Short User Manual: 60 GHz Band Registration Portal
rev.200417

The portal for radio station registration in the 60 GHz band (https://60ghz.ctu.cz) is operated by Czech Telecommunication Office (https://www.ctu.cz). Questions or comments: 60ghz@ctu.cz

Disclaimer:

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

Contents

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

First, go to https://60ghz.ctu.cz and ...

Get registered (**Registration → Natural Person** or **→ Legal Person**). 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 settings. You can edit the Profile of the registered person anytime at **→ Profile**.

The <u>registration of new Station (NS)</u> is done by one of these buttons:

|	
NEW station WiGig PtP[1]/PtMP[2] (with mitigation)	**NEW pair of stations FS PtP[1]** (without mitigation)
Here, you can <u>register WiGig Stations (incl. associated client stations) one by one</u>. Thus for a PtP link, each Station must be registered separately.	Here, you can <u>register FS[3] PtP Stations</u>, always in pair.

Push one of the buttons and, first, choose a location for the Station on a map. You will add <u>parameters</u> later. You can quit the data filling anytime and return later. The draft record is kept as „<u>Draft</u>" status. A successful registration is indicated by <u>Active</u> status.

2. Left button: Installation of the WiGig (PtP, PtMP, MGWS/802.11ad, beamforming)

<u>WiGig Applications</u> are always installed separately (→ **New WiGig station**). After choosing the location for the Station on the map,[4] choose a direction where the Station will "beam" (aim) with its <u>main lobe</u>: you can set it with a click on a compass rose button → **Choose the angle**:
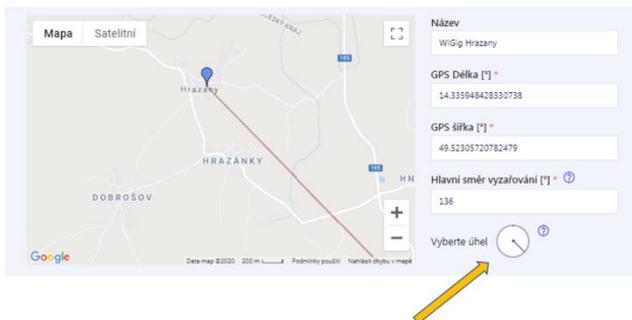
Then add the <u>parameters</u>. We advice to fill in → **Antenna gain** and → **Delivered power** separately, i.e. by ticking → <u>Automatic calculation</u>. If you do not know this data, enter <u>maximal parameters</u>.

The "<u>Coordination calculator</u>" is located under the button → **Save and continue** (or → **Save and re-calculate**, if you are <u>additionally changing some parameters</u>). <u>The difference in directivity between PtP and PtMP</u> is determined by antenna gain. After finishing the calculation, the new Station finds itself in the <u>Waiting</u> status and the calculated results are displayed in <u>Table of affected stations</u>. If there was not found any conflict with other Station, you can use the → **Publish** button and publish the new Station on the map, finishing your registration successfully. The Station will later change the indicated <u>coordination status</u> to <u>Active</u>. In case the Calculator shows that your Station could interfere with some other "<u>directional fixed FS microwave link</u>**Chyba! Záložka není definována.**", a sign "conflict" and indication "<u>NS</u> interferes" will appear. For such case the Portal will offer <u>three possible solutions by following buttons</u>:

[1] PtP = Point-to-Point, direction link.
[2] PtMP = Point-to-Multi-Point, sector antenna.
[3] FS = Fixed Service, fixed radiocommunication services.
[4] You can enter the GPS also manually.

i. → **Edit your own parameters**: You can return to the parameters specification and edit them – e.g. decrease the dBm power, choose better placement (GPS), the direction of beaming etc.

ii. → **Contact the operator** of the affected Station with suggestion (request) to edit parameters of the affected Station (i.e. fixed link, where the possible interference may occur) to decrease the *C/I* demand on non-interfered operation (or generally, request a change of the parameters to meet you halfway):
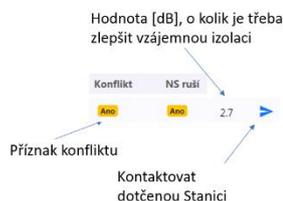
The operator of the affected Station can edit the parameters of "own" Station (thereby allowing installation of the new Station), by e.g. decreasing the *C/I*, editing the radiated power[5] etc.

