouze pro 60 GHz)	Nazev Stanice	Typ Stanice	Hlavni smer vyzarovani [stupne]	Kmitocet f [MHz]	sirka kanalu [MHz]	ERP [dBm]	Zisk anteny [dBi]	privedeny vykon [dBm]	ID protistanice (nepovinne)	pomer C/I [dB]	Stanice je Nova nebo Upravena?	Neobsaz	
107	50,031145	15,755163			01711BF7B32F	Stanice-8484	WiGig	313	2160	40	37	9				nova		
115	50,029807	15,734317			7ESAD1ESSDS2	Stanice-3134	WiGig	286	2160	42	12	10				nova		
108	50,048844	15,781761			52D4AC07C0EB	Stanice-3104	WiGig	78	2160	21	14	6				nova		
167	50,046685	15,757463		00:E1:3E:F5:13:BD		Stanice-7434	WiGig	193	2160	40	16	6				nova		
56	50,043582	15,773679		83:E4:86:9D:25:E2		Stanice-7675	WiGig	78	2160	42	18	8				nova		
109	50,022478	15,730736			153B80BC1151	Stanice-6836	WiGig	93	2160	46	21	10				nova		
111	50,031669	15,738641			7774CC7FD28D	Stanice-3191	WiGig	206	2160	47	21	9				nova		
40	50,052431	15,739851			8AEE341C1B0F	Stanice-3147	FSPP		61200	200	32	10				24 nova		
40	50,034768	15,790119			ED4CC6C644EE	Stanice-3021	FSPP		61200	200	32	10				24 nova		
	50,034976	15,776405		8C:01:C2:84:8E:84		Stanice-8775	FSPP		58800	100	35	5				16 nova		
	50,043659	15,770826		47:1E:97:35:86:40		Stanice-6002	FSPP		58800	100	35	5				16 nova		
70	50,034094	15,779728			90B0936048FD	Stanice-6358	FSPP		65400	150	32	10				19 nova		
70	50,035604	15,758564			B4F283B6EEA3	Stanice-8402	FSPP		65400	150	32	10				19 nova		
65	50,034407	15,788113			6E8F8F95AAEE	Stanice-5416	FSPP		63600	100	32	10				12 nova		
65	50,052111	15,77089		D0:1F:13:21:08:E0		Stanice-2594	FSPP		63600	100	32	10				12 nova		
	50,033632	15,789188			71C69018:05:3E		WiFi_5_2										nova	
	50,039408	15,751515			A9:2C:67:89:66:8B		WiFi_5_2-1439										nova	
	50,049158	15,779188			D5:15:40:DB:19:2A		WiFi_5_2-6961										nova	
	50,026253	15,77607			93:2A:96:83:FA:F5		WiFi_5_2-7638										nova	
	50,029194	15,738505			28:F8:17:3E:C4:41		WiFi_5_2-7415										nova	
	50,029447	15,738906			41:C5:8E:F4:22:E8		WiFi_5_2-1163										nova	
	50,023561	15,754083			87:E7:1D:D3:8C:89		WiFi-8611										nova	
	50,033816	15,769537			3E:8F:2C:06:DD:88		WiFi-1686										nova	
	50,046191	15,787518			8B:DD:DB:85:26:C4		WiFi-2626										nova	
	50,047557	15,770293			49:7C:53:68:1E:84		WiFi-5681										nova	
	50,045363	15,750717			AB:A7:56:01:1D:EE		WiFi-6421										nova	
213	50,043983	15,770597			87:3B:DF:F1:96:EE		WiFi-2902										nova	
211	50,022905	15,747265			94:7B:2F:FC:79:3D		WiFi-8835										nova	

During the import, the **C/I** entry is considered to be the closest number to the entry listed in **C/I listing**.

9.2. Export

After logging in, users can export all records of their Stations (in **Active**, **Waiting**, and **Draft** mode) to an XLSX file compatible with the **Import** template.

