

# Technologically managed environment and self-regulation in mm waves

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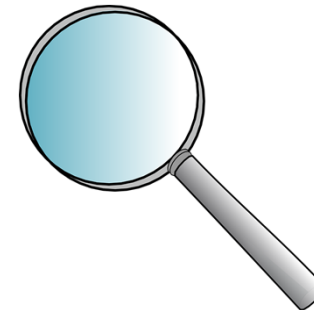
EUCNC 6G Summit, June 8-11, 2021  
(virtual conference)



Český telekomunikační úřad

# Topics

- ❖ Reasons for new approaches in spectrum management
- ❖ Light-licencing in the 60 GHz band: how it works
- ❖ RLAN 5.8 GHz band
- ❖ 5G NR in mm waves, dynamic access
- ❖ Further steps and conclusions



# Reasons for new approaches in spectrum management

## Risk management and innovations

- The construction of fibre networks: long-term impediments affecting the availability of the connectivity in rural (and other specific) areas
- Wireless platform is a reasonable solution to bridge the last mile. Licence-exempt authorisation facilitates deployment of networks (and, the availability of the connectivity).
- In 2015, national government Radio Spectrum Strategy identified 2 candidate bands: 60 GHz and 5.8 GHz.
- But, incumbents:
  - ✓ 5.8 GHz band: military radiolocation and Road Tolling
  - ✓ To manage the coexistence with the incumbents: light-licencing
- Introduction of techno-regulation



# Light-licencing in the 60 GHz band: how it works

([rlan.ctu.cz/en](http://rlan.ctu.cz/en))

## Example: Fixed Service station(s)

### 60 GHz Station

- + Add new WiGig PtP or PtMP Station  
MGWS, IEEE802.11ad/ay, beamforming  
(with mitigation)
- + Add new FS PtP Stations (paired)  
Fixed Services, only fixed directional connections  
(without mitigation)

### 5.8 GHz Stations

- + Add new Access Point 5.8 GHz

### 5.2 GHz Station

- + Add new Access Point 5.2 GHz

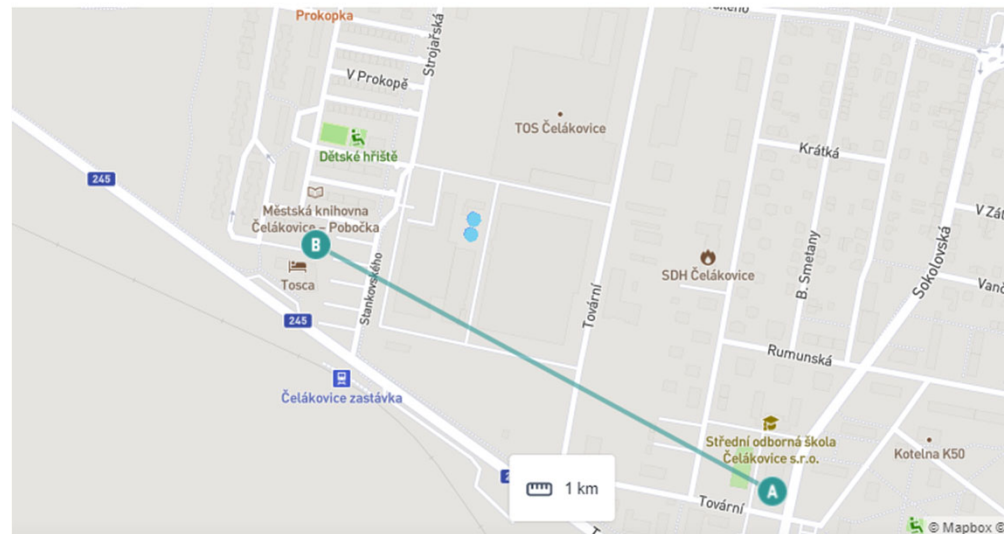


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Where are stations located?

Use the map to select the location or enter the GPS coordinates.

|                   |                    |                    |                    |
|-------------------|--------------------|--------------------|--------------------|
| Latitude A *      | Longitude A *      | Latitude B *       | Longitude B *      |
| 50.15880963364367 | 14.742027139358896 | 50.161350729497286 | 14.734687324028243 |



# Light-licencing in the 60 GHz band: how it works

Microwave\_link1 A Concept

Name  
  Location  
  Parameters  
  Summary

**Station A**                      **Station B**

What is the antenna gain and power?

Antenna gain [dBi]                      Antenna gain [dBi]  
 42    42

Conducted power [dBm]                      Conducted power [dBm]  
 10    10

RF injection power into antenna, transmission power, conducted power

What is the channel bandwidth?

Channel bandwidth [MHz] \*                      Channel bandwidth [MHz] \*  
 200    200

Occupied bandwidth, channel bandwidth

What is the medium frequency?