The button → **Contact the operator** can also help to reach mutual agreement before → **Declaration on isolation**. You can use the messaging system provided by the Portal to contact the operator of any Station (after clicking on Station details click on the button → **Contact the Station operator** 🗨). The results about your Stations are marked with icon 😊 . The communication with other users is anonymous (in case the operators do not tick the checkbox → **Display my e-mail**). Incoming new message is indicated in upper bar 💬¹ and the operators 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 apparently isolated from the affected Station by some barrier, by frequency separation or physical separation, 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 system of the Portal, the result of the decision is visible to affected Stations, and in the future, it will be published also on the public version of the Portal in Table of mutual declarations.[6]

Only after solving the conflicts, the button → **Publish Station** is activated. The Station becomes Active and is visible in → **List of all Stations**.

For resolving conflicts, it is good to keep in mind that a new Station may be in conflict with a Station belonging to the same operator (i.e. yourself). The results related to your Stations are marked with icon 😊 .

3. Right button: Installation of the fixed link (FS[3]) PtP (without mitigation techniques)

Stations of fixed microwave links FS PtP[7] are installed with the button → **New PtP Station** (without mitigation techniques), always in pair (Station A, Station B). They are also placed on the map[4] with a click where the application itself calculates mutual directions of the radiation. Just add parameters, press → **Save and continue/re-calculate** (i.e. the Coordination calculator starts) and (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.

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[5] The maximal power of a number of devices is lower than the maximum levels authorised by the relevant regulations; for these devices, the actual value should be entered.
[6] Anonymously, nevertheless in the open data mode.
[7] FS PtP have usually duplex operational mode for this band, guaranteed latency and availability (incl. QoS) under given conditions, or they can carry the IEEE 1588 synchronisation and other specific parameters.

4.   Indication of the coordination status

When entering data for the new Station (and in → **List of my Stations**), the status of entered parameters is always indicated:

- "Draft": a status following clicking on one of the New Station buttons, i.e. when entering the data and before you click the button → **Save and continue/re-calculate**. The data will remain saved even in case of Internet connection failure etc. Neither the time period nor the number of data is limited.
- "Waiting": a status used while the Coordination calculator is processing the calculation, where the result can have either of the two following forms:

  ✓   The Calculator found no potential conflict and you can just click the button → **Publish**, or
  ✓   The Calculator indicated possible interference (from your Station towards other or vice versa) and then it is time to change the parameters of the new Station, or alternatively of the affected-existing Station.

- "Active": the Station is published on the map and a time period of 18 months begins, over which the Station's data is being kept on the Portal.

