Project	**IEEE 802.16 Broadband Wireless Access Working Group**	
Title	**Proposed Changes to the BWA Coexistence Working Document IEEE 802.16c-99/02r1**	
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Source	Andy McGregor Nortel Networks PO Box 3511, Station C Ottawa, Ontario, K1Y 4H7, Canada	Voice: 613-763-7942 Fax: 613-765-5598 Email: mcgregor@nortelnetworks.com
Re:	This proposes some revisions to Working Document IEEE 802.16c-99/02r1	
Abstract	Working Document IEEE 802.16c-99/02r1 is, in part, based on text extracted from a draft Canadian standard RSS-191. The working document has some editorial errors in the text extracted and the draft Canadian standard has been revised. Based on this, some revisions to the Working Document are proposed.	
Purpose	This contribution proposes revisions to Working Document IEEE 802.16c-99/02r1.	
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Proposed Changes to the BWA Coexistence Working Document IEEE 802.16c-99/02r1

Section 3.1.2.3.1.1 was based on an earlier version of draft Canadian specification RSS-191. In extracting the text from draft RSS-191, some references to other sections of RSS-191 were accidentally left in place and need to be corrected in the working document. Draft RSS-191 has also undergone further revision and it is suggested that these changes also be considered for the next revision of the IEEE Coexistence Working Document IEEE 802.16c-99/02r1. The following text shows the explicit changes being proposed.

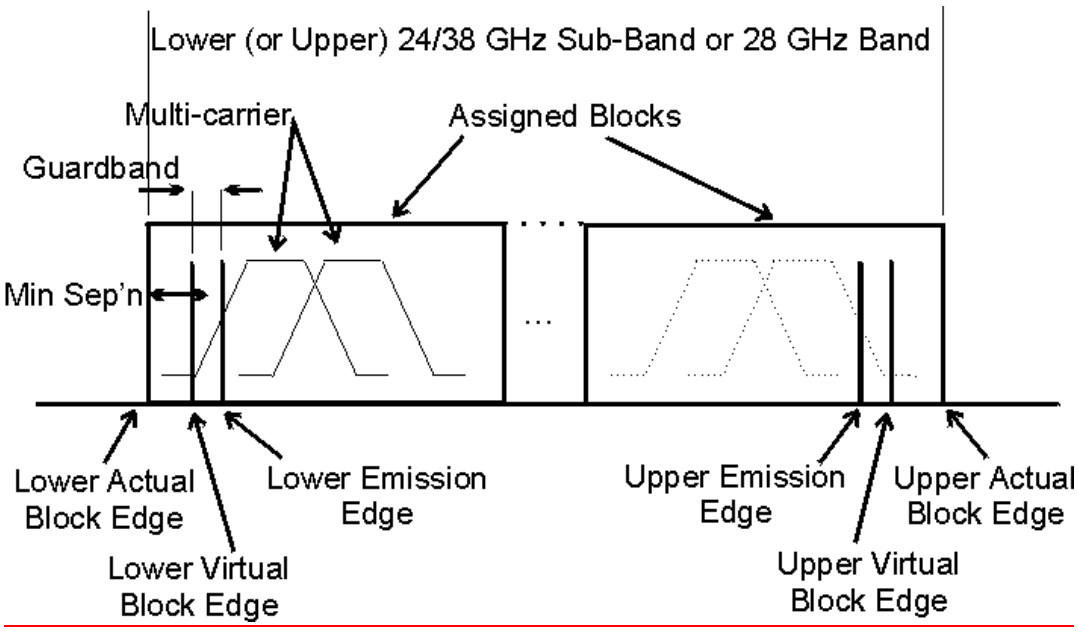
3.1.2.3.1.1 Unwanted emissions

Unwanted emissions comprise of out-of-band emissions (emission on a frequency or frequencies immediately outside the *occupied* bandwidth), spurious emissions and harmonics. They are to be measured when the transmitter is operating at the manufacturer's rated power and modulated with signals representative of those encountered in a real system operation ~~as in section 6.2~~. Unwanted emissions are to be measured at the output of the final amplifier stage or referenced to that point. The measurement can be done at the transmitter's antenna connector as long as there is no frequency combiner in the equipment under test. It is important however that the point of measurement for this test be the same as the one used for the output power test. The point of measurement and the ~~The~~ *occupied* bandwidth (B_o) shall be stated in the test report by the certification applicant.