Center frequency [MHz] \*                      Center frequency [MHz] \*  
 60480    60480

The center frequency must be between 57,000 MHz and 66,000 MHz

What is the desired signal to interference ratio?

Signal interference ratio \*                      Signal interference ratio \*  
 16QAM: C/I = 18dB                      16QAM: C/I = 18dB

Which of these identifiers do you know?

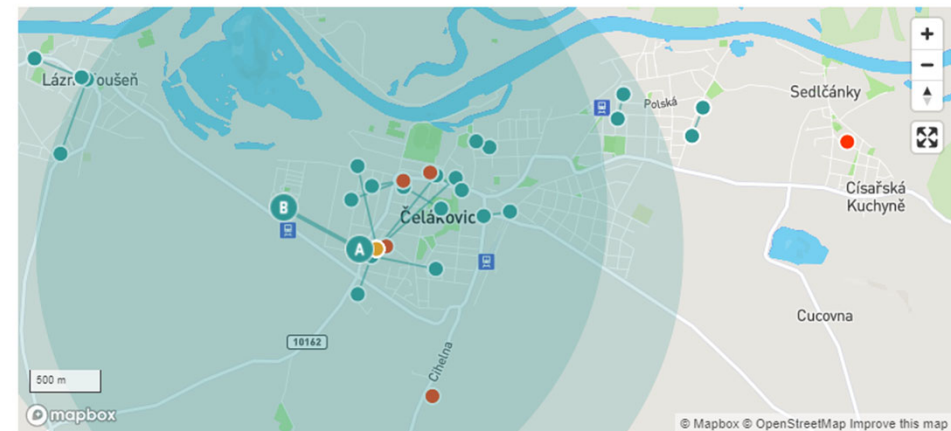
MAC address    Serial number                      MAC address    Serial number

Serial number                      Serial number  
 5G78912008                      5G78912009

Coordination zone: circles of 3.5 km in diameter

Location

| Station A  | Station B  |
|--|--|
| GPS<br>14.74202713935890°,<br>50.15880963364367° | GPS<br>14.73468732402824°,<br>50.16135072949729° |



Push button  to launch the Coordination Calculator.

Note: batch file handling implemented.



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# Light-licencing in the 60 GHz band: how it works

## Coordination Calculator results:

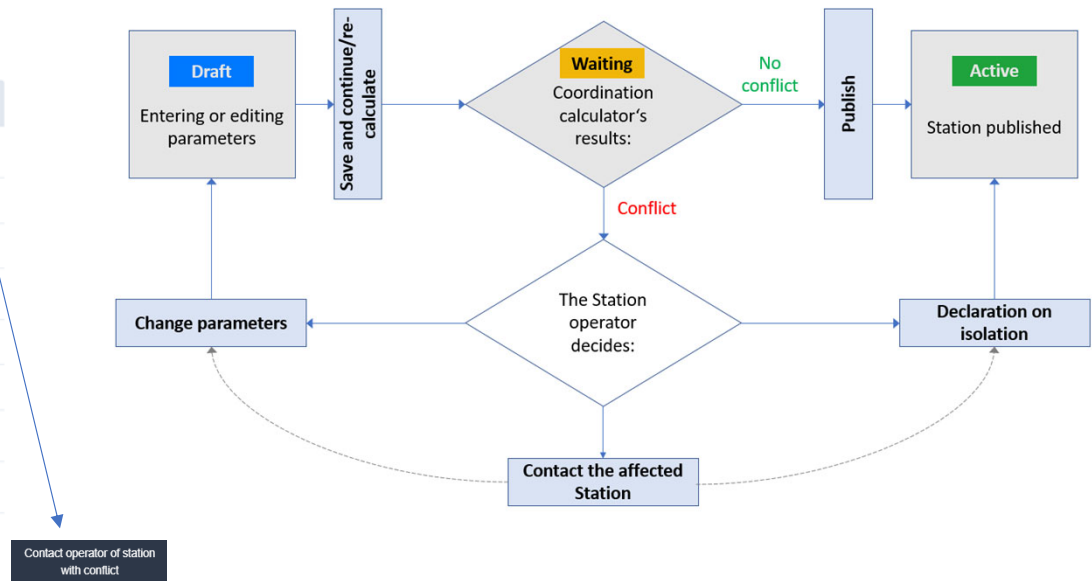
If no potential interference identified, the station(s) can be easily published.

In case of a conflict, 3 solutions:

### Affected stations

The coordination calculator checked for potential conflicts of the new Station (NS) with nearby Stations.