- "Expired": if the Station's data has not been updated for 18 months from installation or from the last data update, the data 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):
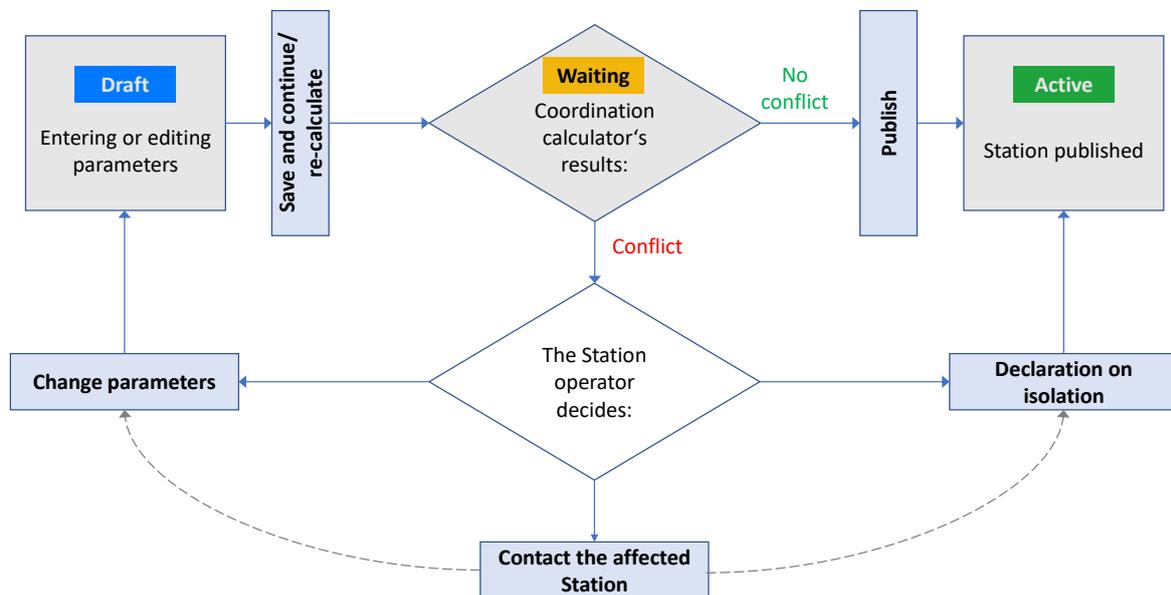
Data update for a Station can be done e.g. by clicking on the pen icon in the List of Stations, or when changing parameters of a published Station.

Measure to ensure equal chances for other providers: The maximum number of Stations (for one user) in the "Waiting" status is limited. The indicator is located on the main List of Stations.

An example of a detail and its interpretation:

| 10 / 15 | „I have 10 Stations in the "Waiting" status out of maximum 15 Stations in the "Waiting" status." |
| | „I can move 5 more Stations to the "Waiting" status." |

The operator of the Portal will adjust this limit based on the operation experience.

Note: The changes in Station's statuses (e.g. moving the Station from "Waiting" to "Active" status) are fully in the hands of the Stations operators – CTU does not intervene into the coordination.

5. Later changes of parameters of the published Stations

Parameters of the Stations can be changed after publishing by clicking on the pen icon in the List of Stations. The procedure is similar to installation of new WiGig Station or FS PtP, but the Coordination calculator is not activated as long as you edit parameters which do not change the original coordination results. The activation of Coordination calculator and the following publication is considered as a Station data update.

6. Entered parameters

| 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; the basic bandwidth is entered in case of aggregation.
Central frequency, [MHz]	+57000	+66000	
Modulation	4QAM	512QAM	Usually max. 16QAM. Higher modulation => higher transmission capacity => link more prone to interference

7. Technical Annex

7.1. Technical-regulatory summary of the Portal concept

The 60 GHz 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 the new Station's installation,

where the result of this calculation is a recommendation, whether the new Station can be placed, or whether it is necessary to change parameters on the side of the new Station or 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.[8] Due to this simplification, some parameters and methodologies are designed so that in some situations, the results provide conservative estimates (i.e. with better protection).

The application 60 GHz Portal 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 new Station with WiGig technologies, or of a pair of Stations with FS PtP technologies.

7.2. Technologies WiGig PtP, PtMP (incl. MGWS, 802.11ad, beamforming)

The stations from this category are operated either in the point-to-point (PtP) mode or in the point-to-multiple point (PtMP[9]) 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 basically designed for sharing,
- LBT: carrier-sense multiple access with collision avoidance, CCA/ED,
- RF channel selection,[10]
- Beamforming.

Especially the last two mitigation techniques are essential for the correct result of the Coordination calculator. If they are (or if they can be) active (in manual or automatic mode), they contribute to the operational stability of the 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 bandwidth[11]). The Coordination calculator presumes the conservative situation, i.e. that in case of coexistence with FS PtP systems, the frequency is shared. In case the Stations operators are sure that there is frequency separation (e.g., 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.

All WiGig Stations are always registered separately (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 the data are administered separately.

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[8] The radiation diagrams are designated for horizontal level only.
[9] The „MP" includes also MESH communications of MP-MP Stations.
[10] It is possible to select from 4 channels in total (for channel bandwidth 2 160 MHz).
[11] Channel bandwidth.

