IEEE P802.15
Wireless Personal Area Networks

Project	IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)		
Title	**Regulatory Requirements**		
Date Submitted	[18 January 2006]		
Source	[Abbie Mathew] [NewLANS, Inc.] [238 Littleton Road, Westford, MA 1886, U.S.A.]	Voice: Fax: E-mail:	[+1-617-283-1363] [+1-978-692-1619] [amathew@newlans.com]
Re:	[]		
Abstract	[]		
Purpose	[]		
Notice	This document has been prepared to assist the IEEE P802.15. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.		
Release	The contributor acknowledges and accepts that this contribution becomes the property of IEEE and may be made publicly available by P802.15.		

Table of Content

This page intentionally blank

Introduction

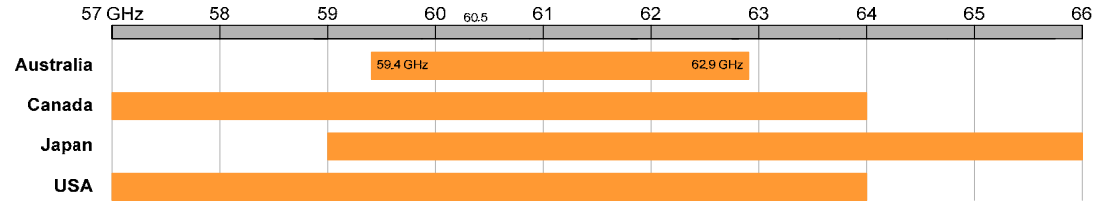
Purpose

The purpose of this document is to provide a convenient reference to the regulatory requirements in Australia, Canada, Japan and the United States. In case of conflict between this document and the regulatory documents in any of the mentioned countries, the latter shall prevail. This document does not replace the regulatory documents listed below.

	Region	Regulatory Document
1	Australia	Radiocommunications Class License 2000
2	Canada	RSS-210, Issue 6, September 2005
3	Japan	Regulations for Enforcement of the Radio Law 6-4-2 Specified Low Power Radio Station (11) 59-66 GHz band
4	USA	CFR Title 47 Part 15.255

Frequency Allocation

Shown below are the frequency allocations in the regions specified in the earlier paragraph.



Point of Contact

Listed below is the point of contact for each region. Queries and clarifications may be directed to them.

	Region	Contacts	Email
1	Australia	Tony Pollock	tony.pollock@nicta.com.au
2	Canada	Abbie Mathew	amathew@newlans.com
3	Germany	Günter Kleindl	guenter.kleindl@siemens.com
4	Japan	Hideto Ikeda	ikeda637@oki.com
5	USA	Abbie Mathew	amathew@newlans.com

Australian Regulatory Requirements

This section briefly describes pertinent contents in Radiocommunications Class License 2000.

1. **Regulatory Documents**

   Radiocommunications Class License 2000

2. **Harmonization**

   None

3. **Frequency**

   59.4 GHz to 62.9 GHz[1]

4. **Product Classification**

   [need info]

5. **Output Power**

   (i) 10 mW (+10 dBm) maximum total peak transmitter power into the antenna
   (ii) 150 W (+51.8 dBm) peak maximum EIRP

6. **Peak Transmitter Output Power**

   See paragraph 5 above.

7. **Transmitter Spurious Emissions**

   [need info]

8. **Receiver Spurious Emissions**

   [need info]

9. **RF Radiation Exposure**

   Not Applicable

[1] Page 13 in Radiocommunications Class License 2000

Canadian Regulatory Requirements

This section briefly describes pertinent contents in RSS-210, Issue 6, September 2005, and in other documents.

1. **Regulatory Documents**

   (i) RSS-210, Issue 6, September 2005
   (ii) RSS-Gen, Issue 1, September 2005

2. **Harmonization**

   Canadian and US regulatory requirements are harmonized.

3. **Frequency**[2]

   The operating frequency range is 57.05 GHz to 64 GHz. Note that 57.00 to 57.05 GHz is *reserved exclusively for a publicly-accessible coordination channel*.

4. **Product Classification**

   Classified as Category I equipment, which means that the equipment requires certification from Industry Canada.[3]

5. **Output Power**[4]

Average Power Density	≤ 9 μW/cm^2 at 3 m from the antenna aperture
Peak Power Density	≤ 18 μW/cm^2 at 3 m from the antenna aperture

   Note

   (i) Conducted or radiated measurements are acceptable.[5]
   (ii) Average power density of 9 μW/cm^2 and 18 μW/cm^2 described above translates to an EIPR of 40 dBm and 43 dBm respectively – refer to APPENDIX - A

6. **Peak Transmitter Output Power**[6]

   Total peak transmitter output power shall not exceed 500 mW, assuming that the emission bandwidth is equal to or greater than 100 MHz.

