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Radio Standards Specification

Flexible Use Broadband Equipment Operating in the Band 3450-3650 MHz

Preface

Radio Standards Specification (RSS) 192, issue 4, *Flexible Use Broadband Equipment Operating in the Band 3450-3650 MHz* replaces issue 3 of RSS-192, *Fixed Wireless Access Equipment Operating in the Band 3450-3650 MHz*, dated January 2008.

Listed below are the main changes:

1. updated requirements to accommodate flexible use broadband equipment as per Innovation, Science and Economic Development Canada's [*Decision on Revisions to the 3500 MHz Band to Accommodate Flexible Use and Preliminary Decisions on Changes to the 3800 MHz Band*](#)
2. added definitions related to flexible use broadband equipment
3. updated the transmitter output power limits and the unwanted emission masks for base stations and subscriber equipment

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1. Scope

This Radio Standard Specification (RSS) sets out certification requirements for flexible use broadband equipment used in fixed and/or mobile services operating in the frequency band 3450-3650 MHz.

2. Transition period

This document will be in force upon publication on Innovation, Science and Economic Development Canada's (ISED) website. However, a transition period of six (6) months following its publication will be provided, within which certification under RSS-192, issue 4, or issue 3 will be accepted. After this period, only applications for certification of equipment under RSS-192, issue 4, will be accepted and equipment manufactured, imported, distributed, leased, offered for sale, or sold in Canada, shall comply with this present issue.

A copy of RSS-192, issue 3, may be requested by [email](#).

3. Certification

Equipment covered by this standard is classified as Category I equipment. Either a technical acceptance certificate (TAC) issued by the Certification and Engineering Bureau (CEB) of ISED or a certificate issued by a recognized certification body (CB) is required.

4. Licensing requirements

Equipment covered by this standard is subject to licensing pursuant to subsection 4(1) of the [Radiocommunication Act](#).

5. RSS-Gen compliance

RSS-192 shall be used in conjunction with RSS-Gen, [General Requirement for Compliance of Radio Apparatus](#), for general specifications and information relevant to the equipment to which this standard applies

6. Related documents

All documents are available on ISED's [Spectrum management and telecommunications](#) web page.

The following document should be consulted in conjunction with this RSS:

SRSP-520 *Technical Requirements for Fixed and/or Mobile Systems, including Flexible Use
Broadband Systems in the Band 3450-3650 MHz*

SRSP – Standard Radio System Plan

7. Definitions

Active antenna system (AAS) refers to an antenna system where the amplitude and/or phase between antenna elements is dynamically adjusted resulting in an antenna pattern that varies in response to short-term changes in the radio environment. AAS may be integrated in a point-to-multipoint (P-MP) hub station, base station and non-fixed subscriber equipment. Antenna systems used for long-term beam shaping such as fixed electrical down tilt are not considered an AAS.

Active antenna system (AAS) base station equipment is a base station equipment with AAS.

Antenna means a radiating unit/component which contains all radiating elements.

Base station equipment is equipment that provides network connectivity to, as well as management and control of, the subscriber equipment.

Channel bandwidth is the equipment's operating bandwidth specified by the manufacturer that contains the information transmitted.

Channel frequency is the frequency at the center of the channel bandwidth.

Fixed subscriber equipment is fixed equipment that provides connectivity between the user's equipment and base station equipment. Fixed subscriber equipment is used at an installed fixed location and is not operational while in motion. Fixed subscriber equipment is not considered as fixed point-to-point equipment.

Frequency block is defined as a 10 MHz block of frequency in the band 3450-3650 MHz (see SRSP-520, *Technical Requirements for Fixed and/or Mobile Systems, including Flexible Use Broadband Systems in the Band 3450-3650 MHz*).

Frequency block group is a continuous frequency range of multiple block(s) of 10 MHz that contains the equipment's channel bandwidth. For equipment with channel bandwidth smaller than 10 MHz, the frequency block group is the frequency range of a 10 MHz block.

Frequency block range is the range of all frequency blocks that contains the equipment operating frequency range.

Indoor base station equipment is a base station, by the nature of its design, which operates in locations completely enclosed by walls and a ceiling (e.g. a transmitter that must be connected to the alternate current (AC) power lines, an enclosure that is not waterproof, etc.)

Maximum effective isotropic radiated power (e.i.r.p._{max}) is the maximum average channel power in dBm measured as e.i.r.p. across all antenna elements per channel.

