

Appendix B – Licence conditions 2.1 GHz band

This document is a non-binding translation to English of the Swedish appendix (to the Open Invitation Part 2) published 26 April 2023

Area of use and technical conditions

1. The licence is national.
2. The licence shall be used for terrestrial systems which can provide mobile broadband services.
3. Frequency Division Duplex (FDD) technology shall be used as the duplex method for downlink and uplink transmission respectively.

Base stations are radio transmitters whose transmission shall be in the downlink direction in the frequency range 2110–2170 MHz (Downlink FDD).

Terminals are radio transmitters whose transmission shall be in the uplink direction in the 1920–1980 MHz frequency range (Uplink FDD).

Repeaters¹ shall comply with the respective conditions for base stations and terminals.

4. In the frequency range 2110–2170 MHz, outside the assigned frequency block, base stations shall comply with power limits pursuant to Table 1.

Table 1 Power limits in the frequency range 2110–2170 MHz, outside the assigned frequency block

BEM ² element	Frequency range	Maximum mean EIRP ³ (non-AAS) per antenna (*)	Maximum mean TRP ⁴ (AAS ⁵) per cell (**)
Transitional region	0 to 5 MHz outside the block edge	16.3 dBm/5 MHz	8 dBm/5 MHz

¹ Repeaters are radio transmitters that transmit both downlink and uplink.

² BEM – Block Edge Mask. BEM is a spectrum mask that defines power limits as a function of the frequency distance from the edge of a frequency block assigned to a license holder.

³ EIRP – Equivalent Isotropically Radiated Power

⁴ TRP – Total Radiated Power

⁵ AAS – Active Antenna System

	5 to 10 MHz outside the block edge	11 dBm/5 MHz	3 dBm/5 MHz
Baseline	>10 MHz outside the block edge	9 dBm/MHz	1 dBm/MHz
(*) Non-AAS power limits are defined per antenna and apply to base station configurations with up to four antennas per sector. (**) For base stations with multiple sectors, the maximum mean power applies per sector.			

5. If the licence holder has been assigned several contiguous frequency blocks, the restrictions on maximum average power under condition 4 above apply only outside the contiguous frequency blocks.
6. The licence holder may, by agreement with other licence holders in 1920–1980/2110–2170 MHz, deviate from the conditions pursuant to condition 4 above, as far as the 2110–2170 MHz frequency range is concerned.
7. The licence holder's installations of fixed terminals outside urban areas⁶ are allowed to exceed 24 dBm EIRP. This is subject to the condition that harmful interference is not caused to other radio uses and that conditions pursuant to coordination agreements with other countries are met.
8. The licence holder is responsible for planning the radio network.

Coverage and deployment conditions⁷

9. The licence holder shall provide coverage for mobile services pursuant to condition 12 along a total of 97% of the railway sections shown in Appendix B1.

In the event that there is more than one track along any railway section in Appendix B1 the covered section shall be calculated pursuant to the formula:
*(number of tracks with coverage along a section / total number of tracks along the same section) * the length of the section in question.*

⁶ According to the definition of urban areas used by Statistics Sweden.

⁷ Licence holders winning at least 40 MHz in the 2.1 GHz and/or 2.6 GHz bands shall comply with these conditions

10. Capacity and performance⁸ shall be at least equivalent to what can be achieved by using 2x20 MHz LTE⁹ with 2x2 MIMO¹⁰ (if FDD is used) or 40 MHz LTE with 2x2 MIMO (if TDD is used).
11. At least 40 MHz of the licence holder's spectrum holdings in frequency bands above 1 GHz¹¹ shall be used to provide coverage.
12. Coverage for mobile services is deemed to exist if, with a handheld terminal, it is possible to receive data at a rate of 30 Mbit/s and to transmit data at a rate of 256 kbit/s, under normal conditions.