Single-carrier and multi-carrier tests are described below. If multicarrier operations are intended, then both tests are required.

Single carrier and multi-carrier tests are to be carried out relative to a virtual block edge (defined in the following table). The virtual block edge is located within the assigned band (see diagram below). When a transmitter is designed to only operate in part of a band (e.g. because of Frequency Duplexing), the virtual block edge shall be inside the designed band of operation. The occupied bandwidth of the carrier(s) must be closer to the centre of the block than the virtual block edge. The virtual block edge is only to be used for testing and does not impact an actual implementation in any way. One virtual block edge (at frequency f_{VL}) shall be inside the lower edge of the designed or assigned band and the other virtual block edge (at frequency f_{VU}) shall be inside the upper edge of the designed or assigned band.

Band	Minimum Separation between Actual and Virtual Block Edge
24 GHz	10 MHz
28 GHz	40 MHz
38 GHz	10 MHz



The purpose of specifying the tests relative to the virtual block edges is to avoid the attenuating effects of any RF filters that may be included in the transmitter design, so that the spectrum masks of section 3.1.2.3.1.1.3 are applicable to any channel block.

Note that although testing is specified relative to the virtual block edges, the transmitter is expected to perform similarly for all frequencies within the designed band. Therefore, to reduce the number of test runs, the Lower Virtual Block Edge can be in one assigned band and the Upper Virtual Block Edge can be in another assigned band.

3.1.2.3.1.1.1 Single carrier test

For testing nearest the lower virtual block edge, set the carrier frequency f_L closest to the lower virtual block edge, taking into account any guardband used in the design of the equipment, record the carrier frequency f_L, the virtual block edge frequency f_{VL}, the guardband (f_{LG}) and plot the RF spectrum. Likewise, perform the highest frequency test with the carrier frequency, f_U nearest the upper virtual block edge. Record the carrier frequency, the virtual block edge frequency (f_{VU}), the guardband (f_{UG}) and the RF spectrum plot. The guardband is the frequency separation between the virtual block edge and the edge (99%) of the occupied emission.

The user manual shall contain instructions, such as details on the minimum guardband sizes required to ensure that the radios remain compliant to the certification process.

It is to be noted that the regulations permit licensees to have more than one frequency block for their systems. Equipment intended to have an occupied bandwidth wider than one frequency block per carrier shall be tested using such a wideband test signal for the section 3.1.2.3.1.1.3(1) requirement.

~~For the 24 GHz band, testing shall be performed at either blocks B and D or B' and D', depending upon which sub-band the transmitter under test is designed to operate. Likewise, for the 38 GHz band, testing shall be performed at either blocks B and M or B' and M'.~~

~~The purpose of specifying the tests at the inner blocks (e.g. block B and not A) is to avoid the attenuating effects of any RF filters that may be included in the transmitter design. Note that although testing is specified for only two blocks (to reduce the number of test runs required) the transmitter is expected to perform similarly for all remaining blocks within the assigned band.~~

~~For testing in block B (B'), set the carrier frequency close to the bottom edge, f_L, of block B (B'), record f_L and plot the RF spectrum. Likewise, perform the highest frequency test of block D (D') (in the case of 24 GHz) or block M (M') (in the case of 38 GHz) with the carrier frequency near the upper edge, f_U, of the block.~~

~~It is to be noted that the SRSPs permit licensees to have more than one frequency block (Tables 1 and 3) for their systems. Equipment intended to have an occupied bandwidth wider than one frequency block per carrier shall be tested using such a wideband test signal for the section 6.3.3(1) requirement.~~

~~For the 28 GHz band (25.35-28.35 GHz), the single carrier test is performed in a similar manner as above, with the exception that, for test purposes, the lower and upper edges of the carrier must be offset a minimum of 40 MHz from the lower and upper edges of the assigned band. The purpose of the 40 MHz minimum offset is to avoid the attenuating effects of any RF filters.~~

3.1.2.3.1.1.2 Multi-carrier test

This test is applicable for multi-carrier modulation. It applies equally to multi-transmitters into a common power amplifier. Note that the multi-carrier transmitter must be subjected to the single carrier testing, described above, in addition to the tests specified below.