Maximum total radiated power (TRP_{max}) is the maximum average channel power in dBm measured as TRP across all antenna elements per channel.

Non-active antenna system (non-AAS) is an antenna system that does not meet the definition of AAS.

Non-AAS base station equipment is a base station equipment with a non-AAS.

Point-to-point (P-P) equipment is equipment with directional antenna and is used between two fixed locations installed to provide service such as backhaul.

Point-to-multipoint (P-MP) hub equipment is fixed equipment to provide communication with multiple user equipment installed at fixed locations.

Total radiated power (TRP) is defined as the integral of the power transmitted by an active antenna system, in different directions over the entire radiation sphere.

$$TRP \stackrel{\text{def}}{=} \frac{1}{4\pi} \int_0^{2\pi} \int_0^{\pi} P(\theta, \varphi) \sin(\theta) d\theta d\varphi$$

Where

$P(\theta, \varphi)$: power radiated by an antenna array system in direction (θ, φ)

$$P(\theta, \varphi) = P_{TX} g(\theta, \varphi)$$

Where,

P_{TX} : conducted power (watts) input to the array system

$g(\theta, \varphi)$: array systems directional gain along (θ, φ) direction

8. Transmitter standard specifications

The provisions of this section are specific to the transmitter standard specifications.

8.1 Measurement method

Measurements shall be performed in accordance with the requirements of RSS-Gen. However, for TRP measurements, the standards listed on ISED's [Certification and Engineering Bureau](#) website shall be consulted.

The equipment measurement shall be performed for all operating channel bandwidths specified by the manufacturer.

AAS equipment with eight antenna connectors or less can demonstrate compliance with the e.i.r.p. limits instead of the TRP limits using the standardized measurements procedures specified in RSS-Gen.

All equipment with more than eight antenna connectors shall demonstrate compliance with the TRP limits for the unwanted emission.

8.2 Frequency plan

The band 3450-3650 MHz is divided into 10 MHz blocks as per SRSP-520. Blocks can be aggregated to form a channel larger than 10 MHz.

8.3 Occupied bandwidth

The occupied bandwidth shall not exceed the equipment's channel bandwidth, which is declared by the manufacturer.

8.4 Type of modulation

The modulation used shall be digital.

8.5 Frequency stability

The frequency stability shall be sufficient to ensure that the occupied bandwidth remain within each frequency block group when tested at the temperature and supply voltage variations specified in RSS-Gen.

8.6 Transmitter output power

The maximum output power of the equipment measured in terms of average values shall comply with the limits specified in table 1.

Table 1: Maximum power of equipment

Equipment type	Maximum power
Non-AAS: base station (outdoor), fixed P-P station, P-MP hub station	68 dBm e.i.r.p./ 5 MHz
AAS: base station (outdoor), P-MP hub station	47 dBm TRP/ 5 MHz
Indoor base station	33 dBm TRP/channel bandwidth
Fixed subscriber equipment	39 dBm e.i.r.p./channel bandwidth
Subscriber equipment other than fixed subscriber equipment:	
Non-AAS	23 dBm e.i.r.p./ 10 MHz
AAS	28 dBm TRP/channel bandwidth

8.7 Transmitter unwanted emissions

Unwanted emissions shall be measured in term of average value when the transmitter is operating at the manufacturer's rated power and modulated as specified in RSS-Gen.

Equipment shall meet the unwanted emission limits, specified below, outside each frequency block group. The unwanted emissions shall be measured and reported for two channels: one located at the bottom and one at the top of the operating frequency block range. In doing so, the equipment must be set such that the middle of the occupied bandwidth is as close to the bottom or the top edge of the frequency block range for each measurement respectively, as the equipment design permits.

If the transmitter is designed for a multi-carrier operation, the tests shall be carried out using both the maximum and minimum number of carriers intended for the equipment.

Set the channel frequency f_L to the lowest frequency of the frequency block range. Record f_L and the RF spectrum. Repeat the test using the highest channel frequency f_H of the frequency block range.