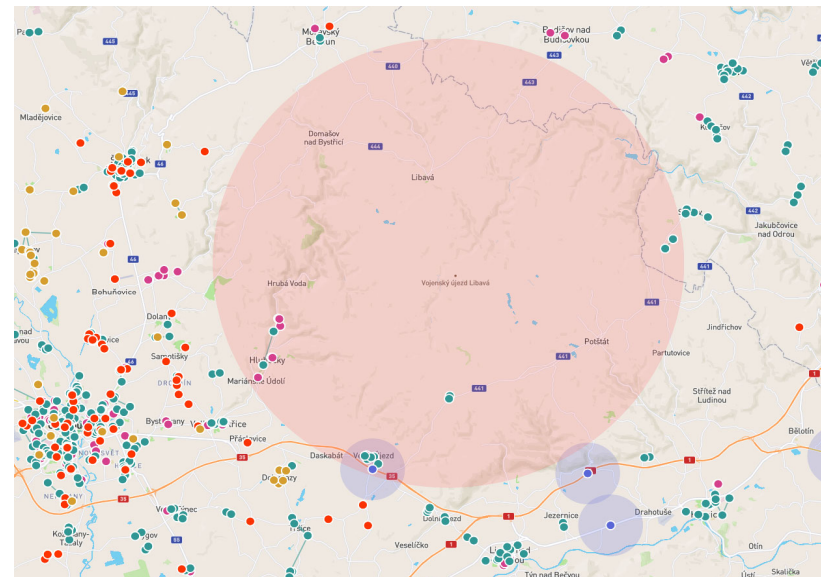
| ID   | Type            | Name    | Published by                        | Conflict                              |
|--|-----------------|---------|-------------------------------------|---------------------------------------|
| 0012166  | FS PiP          | 1473-SL | <input checked="" type="checkbox"/> | <span style="color: orange;">⚠</span> |
| Station A      Conflict: Yes      NS interferes: Yes (5.9 dB)      NS is interfered: Yes (16.7 dB) |                 |         |                                     |                                       |
| Station B      Conflict: No      NS interferes: No (-27 dB)      NS is interfered: No (-16.2 dB)   |                 |         |                                     |                                       |
| 0012166  | FS PiP          | 1473-SL | <input checked="" type="checkbox"/> | <span style="color: orange;">⚠</span> |
| Station A      Conflict: No      NS interferes: No (-34.3 dB)      NS is interfered: No (-23.5 dB) |                 |         |                                     |                                       |
| Station B      Conflict: Yes      NS interferes: Yes (7.4 dB)      NS is interfered: Yes (18.2 dB) |                 |         |                                     |                                       |
| 0046709  | FS PiP          | 600096  | <input checked="" type="checkbox"/> | <span style="color: green;">✔</span>  |
| 0063417  | WiFi AP 5.8 GHz | CIMOP   | <input checked="" type="checkbox"/> | <span style="color: green;">✔</span>  |



# RLAN 5.8 GHz band

## Light-licencing for fixed high-power installations

- New band for RLANs (e.i.r.p. > 25 mW), based on sharing principles: 5725-5850 MHz (April 2021).
  - ✓ WAS/RLANs with e.i.r.p. > 200 mW: light-licencing in order to manage the coexistence with incumbents.
- Spectrum sharing with military users: exclusion zones + agreement on the conditions during peacetime.
- Road tolling protection: exclusion zones
- CEPT and RLAN in the 5.8 GHz: no European harmonisation, but draft new ECC Report on national measures (public consultation during summer 2021).



# 5G in mm waves, dynamic access

## New governmental R&D project in the 26 GHz band

- Observations of alternative ways to authorise the 26 GHz band for 5G NR applications, aiming to:
  - ✓ Easy availability of frequencies, addressing various users and verticals.
  - ✓ Involve different stakeholders for wide collaboration.
  - ✓ Results to be shared with other (European) countries.
- Research streams:
  - 1) Radio planning tools and algorithms
  - 2) Software
  - 3) Maps
  - 4) Legal issues; e.g. SW solutions shared with other administrations: Free and Open Source Software (FOSS) licences considered.
- 5G FWA trials in the 26 GHz band will be launched in 2021





## Further steps and conclusions

- New features in the 60 GHz and 5 GHz bands ([rlan.ctu.cz/en](http://rlan.ctu.cz/en)): API interface to connect external information systems with the portal (dynamic re-configurations).
- The project on 5G NR in mm waves (26 GHz band): dynamic access to spectrum will be observed.
- Spectrum sharing, know-how sharing and the European collaboration:
  - Observations of the feasibility of FOSS licences: European Union Public Licence 2.0 or other copyleft licences can be explored.
- Licence-exempt usage is the candidate for dynamic access. To maintain regulation principles, technologies have to be involved (techno-regulation).
- Spectrum sharing is about balancing benefits and possible risks. Policymakers and administrations are obliged to study new and innovative approaches.

