IEEE P802.11
Wireless LANs

|  |
| --- |
| Spectrum Mask Descriptor Examples |
| Date: 2011-09-25 |
| Author(s): |
| Name | Company | Address | Phone | Email |
| Peter Ecclesine  | Cisco | 170 W. Tasman Dr., MS SJ-14-4, San Jose, CA 95134  | +1 408 527 0815 | pecclesi@cisco.com  |

Abstract

This document presents the spectrum mask descriptor in TLV format in worked examples to address the development of regulations regarding unlicensed operation in TV bands, especially in UK.

Changes in 802.11-11/1349r1: After discussion in Jacksonville of 11-11/1624r0 Representation of Transmitter Characteristics, especially slides 9, 10 and 11, this submission extends the alternative transmit mask representation of slides 9 and 10 by changing the frequency representation to units of 125 kHz. This submission proposes modifications to P802.11af\_D1.06.

Changes in 802.11-11/1349r2: change units of frequency to 100 kHz.

## Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGaf Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGaf Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGaf Editor: Editing instructions preceded by “TGaf Editor” are instructions to the TGaf editor to modify existing material in the TGaf draft. As a result of adopting the changes, the TGaf editor will execute the instructions rather than copy them to the TGaf Draft.***

**Discussion**

The ECC Report 159 Section 9.3.3 Technical information to be communicated to the geo-location database stated "*Providing information about the type of device, such as the device class will allow information to be returned according to device capabilities and interference characteristics. The database could then take into account its known transmission parameters in returning appropriate frequencies and allowed maximum transmission power. Different classes of devices, with different technical characteristics, can exhibit different interference characteristics (e.g. antenna type, antenna height, type of technology and modulation) allowing different EIRP limits. For example, devices classes which would have good out-of-band emission characteristics might be able to transmit with higher power levels on some frequencies and/or locations. Defining device classes and their characteristics is a topic for standardization.*"

This allows the database (or its proxy if allowed by regulation) to generate a tailored list of available channels based on the device's spectrum mask. Thus, spectrum mask information may be provided to the database.

In OFCOM "Implementing Geolocation--Summary of consultation responses and next steps" published in Sep. 1, 2011, it says

"*3.31 Compliance with the R&TTE Directive and related issues. One respondent commented on our approach towards the emissions mask where there are no “hard” values set in the specification. Instead, manufacturers are required to supply, or otherwise refer to, typical masks for each device type which are then taken into account by the database algorithms. The respondent felt this would not work because manufacturers cannot be obliged to provide such a mask and there is no way to check that what they provide is accurate.*

*3.32 We have considered this point and agree that we cannot oblige manufacturers to provide a mask. However, we do not believe that such action will be necessary. It is our belief that manufacturers will be incentivised to provide accurate device masks on a voluntary basis as the most efficient way to ensure that their devices have access white space spectrum.*"

To address this OFCOM approach and to make the 11af standard more suitable for assessing interference to protected services, we allow the devices to give their spectrum mask information as defined in the TLV format called Spectrum Mask Descriptor.

The transmit spectral mask is created and applied as shown in Figure 1 about the channel center frequency

(Fc). The 0 dBr level is the maximum power spectral density measured in the 26 dB occupied bandwidth of the channel. The measurements of transmit spectral density are made using a 100 kHz resolution bandwidth and a 30 kHz video bandwidth.

Note that the emission bandwidth of OFDM modulated signal under FCC part-15 subpart E is determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier.

**8.2.6 TLV Values**

**8.2.6.1.3 Spectrum Mask Descriptor**

***TGaf Editor: change Spectrum Mask Descriptor entry as follows:***

This parameter describes the spectrum masks used for devices. The Spectrum Mask Descriptor is shown in Table 8-14e (Spectrum Mask Descriptor definition) and Table 8-14f (TX Characteristics value fields) ~~and Table 8-14f (Spectrum Mask Descriptor value fields)~~.

Table 8-14m – Spectrum Mask Descriptor definition

|  |  |  |  |
| --- | --- | --- | --- |
| **Type** | **Length** | **Value** | **Scope** |
| <ANA> | *variable* | Compound TLVs in Tables 8-14f (TX Characteristics ~~Spectrum Mask Descriptor~~ value fields).  | UK |

***TGaf Editor: delete Table 8-14f and insert Table 8-14f TX Characteristics value fields entries as follows:***

Table 8-14f – TX Characteristics value fields

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Subtype** **(1 octet)** | **Length (octets)** | **Value** | **Scope** |
| Length | 1 | 1 | Length in octets of TX Characteristics value fields. | UK |
| Lowest channel number | 2 | 1 | Lowest channel number with these TX characteristics | UK |
| Highest channel number | 3 | 1 | Highest channel number with these TX characteristics | UK |
| AGain | 4 | 1 | Maximum antenna gain in dBi (signed integer in units of 1 dBi) | UK |
| Spectrum Mask | 5 | variable | The Spectrum Mask field describes the transmit spectrum of a device by giving frequency mask pairs, where frequency is 16-bit unsigned integer number of 100 kHz increments from the center frequency of the RLAN to the minimum offset for the mask value, and mask is an unsigned octet representing power spectral density of the emissions, measured in dB below the maximum output power, of the transmitter at this frequency offset. | UK |

***TGaf Editor: insert text in NOTE as follows:***

NOTE—an example communicating three occupied points at 2.5 MHz/0 dBm, 2.625 MHz/-20 dBm and 3.0 MHz/-35 dBm: <ANA>, 0x27, 0x15, 0x23, 0x02, 0x14, 0x00, 0x15,0xEC, 0x18, 0xDD