7.3. Distinguishing the WiGig PtP and WiGig PtMP

The operation of WiGig PtP1 has a directional character, while the operation of PtMP2 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)
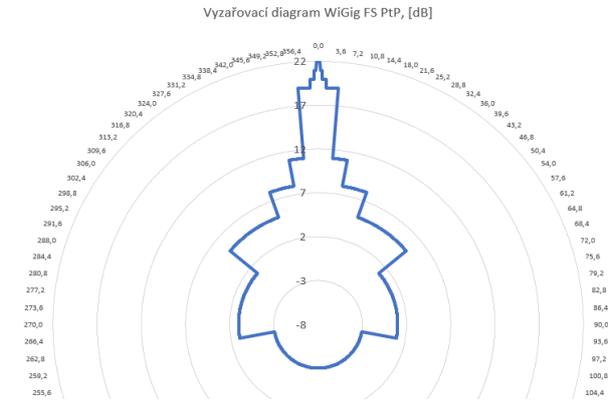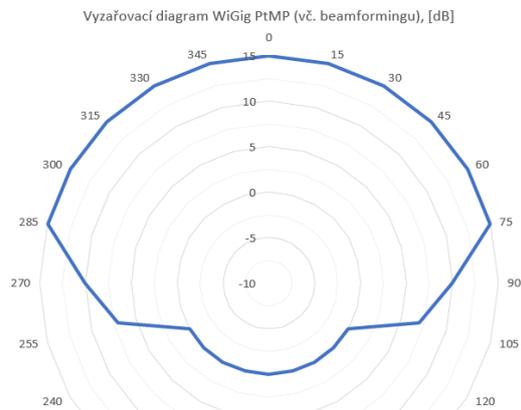For G_{dbi} ≤ 25 dBi the Station is considered as PtMP (= sector antenna)

Parameters of the WiGig antennas used in Coordination calculator:

Sector (PtMP) antennas:
Radiation angle: ±85^0 for -3dB;
±120^0 for -15dB; front-to-back ratio: 15 dB

Directional (PtP) antennas:
Radiation angle: ±2^0 for -3dB;
front-to-back ratio: 25 dB

The entered direction of main lobe data corresponds to the radiation angle 0^0.

7.4. The FS[3] PtP technology (Fixed Service, without mitigation techniques), fixed point-to-point links

The parameters and computation procedures for these technologies on the 60 GHz Portal are based on planning procedures for the fixed radiocommunication service. The formula FSPL (free-space path loss) and procedures and antenna characteristics according to Recommendation ITU-R F.699 were used. The radiation characteristics of the antennas are set for 8 representative antenna samples for diameters up to 0,5 m for these scopes of antenna gains G_{dbi} [dBi]:

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

Thus the algorithm will use the radiation characteristics corresponding to the installed FS PtP antenna gain (stated during entering parameters) for computing.

To support ensuring of the allowed error rate BER = 10e-6 for PtP technologies without mitigation techniques, the requests for signal-to-interference ratio (*C/I*) are reflected based on the type of used

modulation scheme. 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[12]	12	128QAM	28
16QAM	18	256QAM	31
32QAM	21	512QAM	34
64QAM	25	---	---

It is advised to choose rather lower modulations[13] - the practical benefit of modulations with constellations above 64QAM is usually not big for outdoor installations in the 60 GHz band. In case that an operator of the new (other) Station sends a request (suggestion) to decrease the *C/I* demand, the suggestion will most likely be aiming at modulation. The default setting is for 4QAM.

In case of fixed point-to-point FS PtP links, the central frequency and occupied bandwidth (width of the radio channel) is entered.

These Stations are registered always in pair (FS-A ↔ FS-B), they are displayed always side by side, and in case of change of parameters or deleting a Station, both Stations are treated inseparably (in pair), incl. their time period for keeping the data.