Export options for public data (accessible without logging in) are gradually being extended for the API endpoints:

<https://rlan.ctu.cz/api/v1/station/all-stations>
<https://rlan.ctu.cz/api/v1/station/geo-stations>

10. FAQ

- i. How are/will be the existing/registered Stations protected against interference from newly installed Stations, which are being registered later? (60 GHz)

The measures to protect existing Stations are organized in several levels:

- First level is the Coordination calculator, which based on the data provided by Station operators, indicates whether it is feasible to place a new Station(s) to the proposed location. This measure should lead to decreasing the risk of mutual interference.
- Second level is the communication between users (Station operators). If there is a potential interference indicated during installation of a new Station, it is possible to contact the operator of the affected Station. It is also possible to contact other operators anytime through [chat](#). Thus it is possible to make an agreement with other operators who are active in the same geographic area and find a solution, using i.a. [the findings](#) described in this document.
- Third level is the possibility to contact Portal administrator at 60ghz@ctu.cz to discuss solutions for cases when a discrepancy appears in the workings of the Coordination calculator or in Portal functions, or to address other specific situations.
- Fourth level is the possibility to contact CTU by applying procedures of the Czech legal order. This option will address situations when Station operators are not able to reach agreement and all other possible solutions [described in this document](#) have been exhausted.

- ii. I asked the affected Station to edit its parameters so I could pass the Coordination calculator, the affected Station did it, but the results show no difference. (60 GHz)

After requesting the change of parameters, leave the data entering mode – either go to Home Page or log out and in again.

- iii. I need to transfer my Stations to another operator.

Contact the administrator at 60ghz@ctu.cz

- iv. I have a comment on functioning of the RLAN Portal application or on this Manual.

Contact the administrator: 60ghz@ctu.cz

- v. I registered a fixed FS PtP link, my Station passed the Diagram of basic operations and statuses by the green “No conflict” branch and yet, another registered Station is causing interference to my Station. (60 GHz)

Generally speaking, results of the Coordination calculator are indicative only. Please check whether the Station causing interference is not installed with a conflict (NS is interfering), i.e. by → **Declaration on isolation**. You can find this through → **List of all Stations** after clicking on your Station. Depending on the concrete situation, you can then follow the steps described in [FAQ \(i\)](#).

Note: Harmful interference is such level of mutual influence by electromagnetic field, that the (radio) communication or service provided or transmitted by Stations using spectrum in accordance with established conditions is repeatedly interrupted or obstructed.

- vi. My Station is suffering interference, but I did not find any other Station through the Portal that could be the potential source of this interference. (60 GHz)

In this case, data on the Portal cannot solve the problem. After checking the correct configuration of your Station it is necessary to perform visual check of the surroundings and a site survey with other tools (incl. technical), or to apply fourth bullet in [FAQ \(i\)](#).

- vii. I want to decrease the radiated power of my published Station, which passed through the Coordination calculator by Declaration on isolation (results of the calculation thus had indicated potential conflict, e.g. by +5 dB). However, even after the decrease the radiated power exceeds the Calculator criteria (the decrease is, e.g., by 2 dB only). Do I have to repeat the Declaration on isolation? (60 GHz)

In case of decreasing the parameters, where the original declared (higher) limit of potential interference is not exceeded, the → **Declaration on isolation** button is not activated.

- viii. What is the permitted format of the serial number? (60 GHz)

Max. 12 characters, combination of numbers and letters of the English alphabet, other (special) signs are not allowed.

- ix. Do the Portal users need to use ESD II Portal forms for new users?

No. The registration to the 60 GHz Portal is possible with no further forms.

- x. I have a device without stated antenna gain or radiated power. What parameter should I enter? (60 GHz)

See [above](#).

- xi. Is the number of Stations in the “Draft” status limited?

No, the number is not limited.

- xii. If a legal entity is registering, is it possible to create “sub-accounts for individual users”, or is it necessary to create an account for every administrator separately?

Sub-accounts are not implemented in the current version – see also the [following question](#).

- xiii. Is it possible for more users to log into a single account simultaneously?

The simultaneous logging in of multiple users is possible, but there are no specific tools or logic implemented for collaborative access.

- xiv. Does the waiting queue (Stations in “Waiting” status) relate to one account? Is there some time limit or daily quota?

The “Waiting” status applies only to Stations where a conflict was found. The number of Stations that can rest in the “Waiting” status simultaneously is limited per account. The “Waiting” status is not limited by time. Time quotas are not implemented. See also [limit](#) and [FAQ \(xviii\)](#).

xv. How can I rename a Station?

