Response to public consultation on increasing radiated power limits for license exempt equipment (September 2006)

About Cisco

Cisco is the worldwide leader in networking for the Internet. Since the company invented the first multi-protocol router in 1984, Cisco has been one of the leaders in the development of IP-based networking technologies. This tradition of IP innovation continues with industry-leading products in the core areas of routing and switching, as well as advanced technologies in areas such as home networking, IP-enabled voice, optical, network security, storage networking and wireless LAN.

General Comments

Cisco applauds Ofcom's initiative to examine options for liberalization of the radio regulations for the 2.4GHz and 5 GHz License Exempt frequency bands. In Cisco's view, the full value of Wireless Local Area Network (WLAN) technology will not be realized until the regulatory requirements for its use match its technical capabilities. While WLAN is a low power technology designed to operate in an environment where the devices must accept interference, the importance of fostering a robust market for broadband services and broadband access should compel administrations to ask whether the rules that have been established for WLAN optimize this technology's contribution toward ubiquitous broadband availability. Cisco therefore thanks Ofcom for initiating this important discussion.

European regulators generally have taken a somewhat conservative view of the power limits that should be applied to WLANs, which means that the geographic reach of the devices is smaller, and data throughput is lower than it might be. Ofcom, and its consultant Scientific Generics, have done an admirable job of attempting to quantify the consumer surplus that could be attributed to a different set of rules that would allow more powerful transmitters to be used. Cisco agrees with the consultation document that increasing power limits available for WLAN in less populated areas, and increasing power limits available for wireless backhaul applications, are very positive steps that will pay productivity dividends to UK enterprises and to the economy generally.

Response to Consultation Questions

Q1: Have all the possible victims of interference been correctly identified and quantified as far as possible?

The report has, for the most part, correctly identified and quantified the possible victims of interference. However, Cisco notes that claims of interference with respect to specific services are based on calculations only and we are concerned that some risks may be overstated. Experience will help settle these risk assessments.

We also believe that experience gained in the use of Dynamic Frequency Selection (DFS) in Europe as well as in the US, provides a firm basis for believing that this technology can be used in the UK to successfully avoid military radars. We look forward to working with the Ministry of Defence on this issue when it takes up further consideration of the power issues at 5 GHz.

Q2: Have the costs and benefits been correctly captured? In particular, are the costs of interference to WLANs appropriately assessed?

The consultation document does a good job of explaining the consumer surplus that could be gained if WLANs are put to more productive use by allowing greater power limits. However, Cisco believes that the report overemphasizes the likelihood of interference to business users. While we do agree that business users in urban areas are most likely to be effected if power limits are increased at 2.4 GHz, we believe the robust nature of the contention-based protocol used in 802.11 technology will resolve most interference concerns as it has in the past.

Unlike analog or standard digital transmissions, 802.11 technology is designed from the beginning to accept interference, and therefore is continuously engaged in re-sending packets whenever packet collision occurs. Given the tremendous speeds that the technology has attained, and the applications that users typically run, it would take a significant concentration of transmitters running packet-intensive applications before a noticeable decline in application performance could be noted.

For example, when 802.11 technologists gather for standards meetings, it is not unusual to have as many as 40 users relying on a single access point. It is unlikely that most businesses, in most office settings, would experience a concentration of usage that would cause system performance degradation.

Q3: Are there any other mechanisms that could be used to restrict device operation to appropriate areas? Of the schemes set out which should be preferred?

In the consultation document, Ofcom requests comment on administrative or technical methods of restricting higher power devices to operation in rural areas. We believe that the report has correctly identified the two principal types of system that can be used to restrict device operation to appropriate areas – database registration and location awareness.

Of these, registration on a database is likely to be the most appropriate solution in the short to medium term. This position should be reviewed as technology evolves. At present, there are some standards committees reviewing location awareness technology for use in other bands, and if adopted, location awareness technology might become more mainstream.

Finally, Cisco notes that both options require a legal definition of the geographic area where higher power is allowed, and that the definition be readily available to manufacturers, integrators, service providers and users.

Q4: Should we move from specifying radiated power to specifying conducted power?