The signal strength level for coverage shall be based on the following assumptions:

- a. Base station receiver sensitivity of the equipment used in the network
 - b. Terminal output power and receiver sensitivity of a "smartphone-type" hand-held terminal¹²
 - c. Terminal antenna gain: -3 dBi
 - d. The height of the terminal: 4 metres above the railway track, measured from the top of the rails (RÖK)
 - e. Margin of signal attenuation relative to a terminal free of body contact: 17 dB
 - f. Interference margin (load) in uplink: 2 dB
 - g. Lowest data speed in uplink: 256 kbit/s, under normal conditions
 - h. Lowest data speed in downlink: 30 Mbit/s, under normal conditions
 - i. Coverage probability on the cell edge (edge of the coverage area): $\geq 80\%$
13. The above conditions must be met no later than 31 December 2030 and the coverage must be maintained for the duration of the licence period.

Sharing conditions

14. The licence holder has, pursuant to this licence, priority in the assigned frequency range over licence holders who may be added later. The frequency range is

⁸ In terms of speed and latency

⁹ LTE – Long Term Evolution: technical standard for wireless broadband services

¹⁰ MIMO – Multiple Input Multiple Output: technology for wireless digital data transmission in which both the transmitter and the receiver have multiple radio receivers and transmitters respectively

¹¹ Any frequency band above 1 GHz that is harmonised within the European Union for terrestrial systems capable of providing electronic communications services may be used.

¹² If, for the technology used in the network, there is more than one standardised terminal class, which corresponds to a "smartphone-type" hand-held terminal, the one with the lowest output power and the worst receiver sensitivity shall be assumed.

shared with others provided that the licence holder, pursuant to this licence, is not subject to harmful interference.

Conditions on coordination

15. The licence holders shall obtain the consent from the Swedish Armed Forces for all new installations of radio transmitters and changes to existing installations of radio transmitters (e.g., updated technologies, directions/tilt, power, channel bandwidth) in the following municipalities: Ekerö, Gotland, Karlskrona, Kungsbacka, Marks, Simrishamn, Skurup, Trelleborg, Varberg, Vellinge and Ystad.
16. The licence holder shall comply with the conditions according to applicable coordination agreements between Sweden and other states.

Conditions regarding requirements that are of importance to the national security of Sweden

17. The licence holder shall take the technical and organizational measures required to ensure that the radio usage does not cause harm to the national security of Sweden.
18. Conditions 19–21 apply to central functions, i.e., functions in:
 - the radio access network,
 - the transmission networks,
 - the core network, and
 - the operation and maintenance networkthat are necessary to maintain overall network functionality and electronic communications services provided by the holder of the licence.
19. Central functions used for the provision of services in the 900 MHz, 2.1 GHz and 2.6 GHz frequency bands must not contain products from Huawei and ZTE.
20. If the primary source for the common time reference is reception of signals from satellite (GNSS), or if the source is otherwise located outside Sweden, then a redundant source located in Sweden shall be functionality-tested and ready to be put into service when needed.
21. Central functions must not be dependent on staff or functions located abroad.

Information

Notification obligation

Public communication networks of the type that are normally provided against payment or publicly available electronic communication services may only be provided after notification to PTS.

Information obligation

Anyone operating under the Electronic Communications Act is obliged to provide PTS, upon request, with the information and documents necessary for verifying compliance with the conditions imposed under the Act.

Changes of conditions

The licence conditions may be amended with regard to future changes in radio technology or changes in radio usage due to international agreements to which Sweden is a party or provisions adopted on the basis of the Treaty on the Functioning of the European Union.

Licence conditions may also be changed immediately if it can be assumed that the radio usage will cause harm to Sweden's security.

Coordination with the Swedish Armed Forces

Coordination with the Swedish Armed Forces regarding the expansion, deployment or modification of base stations in certain municipalities is initiated by filling out a form available on the Swedish Armed Forces website.¹³ The completed form is sent to the Armed Forces according to the instructions on the form. For questions, please contact the Swedish Armed Forces at fysplan@mil.se.

Existing coordination agreements

Information on existing coordination agreements for block licences can be found on PTS's website¹⁴.

¹³ <https://www.forsvarsmakten.se/sv/om-forsvarsmakten/dokument/remissblanketter/>

¹⁴ <https://www.pts.se/en/english-b/radio/coordination-agreements/>