[2] Paragraph A13.2.1 and A13.2.2 (ii) in RSS-210
[3] Paragraph 2.1.1 in RSS-Gen
[4] Paragraph A13.2.2 (i) in RSS-210
[5] Paragraph 4.6 in RSS-Gen
[6] Paragraph A13.2.3 in RSS-210

7. **Transmitter Spurious Emissions**[7]

Maximum power density of any emissions outside the 57 GHz to 64 GHz band shall consist of only spurious emissions.

Frequency	Field Strength / Power Density	Measurement Distance
0.009 MHz to 0.49 MHz	$2400/F_{MHz}$ µV/meter	300 meters
0.49 MHz to 1.705		30 meters
1.705 MHz to 30.0 MHz	30 µV/meter	30 meters
30 MHz to 88 MHz	100 µV/meter	3 meters
88 MHz to 216 MHz	150 µV/meter	
216 MHz to 960 MHz	200 µV/meter	
960 MHz to 40 GHz	500 µV/meter	
40 GHz to 57 GHz	90 pW/cm^2	
64 GHz to 200 GHz		

Note

(i) Emissions up to fifth harmonic of the highest operating frequency shall be measured.[8]
(ii) Measurement with RF detector with detection bandwidth of 57 to 64 GHz and video bandwidth of 10 MHz minimum or equivalent.[9]
(iii) Conducted measurement only permitted above 40 GHz, provided the antenna characteristics are accurately determined.[10]

8. **Receiver Spurious Emissions**[11]

Any one of the measurements is acceptable.

(i) Conducted Measurements (with antenna)

- Spurious emissions ≤ 2 nW at any discrete frequency from 30 to 1000 MHz
- Spurious emissions ≤ 5 nW at any discrete frequency above 1 GHz

(ii) Radiated Measurement

Spurious Frequency MHz	**Field Strength** µV/m at 3 meters
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500

[7] Paragraph A13.2.2 (ii) in RSS-210
[8] Paragraph A13.2.4(i) in RSS-210
[9] Paragraph A13.2.4 (ii) in RSS-210
[10] Paragraph A13.2.4 (iii) in RSS-210
[11] Paragraph 2.3 in RSS-210, paragraph 6 in PSS-210 and paragraph 7.2.3 in RSS-Gen

9. **RF Radiation Exposure**

[Left intentionally blank]

10. **Transmitter Identification**[12]

Within any one second interval of signal transmission, each transmitter with a peak output power equal to or greater than 0.1 mW or a peak power density equal to or greater than 3 nW/cm^2, as measured 3 meters from the radiating structure, must transmit a transmitter identification at least once. Each application for equipment authorization for equipment that will be used inside of a building must declare that the equipment contains the required transmitter identification feature and must specify a method whereby interested parties can obtain sufficient information, at no cost, to enable them to fully detect and decode this transmitter identification information. Upon the completion of decoding, the transmitter identification data block must provide the following fields:

- Industry Canada certification number, which shall be programmed at the factory.
- Manufacturer's serial number, which shall be programmed at the factory.
- Provision for at least 24 bytes of data relevant to the specific device, which shall be field programmable.

[12] Paragraph A13.2.7 in RSS-210

German Regulatory Requirements

This page intentionally blank

Japanese Regulatory Requirements

This section briefly describes pertinent contents in Regulations for Enforcement of the Radio Law 6-4-2 Specified Low Power Radio Station, (11) 59-66 GHz band.

1. **Regulatory Documents**

   Regulations for Enforcement of the Radio Law, 6-4-2 Specified Low Power Radio Station, (11) 59-66 GHz band

2. **Harmonization**

   None

3. **Frequency**

   (i) 59.0 GHz to 66.0 GHz
   (ii) 2.5 GHz maximum occupied bandwidth

4. **Product Classification**

   Specified Low Power Radio Station

5. **Output Power**

   (i) 10 mW (+10 dBm) maximum total peak transmitter power into the antenna
   (ii) 47 dBi maximum antenna gain
   (iii) +50%, -70% maximum output power deviation tolerance over temperature and time

6. **Peak Transmitter Output Power**

   See paragraph 5 above.

7. **Transmitter Spurious Emissions**

   100 μW maximum, out-of-band

8. **Receiver Spurious Emissions**

   100 μW maximum, inband and out-of-band

9. **RF Radiation Exposure**

   Not applicable

South Korean Regulatory Requirements

This page intentionally blank
South Korean frequency allocation will be released in early 2006

US Regulatory Requirements

This section summarizes the US regulatory requirements in Part 15.255.

1. **Regulatory Document**

   (i) CFR Title 47 Part 15.255
   (ii) CFR Title 47 Part 15.209

2. **Harmonization**

   Canadian and US regulatory requirements are harmonized.

3. **Operating Frequency**

   57.05 GHz to 64 GHz. *57 GHz to 57.05 GHz is reserved exclusively for a publicly-accessible coordination channel*.[13]

4. **Product Classification**

   Part 15 device that requires certification from the FCC

5. **Output Power**[14]

Average Power Density	≤ 9 μW/cm^2 at 3 m from the antenna aperture
Peak Power Density	≤ 18 μW/cm^2 at 3 m from the antenna aperture

   Note

   (i) Measurement with RF detector with detection bandwidth of 57 to 64 GHz and video bandwidth of 10 MHz or equivalent.[15].