8.7.1 Unwanted emission limits for outdoor base station, P-P and P-MP equipment

The unwanted emissions of base station, P-P and P-MP equipment shall comply with the limits below. Equipment shall be classified as Type 1 or Type 2 equipment if its unwanted emissions in any 5 MHz bandwidth, outside the frequency block group, comply with limits specified in table 2 or table 3, respectively

Table 2: Unwanted emission limits for Type 1 base station, P-P, and P-MP equipment

Offset frequency from the edge of the frequency block group (MHz)	Non-AAS e.i.r.p. (dBm/5 MHz)* Per single antenna connector	AAS TRP (dBm/5 MHz) * Per cell
0-5	Min {(e.i.r.p. _{max} - 40), 21}	Min {(TRP _{max} - 40), 16}
5-10	Min {(e.i.r.p. _{max} - 43), 15}	Min {(TRP _{max} - 43), 12}
>10	Min {(e.i.r.p. _{max} - 43), 13}	Min {(TRP _{max} - 43), 1}

* e.i.r.p._{max} and TRP_{max} are expressed in dBm

Table 3: Unwanted emission limits for Type 2 base station, P-P and P-MP equipment

Non-AAS e.i.r.p. (dBm/5 MHz) Per cell	AAS TRP (dBm/5 MHz) Per cell
-34	-43

8.7.2 Unwanted emission limits for indoor base station equipment

Indoor base station equipment shall have the TRP (per cell) or conducted power (per single antenna connector), where applicable, of unwanted emission outside the frequency block group not exceeding the following limits, as shown in table 4.

Table 4: Unwanted emission limits for indoor base station equipment

Offset frequency from the edge of the frequency block group (MHz)	Unwanted emission limits (dBm/MHz)
0-5	-20 - (1.4)(Offset frequency)
5-10	-27

8.7.3 Unwanted emission limits for subscriber equipment

Subscriber equipment shall have the TRP (per cell) or conducted power (per single antenna connector), where applicable, of unwanted emission outside the frequency block group not exceeding the following, where B is the frequency block group in MHz as shown in table 5.

Table 5: Unwanted emission limits for subscriber equipment

Frequency block group (B)	Offset frequency from the edge of the frequency block group (MHz)			
	0-1	1-5	5-B	>B
10 MHz, 20MHz, 30 MHz and 40 MHz	-13 dBm/1% of B	-10 dBm/MHz	-13 dBm/MHz	-25 dBm/MHz
> 40 MHz	-24 dBm/30 kHz	-10 dBm/MHz	-13 dBm/MHz	-25 dBm/MHz

8.7.4 Out-of-frequency band unwanted emission limits for outdoor base station, P-P and P-MP equipment

Notwithstanding the above limits in 8.7.1, the unwanted emissions shall not exceed:

- a. the limits in table 6 for frequencies below 3450 MHz and above 3650 MHz
- b. -13 dBm TRP /MHz (per cell) or conducted power (all antenna connectors), where applicable, for all frequencies below 3400 MHz and above 3690 MHz.

Table 6: Out-of-frequency band unwanted emission limits for outdoor base station, P-P and P-MP equipment

Frequency range (MHz)	Non-AAS e.i.r.p limit (dBm/5 MHz)* Per single antenna connector	AAS TRP limit (dBm/5 MHz)* Per cell
3650-3655; 3450-3445	Min {(e.i.r.p _{max} - 40), 21}	Min {(TRP _{max} - 40), 16}
3655-3660; 3445-3440	Min {(e.i.r.p _{max} - 43), 15}	Min {(TRP _{max} - 43), 12}
3660-3690; 3440-3400	Min {(e.i.r.p _{max} - 43), 13}	Min {(TRP _{max} - 43), 1}

* e.i.r.p_{max} and TRP_{max} are expressed in dBm

8.7.5 Out-of-frequency band unwanted emission limits for subscriber equipment and indoor base station equipment

Notwithstanding the above limits in 8.7.2 and 8.7.3, the TRP (per cell) or conducted power (per single antenna connector), where applicable, for the unwanted emissions shall not exceed:

- a. for subscriber equipment: -30 dBm/MHz in the frequency range greater than (B+5) MHz from the edge of the frequency band, where B is the frequency block group in MHz
- b. for indoor base station equipment: -30 dBm/MHz for frequencies below 3440 MHz and above 3660 MHz.

9. Test report requirement

In addition to the reporting requirements set forth in RSS-Gen, [*General Requirements for Compliance of Radio Apparatus*](#) the test report shall include the type of outdoor base station, P-P and P-MP equipment being certified (i.e. Type 1 or Type 2).

10. Labelling requirement

Indoor base station equipment shall be labelled on the equipment or a statement shall be included in the user manual using the following text “For indoor use only”.