For multi-carrier testing, the single carrier test method of ~~6.3~~3.1.2.3.1.1.1 ~~can~~ is to be used except that the single carrier is replaced by a multi-carrier modulated signal that is representative of an actual transmitter. The number of carriers should be representative of the maximum number expected from the transmitter, and be grouped side by side nearest the lower virtual block edge ~~near the lower end of the assigned band (in the case of the 28 GHz band) or block B (in the case of the 24 and 38 GHz bands)~~, with lower guardband~~s~~, f_{LG} ~~and f_{UG} (lower and upper guardband respectively)~~, if required by the design of the equipment. Likewise test nearest the upper virtual block edge ~~of the assigned band or top blocks (D' or M')~~. Record their spectrum plots, the number of carriers used and the guardband sizes (f_{LG}, f_{UG}), the carrier frequencies and the virtual block edge frequencies. ~~The guardband is the frequency separation between the edge of the assigned band and the edge of the occupied emission.~~

Notwithstanding the requirements in the table above in section 3.1.2.3.1.1 "Minimum Separation between Actual and Virtual Block Edge", any equipment which uses the complete block or multiple blocks for a single licensee can include the attenuating effect of any RF filters in the transmitter design within the multi-carrier test , in which case the Virtual and Actual block edge frequencies will be the same.

The user manual shall contain instructions, such as details on the minimum guardband sizes required and the maximum number of carriers or multi-transmitters permitted, to ensure that the radios remain compliant to the certification process.

3.1.2.3.1.1.3 Minimum Standard

Unwanted emissions spectral density shall be attenuated by at least A (dB) below the total mean output power as follows:

(1) For a single carrier transmitter (see section 3.1.2.3.1.1.1) :

In any 1.0 MHz reference bandwidth, outside the ~~assigned band/channel~~virtual block edge, and removed from the ~~identified~~ virtual block edge frequency ~~of the occupied emission~~ by up to and including ±200% of the occupied bandwidth (i.e. 2 B_o): at least $A = 11 + 40\ f_{offset}/B_o + 10\ \log_{10}(B_o)$, dB, where B_o is in MHz and f_{offset} = frequency offset (in MHz) from the virtual block edge ~~of the occupied bandwidth~~. Attenuation greater than $56 + 10\ \log_{10}(B_o)$ dB, or to an absolute level lower than -43 dBW/MHz, is not required. For emissions in which the occupied bandwidth is less than 1 MHz, the required attenuation is to be calculated using $A = 11 + 40\ f_{offset}/B_o$ dB.

(2) For a multi-carrier transmitter or multi-transmitters into a common final stage amplifier (see section 3.1.2.3.1.1.2):

The mask is to be the same as in (1), using the *occupied* bandwidth that is defined for multi-carrier transmitters in section 3.1.2.3.1.1~~5.6.1~~. The total mean power is to be the sum of the individual carrier/transmitter powers. Guardbands if used in the equipment design must also be used in testing the spectrum mask.

Note: Several transmitters into a common non-active antenna cannot use the multi-carrier mask for the composite signal. In this case the appropriate mask applies to the individual transmitter.

(3) In any 1.0 MHz band which is removed from the identified edge frequency by more than ±200% of the occupied bandwidth : at least $43 + 10\ \log_{10}(P_{mean})$ dB (i.e. –43 dBW), or 80 dB below P_{mean}, whichever is less stringent. P_{mean} is the mean output power of the transmitter (or, in the case of multi-carriers/multi-transmitters, the sum of the individual carrier/transmitter powers) in watts.

The search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate or carrier frequency), or

from 30 MHz, whichever is the lowest frequency, to the 5th harmonic of the highest frequency generated or used, without exceeding 40 GHz.