   (ii) The fundamental emissions must be contained from 57.05 to 64 GHZ during all condition of operation. Equipment is presumed to operate over the temperature range -20º C to +50º C with an input voltage variation of 85% to 115% of rated input voltage, unless justification is presented to demonstrate otherwise.[16]

   (iii) Average power density of 9 μW/cm^2 and 18 μW/cm^2 described above translates to an EIPR of 40 dBm and 43 dBm respectively.– refer to APPENDIX – A. This assumes that 3 m is in the far field.

6. **Peak Transmitter Output Power**[17]

   500 mW maximum, assuming that the emission bandwidth[18] is equal to or greater than 100 MHz.

[13] Paragraph (d) in §15.255.
[14] Paragraph (b)(1) in §15.255.
[15] Paragraph (b)(4) in §15.255.
[16] Paragraph (f) §15.255.
[17] Paragraph (e) §15.255.
[18] 'Emission bandwidth' is defined in paragraph (e)(1) in §15.255. The definition is as follows. It is the instantaneous frequency range occupied by a steady state radiated signal with modulation, outside which

Note

- Measurement with RF detector with detection bandwidth of 57 to 64 GHz and video bandwidth of 10 MHz minimum or equivalent.[19].

7. **Transmitter Spurious Emissions**

See paragraph 8 below

8. **Receiver Spurious Emissions**[20]

Power density of any emissions outside the 57 GHz to 64 GHz band shall consist of only spurious emissions.

Frequency	Field Strength / Power Density	Measurement Distance
0.009 MHz to 0.49 MHz	$2400/F_{MHz}$ µV/meter	300 meters
0.49 MHz to 1.705		30 meters
1.705 MHz to 30.0 MHz	30 µV/meter	30 meters
30 MHz to 88 MHz	100 µV/meter	3 meters
88 MHz to 216 MHz	150 µV/meter	
216 MHz to 960 MHz	200 µV/meter	
960 MHz to 40 GHz	500 µV/meter	
40 GHz to 57 GHz	90 pW/cm^2	
64 GHz to 200 GHz		

Note

- Level of unwanted emission shall not exceed the level of the fundamental frequency.[21]
- Above specifications must be met over the operating temperature range with an input voltage variation of 85% to 115% of rated input voltage.
- Measurement distance assumes far field.

9. **RF Radiation Exposure**

[Left intentionally blank]

10. **Transmitter Identification**[22]

Within any one second interval of signal transmission, each transmitter with a peak output power equal to or greater than 0.1 mW or a peak power density equal to or greater

the radiated power spectral density never exceeds 6 dB below the maximum radiated power spectral density in the band, as measured with a 100 KHz resolution bandwidth spectrum analyzer.

[19] Paragraph (e)(2) in §15.255

[20] Paragraph (c)(2) in §15.255, parapraph (c)(3) in §15.255, and §15.209

[21] Paragraph (c)(4) in §15.255

[22] Paragraph (i) in §15.255

than 3 nW/cm^2, as measured 3 meters from the radiating structure, must transmit a transmitter identification at least once. Each application for equipment authorization for equipment that will be used inside of a building must declare that the equipment contains the required transmitter identification feature and must specify a method whereby interested parties can obtain sufficient information, at no cost, to enable them to fully detect and decode this transmitter identification information. Upon the completion of decoding, the transmitter identification data block must provide the following fields:

- FCC Identifier, which shall be programmed at the factory.
- Manufacturer's serial number, which shall be programmed at the factory.
- Provision for at least 24 bytes of data relevant to the specific device, which shall be field programmable.

APPENDIX - A

Power density *S* at a distance *R* from a radiating structure is given by the equation below.

$S = \frac{P_T G}{4\pi R^2}$ where P_T is the power into an antenna with gain *G* and *R* is the far field distance

Paragraphs A13.2.2(i) in RSS-210[23] and (b)(1) in §15.255[24] specify average power density at 9 μW/cm^2 at 3 m from the radiating structure.

$\therefore S = 9\mu W/cm^2 = 9\times10^{-3} mW/cm^2$

$\therefore R = 3m = 300\,cm$

$$9\times10^{-3} = \frac{P_T G}{4\pi\left(300^2\right)} = \frac{P_T G}{1130973.36}$$

$\therefore P_T G = 10178.76$

$\therefore 10Log_{10}\left(P_T G\right) = 40\,dBm$

$\therefore P_{T\,dBm} + G_{dBi} = 40\,dBm$ at average power density of 9 μW/cm^2 at 3 m from the antenna

Also $P_{T\,dBm} + G_{dBi} = 43\,dBm$ at peak power density of 18 μW/cm^2 at 3 m from the antenna

[23] Canadian regulatory document
[24] US regulatory document

This page intentionally blank