Cisco supports a move to a general regime based on regulating conducted power in relation to antenna gain. Stated differently, we believe the rule should specify maximum conducted power and, if considered necessary, a maximum antenna gain. We prefer this approach because we believe testing a device to maximum conducted power is more accurate and reproduce-able in a test environment.

We believe that such a rule will open up many new and advantageous applications of RLAN technology without causing undue interference. Further we expect that this change will reduce the incidence of illegal use of amplifiers and antennas that occurs today.

Q5: For 2.4GHz which of these options do you favour? Are there other viable options that should be considered? Or should regulations be left unchanged?

In addition, Cisco supports increasing the allowed radiated power for 2450 -2483.5 GHz. We agree that greater power will allow the technology be used to cover more terrain in rural areas less expensively, providing a lower-cost option for broadband. However we are concerned that interference issues may arise from the indiscriminate and uncoordinated deployment of equipment operating at such high power levels. We would therefore support the increase to 10W with the option for geographical limitations and registration requirements as proposed in option 3. More work will be needed to determine the precise details of such requirements based on the quantity and location of likely demand for installed equipment. Experience with the registration for the 5.8GHz band should indicate whether that registration regime is adequate or needs beefing up.

Cisco prefers a system whereby users register their locations in a database that can be used to enable future coordination in the event of interference as opposed to blanket geographical restrictions, though we recognize that geographical restrictions may prove sensible if analysis indicates that all higher power deployments in a particular area would result in an unacceptable risk of interference. As the technology evolves for smart RLAN equipment with a consequent reduction in the risk of interference then consideration could be given to lifting some of the geographical restrictions and/or registration requirements.

Cisco regrets that the Ministry of Defence is unable at this time to analyze higher power levels from 2400- 2450 MHz. We nevertheless endorse the proposed increase in power at 2450-2483.5 MHz in the hope that once the Ministry of Defence can undertake an analysis, power levels at 2400-2450 MHz can also be adjusted upward, allowing a broader array of manufacturers to offer competitive devices for users of the band.

Further, we were surprised by the formulation “10W EIRP (6.7W if conducted power is specified)”. The difference between these values is small whereas the conducted power is very high. This seems in conflict with Ofcom’s desire to keep interference under control. Therefore a more moderate conducted power specification would be

appropriate. 10W is equivalent to 40 dBm – with a 10 dB antenna gain, the maximum allowed conducted power need not exceed 1W. This is far in excess of what portable devices can support and therefore these high levels of conducted power will be used only by access points and point to point bridging applications

In this context, we note that in jurisdictions such as the United States, 2.4GHz devices have been operating at 1W conducted power plus 6 dB antenna gain (or 4W EIRP) without incident.[1] We would therefore ask Ofcom additionally to consider working towards an across-the-board increase in the limits for RLAN equipment e.g. to 1W conducted power plus 6 dB antenna gain (in combination with a 1 dB reduction in conducted power for every 3 dB in antenna gain) without any geographical restrictions or registration requirements. Such an increase would be an important step in harmonizing world-wide regulations for the 2.4GHz band but we realize it could only be implemented once agreement has been reached with MoD to allow enhanced power across the whole of the 2.4GHz band. A transitional regime in which the higher power levels are allowed in the lower part of the band would still be useful.

Q6: For 5GHz should Ofcom increase the power to 4W EIRP at 5.8GHz in accordance with ECC Recommendation and as set out in the draft IR2007? Should Ofcom open the database for public access to facilitate coordination?

Cisco is especially pleased to see Ofcom's proposals to increase power in the 5.8 GHz band to 4W EIRP. This band is particularly useful for wireless backhaul applications. As WLAN devices are deployed in outdoor mesh configurations, service providers (in particular) require an inexpensive and easy solution to backhauling traffic to an interconnection point. We therefore agree that Ofcom should increase the power as proposed at 5.8GHz and we support opening the database for public access so as to assist in resolving interference cases, eventually reducing Ofcom's involvement in such cases.

[1] In fact, the FCC rules allow 3 dB antenna gain from every dB of reduction in conducted RF power.