7.5. Common parameters and used methodologies

Each Station receives a unique unrepeatable identification number (ID) at the moment of clicking on the first button. Even after deleting the Station (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 during installation of new Station (the radio link budget). The following diagram with matrix of individual scenarios displays situations 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. The localisation of Stations on the map is required only.		**Scenario 2:** Coordination calculator: Check interference *from* another WiGig Station.
	WiGig PtP			
	FS PtP (Fixed Service)	**Scenario 1:** Coordination calculator: Check interference *towards* another FS PtP Station.		**Scenario 3:** Coordination calculator: a) Check interference *towards* another FS PtP Station. b) Check interference *from* another FS PtP Station

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[12] The C/I value in this case includes both QPSK and BPSK.
[13] A number of devices are equipped with automatic choice of coding and modulation; for these, it is possible to tick the highest possible modulation according to the catalogue list, at registration.

The size of the searched area around each new installed Station (NS), where the mutual influence of other Stations is assessed, is a circle of 3.5 km diameter[14] - you can see the area on the map highlighted with pink colour ▨ . It includes Stations in the Active mode only. The result of this assessment is summed in the Table of affected Stations:

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

An example of results' interpretation for a new Station in the Table of affected Stations:

Based on assessment of particular scenarios (results of the Coordination calculator), the Portal will offer some of these measures for installing the new Station (see Diagram of basic operations and statuses):

a) There was either not found any potential conflict and the button **→ Publish Station** is activated, or

b) Possible conflict was found with one or more existing Stations; this is indicated with orange colour and the value *L* [dB] expressing by how much has the protective criteria been exceeded (*L* > 0 dB). Then relevant buttons are activated according to the situation:

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[14] 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.

i.	→ **Edit my own parameters**, which will return the user back to editing the new Station's configuration. In this case, the parameters need to be edited to decrease the influence of the new Station towards the affected 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** of the affected Station (fixed FS PtP link) with suggestion (request) to change parameters (the request should be aimed to e.g. lower demand of *C/I* in the Table of modulations). The new Station remains in the Draft status and waits for the affected Station's parameters being edited – this will be announced through built-in chat communication or its operator can check its status at → **List of all Stations**. The time period for reaching the mutual agreement is not set by the Portal.
iii.	→ **Declaration on isolation** button is designated for situations, which are not implemented in this version of the Coordination calculator (thus assessment made by human is suitable), such as: • The existence of "isolating" barrier between the new and the affected Station (e.g. buildings, trees etc.), • Frequency separation between a fixed PtP link and a WiGig Station ensured by Station operators themselves e.g. by making sure that the WiGig Station cannot automatically switch to a channel which is overlapping with a frequency used by the FS PtP Station, • 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. Note: Hereby, the term "isolation" stands for radio path attenuation between Stations.

The basic operations and statuses during Stations coordination can be found in Diagram of basic operations and statuses.

7.6. The time period for keeping the technical data of Stations

The Portal is equipped with an automatic system providing alerts on time period for which the Station data was not updated:

The data is being kept for a time period of 1 year ("Valid through") from the date of first data entry (or last data update), which is displayed in left field ("Registered"). Before this time period expires, it is necessary to update the data. If the data was not updated, an extra protective time period of 6 months ("Protected" status) begins. When the protective period expires, the data is automatically deleted (expiration). The Portal automatically sends an information e-mail (sender 60ghz@ctu.cz) to Station operators before each of these time periods expires with an alert to update data . After each data update the overall time period for keeping the data extends again by 18 moths (i.e. 1 year plus extra 6 months of protective time period).

There are no expiration time periods for Station operators' registration.

7.7. Findings regarding Stations installation and facilitation of 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. In time of publishing of the first edition of this Manual, they were based especially on

theoretical calculations and simulations, and they do not express individual situations. They 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), and if frequency separation cannot be used, the most effective way is to increase the angle separation – even a change of ca. 3° - 5° of the angle is very effective (the isolation increases by ca. 10 - 40 dB, depending to the antenna type). It is also possible to use more directional antenna.
- Long directional FS PtP links are more vulnerable to interference risk.
- 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 limit a fixed FS PtP link 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) anytime after placement; nevertheless, it is suitable to take into consideration the conditions under which the → **Declaration on isolation** was confirmed.
- When entering the WiGig PtMP parameters, it is useful to enter separately the antenna gain and separately the input power, if possible, because the individual data can help to precise the calculation.
    - When installing the Station, secure a good Internet connection to load the map faster.
    - It is not necessary to start the Coordination calculator after those changes in "parameters change" which do not change the results of coordination, such as:
        - ✓ Change of the Station's name, of the MAC address indication, or of serial number.
        - ✓ WiGig: decreasing the E.I.R.P. (or decreasing the power and/or antenna gain; this does not include 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 the modulation).

