Document under Review: P802.16.2a/D5-2003 **Ballot Number:** 0000475 **Comment Date**

Comment # 116 **Comment submitted by:** Arthur Light Member 2003/02/21

Comment **Type** Technical **Starting Page #** Gen **Starting Line #** **Fig/Table#** **Section**

Contrary to the comment of Bruce Barrow, the term "dBW/MHz" is both mathetically correct and defensible in that it is defined in several electrical engineering dictionaries; whereas, Mr. Barrow's new term "dBW in 1 MHz" is undefined and incorrect. The term "dBW/MHz" when used to refer to noise or noise-like signals, which have a large frequency occupancy a compared to the bandwidth of the receiver of interest properly refers to the amount of power (W) of the signal/noise in 1 MHz as seen by the receiver. If the signal is truly noise-like, the noise power seen by a receiver of a different bandwidth will vary as the ratio of the receiver bandwidths (10 dB/decade or 3 dB/octave). Under these conditions, the term "dBW/MHz" is perfectly correct. If the interfering signal does not vary as described above, referring to that signal as having noise like characteristics is inaccurate, although as indicated by Mr. Barrow frequently incorrectly used. If a signal is coherent, its power in a receiver bandwidth will not vary as the ratio of receiver bandwidths and the term "dBW/MHz" should not be applied to it. The problemis that many people want to use the term indiscriminately, not that the term has no meaning. The term "dBW in 1 MHz" does not have any meaning and is not defined in section 3.1. The implication is that the signal exists in some 1 MHz but there is no indication about the signal's existance or nature in any other 1 MHz. This solution is worst than the originally perceived problem.

Suggested Remedy

Return to the use of "dBW/MHz," but takes some pains to clarify the difference between a noise-like signal in the measurement bandwidth to which the term properly applies and a non-noise-like signal which is present in a measured 1 MHz of spectrum.

Proposed Resolution **Recommendation:** **Recommendation by**

Reason for Recommendation

Resolution of Group **Decision of Group:**

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Comment # 117 **Comment submitted by:** Arthur Light 2003/02/21

Comment Type Editorial **Starting Page #** 7 **Starting Line #** **Fig/Table#** **Section** 3.2

The term dBW is not defined in section 3.2 Abbreviations

Suggested Remedy

In section 3.2 add definition: dBW -- Decibels with respect to 1 Watt

Proposed Resolution **Recommendation:** **Recommendation by**

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Comment # 118 **Comment submitted by:** Arthur Light 2003/02/21

Comment Type Editorial **Starting Page #** 7 **Starting Line #** 26 **Fig/Table#** **Section** 3.2

The term "dBW/MHz" is not defined in section 3.2

Suggested Remedy

In section 3.2 add definition: dBW/MHz -- Decibels with respect to 1 Watt as measured in a 1 MHz bandwidth

Proposed Resolution **Recommendation:** **Recommendation by**

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Comment # 119 **Comment submitted by:** Arthur Light 2003/02/21

Comment Type Editorial **Starting Page #** 7 **Starting Line #** 26 **Fig/Table#** **Section** 3.2

The definition of "dBi" in section 3.2 is incorrect

Suggested Remedy

Change definition of dBi to read -- "decibels relative to a hypothetical isotropic antenna. This term refers to the gain of an antenna"

Proposed Resolution **Recommendation:** **Recommendation by**

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Comment # 120 **Comment submitted by:** Arthur Light 2003/02/21

Comment Type Technical **Starting Page #** 12 **Starting Line #** 33 **Fig/Table#** **Section** 4.2.2

The following portion of section 4.2.2 -- "For example, consider a receiver with 6 dB noise figure. The receiver thermal noise is -138 dBW in 1 MHz. Interference of -138 dBW in 1 MHz would double the total noise, or degrade the link budget by 3 dB. Interference of -144 dBW in 1 MHz, 6 dB below the receiver thermal noise, would increase the total noise by 1 dB to -137 dBw in 1 MHz, degrading the link budget by 1 dB." This section is more incorrect than the problem with dBW/MHz, which would also be misused in this particular case.

Suggested Remedy

A better solution would be to rewrite this part as -- "For example consider a receiver with a 1 MHz bandwidth and a 6 dB noise figure. At a standard room temperature of 27 degrees Celcius, or 300 Kelvins, the background thermal noise as defined by the product of Boltzmann's constant (k = 1.38 x 10-23 Ws/K), the Kelvin temperature (T = 300K), and the receiver bandwiidth (B = 1 MHz) is 4.15 x 10-15 W, or -144 dBW. The 6 db noise figure is equivalent to multiplying the thermal noise by a factor of four (4), thus raising the receiver's internal noise to 16.56 x 10-15 W. An interfering signal of -138 dBW (16.56 x 10-15 W) in the receiver's passband will raise the receiver noise to (16.56 x 10-15 W + 16.56 x 10-15 W = 33.12 x 10-15 W) -135 dBW or an increase of 3 dB. However, an interfering signal in the receiver's passband at the thermal noise floor of -144 dBW will increase the receiver noise to (16.56 x 10-15 W +4.15 x 10-15 W = 20.71 x 10-15 W) -137 dBW or an increase of 1 dB. Thus an inband interferrer at the thermal noise floor will degrade the receiver by 1 dB and an inband interferrer at the receiver's noise floor will degrade the receiver's sensitivity by 3 dB." In most of the other places within the document where "dBW in 1 MHz" has been substituted for "dBW/MHz," the new term has no meaning and cannot be adjusted for receivers with bandwidths other than 1 MHz; whereas, "dBW/MHz" does have mathematical meaning and can be mathematically adjusted to apply to a receiver of any bandwidth.

Proposed Resolution **Recommendation:** **Recommendation by**

Reason for Recommendation

Resolution of Group **Decision of Group:**

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