Name can be changed after signing in by clicking on the Station in the main list and then on the button → **Adjust**, and after the new dialogue window opens → **Continue**, or → **Back**.

xvi. Is it possible to migrate the FS PtP data to WiGig and vice versa? (60 GHz)

No, these are different records with different structures based on two different technologies.

xvii. I have a device which I think is a fixed microwave link, but its model name includes “ad”. Which button should I use to register this Station? (60 GHz)

Some of the differences between WiGig PtP and FS PtP are shortly described [above](#). If the device declares using the 802.11ad standard, it means that measures to increase link resiliency have been implemented also on the protocol level. In consequence, the device has lower (or flexible) demands on interference-free operation ([C/I](#)) and can be operated without the link availability being secured with all the coordination procedures required in fixed service. So, it is advised to get registered as WiGig. Because the responsibility for Station operation is up to the operators, the decision about which button to use in registration is up to the operators as well.

xviii. I have a Station in “Waiting” status and I cannot publish it (i.e. move it to “Active” status).

Coordination of Stations is in the hands of [operators](#), CTU does not intervene into the coordination process. After user completed [solving the coordination \(in the 60 GHz band\)](#), the button → [Publish Station](#) is activated (located under the list of coordinated Stations found in the vicinity of your Station).

xix. A Station cannot be added, a notice “You can’t create more Stations” appeared.

In this case, you reached the limit quota for the number of Stations in “Waiting” mode. To clear the capacity, follow these steps: Either convert some Station(s) from the “Waiting” mode to “Active” mode (i.e. publish the Station), or delete some Station(s) in the “Waiting” mode.

xx. How to extend the validity period of Stations?

The extension of validity period (record update) is described [here](#). The validity period of Stations in “Waiting” and “Draft” mode does not need extending, because they [are not time limited](#). Also, the validity period of Stations that has already been extended shall not be extended except for the annual extension. If you tick these Stations as part of group validity extension, you will receive a harmless notification “The validity of some selected Stations could not be extended”.

xxi. CPE/associated client stations: do I have to register them?

Yes, you have to in the 60 GHz band. See [above](#), including the reasons why.⁵ You don’t have to register CPE in the 5 GHz band.

xxii. I need to re-adjust parameters, but do not see the necessary dialogue window, where can I find it?

The Portal indicates the status of the user’s navigation between steps of a Station registration:



To move between individual steps and dialogue windows use the buttons → **Back** or → **Continue**.

xxiii. Why it is not possible to extend the validity period of all my Stations?

The objective of ticking the validity period extension individually to each Station is specifically to check whether the Station is in use. Collective (automated) validity period extension would foil this objective.

xxiv. I need to change data (e.g. street, town, etc.) in the User profile / I cannot change the data on my Profile. What can I do?

Please do the following: Go to Profile and Settings, in the fields Street, Town, etc. insert (change) the necessary information. Then enter your password in the last form field (you don't need to change the password) and push Save settings. If you didn't receive any error message and the bookmark closed automatically, your data was changed (you can check this in your Profile).

xxv. Are Stations in the 5 GHz band (WiFi) paired? Is the directionality of antennas in 5 GHz inquired?

No.

xxvi. Is there a limit to the number of Stations I may place in the in 5 GHz band? Can an installation of Stations by another RLAN operator put any limits on my operations?

No. No coordination is taking place as part of registration in the 5 GHz band, the number of Stations is not limited, the frequencies are shared.

xxvii. Regarding the XLS import: What will happen if the XLS contains already published Stations with an indication "uprava" (change) but there is no actual change in the data – will the Stations switch to change mode and need to be published again, or will they remain published?

Such Stations will change to "Waiting" mode, i.e. will not be published on the map. To publish these stations (switch to "Active" mode), you must, in the 5 GHz band, confirm each Station separately using the map. In the 60 GHz band, the same procedure must be followed, adding also coordination steps.

xxviii. Regarding the XLS import: We plan to register a large number of Stations. What happens to Stations ABOVE the first 100 to approve?

On the date of launching the import functionality (April 2021), the limit of one batch from one XLS file is 100 Stations. If there are more Stations included in the file, the Portal will only handle the first 100 entries, not taking the other entries (>100) into consideration. Therefore, for larger number of Stations (hundreds) it is necessary to import every 100 Stations in a separate file.

xxix. If I move a Station into "Waiting" mode, will the date of first creation of the Station alter?

No. The date of first creation of a Station will not alter neither with the change to "Waiting" mode (e.g. when making changes) nor during extending its validity period.

xxx. Minding the duplications: I need to change some parameters of several co-located Stations (= with the same GPS coordinates) which are already registered. I want to do this using the XLS import (indication "uprava" (change). Is it possible?