8. FAQ

i. How are/will be the existing/registered Stations protected against interference from new installed (registered later) Stations?

The Station protection measure is graded:

- First level is the Coordination calculator, which indicates feasibility of Station(s) placement based on the data provided by Station operators. 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 conflict 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 others, who utilize the space, and find a solution for all (it is also possible to use the findings described in this document).
- Third level is the possibility to contact Portal administrator (60ghz@ctu.cz) to find possible solutions in case some discrepancy occurs in the concept of the Coordination calculator or in Portal functions, or in any other specific situation.
- Fourth level is to contact CTU, by using procedures of the Czech legal order, if the Station providers neither found a solution for their situation nor reached an agreement, and all here stated possible solutions were 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.

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

iii. <u>I need to transfer my Stations to another operator.</u>

Contact the administrator: 60ghz@ctu.cz .

iv. <u>I have a comment on functioning of the Portal 60 MHz application or on this Manual.</u>

Contact the administrator: 60ghz@ctu.cz .

v. <u>I registered a fixed FS PtP link, my Station passed the Diagram of basic operations and statuses by green branch "No conflict" and yet, another registered Station is causing interference to my Station.</u>

Generally, the Coordination calculator provides only indicative data. First, check if 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. Based on the situation you can follow steps from 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. <u>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.</u>

In this case, data on the Portal cannot solve the situation and after checking the correct configuration of your Station it is necessary to make site survey using other tools (incl. technical), or to apply fourth bullet in FAQ (i).

vii. <u>I want to decrease the radiated power on my published Station, which passed through the Coordination calculator by Declaration on isolation (results of the calculation thus indicated potential conflict, e.g. by +5 dB); however, even after the decrease the radiated power remains in the range of exceeded criteria (e.g. by 2 dB). Do I have to repeat the Declaration on isolation?</u>

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. <u>What format has the serial number?</u>

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

ix. <u>Do the Portal users need to use ESD II Portal forms for new users?</u>

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

x. <u>I have a device without stated antenna gain or radiated power. What parameter should I enter?</u>

See above.

xi. <u>Is the number of Station in the "Draft" status limited?</u>

No, the number is not limited.

xii. <u>If a legal entity is registering, is it possible to create "sub-accounts for individual users", or is it necessary to create account for every administrator separately?</u>

Sub-accounts are not possible in this version – see also the following question.

xiii. <u>Is it possible for more users to log into more than one account simultaneously?</u>

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

xiv. <u>Does the waiting queue (Station in "Waiting" status) relate to one account? Is there some time limit or daily quota?</u>

The "Waiting" status applies only for Stations where some conflict was found and it relates to one account. The "waiting" status is not limited by time. Time quotas are not implemented. See also limit and FAQ (xviii).

xv. <u>How can I change the name of the Station?</u>

Name can be changed in the Station parameters edit mode (pen icon) by clicking on "Back to parameters" and "Back to location" (map mode).

xvi. <u>Is it possible to migrate the FS PtP data to WiGig and vice versa?</u>

No, these are two different data sets from two different technologies.

xvii. <u>I have a device which I think is a fixed microwave link, but in its name is "ad." Which button should I use to register this Station?</u>

Some 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. Because the responsibility for Station operation is in the hands of the operators, the decision about which button to use in registration is in their hands as well.

xviii. <u>I have a Station in "Waiting" status and I cannot publish it (i.e. move it to "Active" status).</u>

The coordination of Stations is in the hands of operators. After solving the coordination the button → **Publish Station** is activated (located under the list of coordinated Stations found in the vicinity of your Station).

<p style="text-align:center">***</p>