N/A any more after 15 June 2021.

xxxii. How to convert a WiGig PtMP Station with a sector antenna to a WiGig MtP Station with a directional antenna?

Directionality is determined by antenna gain; the Portal will handle as PtMP a Station with an antenna with gain <25 dBi. It will handle as PtP a Station with an antenna with gain of 25 dBi or higher. Carry out the conversion as follows: log in, click on the Station in question, then click → **Adjust** and → **Parameters**. If the Station record holds separate entries for Antenna gain and Input power, adjust the Antenna Gain (<25 dBi for PtMP; or ≥ 25 dBi for PtP), then click → **Save and continue**. Station type (at the first row of the Station record) will then switch to PtMP/PtP. If the Station record holds only the EIRP value (which is admissible by the regulation), the threshold of 40 dBm applies: for values below 40 dBm, the Station will be handled as PtMP; for values ≥ 40 dBm, the Station will be handled as PtP.

xxxiii. I have questions regarding the impact of radio waves on health.

Please visit <https://www.ctu.cz/5G>, which contains also a section on radio waves in general. Questions may also be sent by e-mail to 5ghoax@ctu.cz. Please note that the map on the Portal (rlan.ctu.cz) contains no data on 5G stations.

xxxiiii. I cannot see my Stations on the map.

This may happen when the map view zooms in on an area where none of your Stations is located. At any moment, the list of Stations corresponds to the area displayed at current map crop.

xxxv. I need to import a group of stations with the same GPS coordinates.

This is possible, as stations may be co-located, for instance if placed on the same pole. The stations must have different MAC addresses, however.

xxxvi. My Stations installed before 15 June 2021 are not visible (moved back to “Draft” stage). What should I do now?

According to the General Authorization VO-R/12, registrations of all Stations must contain also MAC address as of 15 July 2021. However, your records have not been not lost and the solution is simple: Export all your records to XLS, but filter only the records from the 5 GHz band (“WiFi_5_2” or “WiFi_5_8”) and use those going forward. **Add the missing MAC addresses**, mark these records with the indication “uprava” (*change*), and re-import. Your stations will move from “Draft” to “Waiting” status and you may activate ([publish](#)) them again in the usual way.

xxxvii. Further recommendations regarding import and administration of Stations, based on the questions received:

- Unless you need to edit all the Stations, do not re-import all the Stations. Select the Stations whose data need to be changed and include only those into the import file.
- Change of data for one PtP station will “unpublish” (move to the “Waiting” status) also the other Station in the PtP pair. The pair can be [re-published](#) (moved to “Active”) manually.
- You may receive a notification that the GPS coordinates of an imported edited station (marked “uprava”/*change*) are identical with an already existing Station – most likely, this will be a Station installed by yourself. If you wish to add a new station at the same GPS, mark it with the indication “nova” (*new*). If you wish to clearly distinguish your new station from an existing station, you may enter a slightly different GPS coordinates (at 8th or higher decimal place).
- After each data import, open the list of your Stations – the Stations, or FS PtP station pairs, which have been subject to change in the import will have moved to “Waiting” status and a follow-up action may be needed.
- We suggest entering a unique name for each Station, so as to facilitate Station search and identification. In the current database, there are Stations registered with different parameters

and MAC addresses, but the same name: while these are legally compliant records, they are also far from easy to work with for the users.

- If you received a notification of duplicate MAC address during a data import, this will most likely concern one of your own Stations; in order to find the duplicate, we suggest, e.g., exporting all your Stations into XLS.

xxxvii. Several users administering Stations together (Association).

A Station may be administered by more than one Portal user, by the means of Association. The Association admin can create a new Association by clicking on → **Association** in the bookmark “Profile”. Thereafter, the admin selects the Association name (which is not public), adds an optional description (not public either), and invites Association members by adding their user IDs. User anonymity is guaranteed by the Portal, and thus members must voluntarily communicate their user IDs to the admin first. Association entries can be edited at any time, including individual roles in the Association, or may be deleted entirely.

xxxviii. How can I delete a Station record?



After logging in, go to Stations list, click three vertical dots and select → **Delete**.

The other option is group de-activation: Export all stations to an XLS file. Keep only those Stations you wish to de-activate (they will be are marked “uprava” (*change*) by default) and re-import the XLS file. All the selected Stations will move to “Waiting” status and be “unpublished”. Please note that records in “Waiting” and “Draft” mode will still be used for the purpose of MAC address duplicity checking.