BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

In the Matter of	)	
	)	ET Docket No. 03-65
Interference Immunity Performance	)	
Specifications for Radio Receivers	)	
	)	
Review of the Commission's Rules	)	
and Policies Affecting the Conversion	)	
to Digital Television	)	
	)	

COMMENTS OF THE WI-FI ALLIANCE

The Wi-Fi Alliance respectfully submits these comments in response to the Notice of Inquiry ("NOI") in the above-captioned proceeding.[1] In this NOI, the FCC begins the "consideration of incorporating receiver interference immunity performance specifications into our spectrum policy on a broader basis."[2] While the Wi-Fi Alliance generally supports the FCC's efforts to achieve more efficient overall spectrum utilization through the use of receiver immunity specifications, the FCC should be careful to differentiate receiver immunity from receiver performance, which should remain the domain of the radio manufacturer. The specific comments of the Wi-Fi Alliance are provided in further detail below.

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[1] In the Matter of Interference Immunity Performance Specifications for Radio Receivers; Review of the Commission's Rules and Policies Affecting the Conversion to Digital Television, ET Docket No. 03-65 (rel. Mar. 24, 2003).

[2] Id. at ¶1.

The Wi-Fi Alliance, formerly the Wireless Ethernet Compatibility Alliance ("WECA"), is an international trade association formed in 1999 to promote the adoption and commercialization of products built according to the IEEE 802.11 specifications, including Wireless Local Area Networks ("WLANs") in the 5 GHz frequency band. Membership in the Wi-Fi Alliance is open to all companies that support the WLAN standards, and current members include virtually all of the major radio manufacturers producing wireless network equipment and marketing such products in the United States.[3] The membership continues to expand and currently consists of over 190 companies. The Wi-Fi Alliance's members are closely involved with the development, manufacturing and marketing of WLAN devices, and the Wi-Fi Alliance therefore has particular interest in the recommendations posed in the NOI.

As an initial matter, the Wi-Fi Alliance fully concurs with the FCC's assessment that receivers with poor immunity have resulted in suboptimal spectrum utilization. The Wi-Fi Alliance believes that, over the last few years, newly proposed allocations of spectrum for beneficial services have been limited because the new services would adversely impact adjacent incumbent systems with poor immunity. At the same time, demand for spectrum—and the efficiency of newly implemented systems—has increased substantially, leading to a situation where older, poorly implemented radio operations can preclude needed services impacting a far greater user base.

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[3] A complete membership list is available at WFA's website, www.wi-fi.org. Current members include, among others, 3Com, Acrowave, Agere Systems, AMD, Askey, Atheros, Cisco, Colubris, Connexion by Boeing, Dell, Gateway, Global Sun, Intel, Intersil, Melco, MobileStar, Mobilian, Motorola, NextComm, Nokia, Philips, Proxim, Sony, Symbol, Texas Instruments, and Z-Com.

The Wi-Fi Alliance believes, however, that the FCC should exercise care in differentiating receiver "immunity" with receiver "performance." The former is truly a receiver-only subject but the latter is very much a total systems matter and, the Wi-Fi Alliance believes, technically beyond the scope of this NOI.[4] The Wi-Fi Alliance observes that the current method of defining a service in terms of transmitter power, transmit spectrum (both in-band and out of band emissions), modulation type(s), frequency band(s), allowable spurious emissions (both transmit and receive), and the nature of the service provides the necessary information for a radio receiver manufacturer to produce compliant devices. The issues of design trade-offs between receiver performance, circuit complexity, physical size, power requirements, and ultimate cost, however, are and should remain the domain of the radio manufacturer. The Wi-Fi Alliance defines receiver immunity, or immunity performance, as the resistance of a receiver to interference signals outside its intended band or channel of operation.[5]

Broadly speaking, separation should also be made between in-band and out of band interference. The latter may result from co-channel operation of different services or systems. Here, systems design that takes into account all aspects of transmission and modulation, RF link budget and relative interferer strength, propagation and delay as well as transmission timing and other factors play a role. A radio system can be optimized to deal with specific or limited types of interference and so remain usable in case of (some) interference. A case in point is a direct

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[4] Notably, receiver immunity is subject to regulation in many other countries. In the EU, for example, receiver immunity is addressed under the heading of EMC certification on the basis of standards developed by industry. These standards become legal instruments and support the formal EMC certification process in the EU.

[5] The Wi-Fi Alliance believes that the broader topic of immunity robustness, and specifically in-band interference rejection, should also remain the domain of the radio manufacturer.

sequence spread spectrum WLAN that is interfered with by a narrowband 2.4 GHz portable phone. In some cases, co-channel operation is not possible and one service or system has to protect itself by moving to another frequency to avoid interference. A case in point is the Dynamic Frequency Selection (or "DFS") mechanism being required of WLAN devices operating in the 5 GHz band. Finally, there is the case of strong interference from out of band sources that can affect receiver performance in ways that cannot be compensated for at the transmitter. A case in point is a mobile telephone transmitter that causes interference in a TV receiver because of direct signal injection into the TV receiver circuits.[6] Resistance to this sort of interference is known as receiver EM immunity. In our understanding these EMC effects are the proper subject of this NOI and they should be considered together.

Receiver immunity can be improved through various means. Among the factors that have a direct impact on receiver immunity is proper RF shielding and adequate RF filtering. Certain receiver interference issues are related to the lack of sufficient shielding of the sensitive high-gain sections (typically the IF circuits) in the receiver and front-end overload due to inadequate rejection of out-of-band signals. For some services, these factors can be critical in securing reasonable immunity. Another important factor is designing receiver circuitry with enough dynamic range to handle high-level in-band signals. These three factors form the basis of good receiver design regardless of frequency band and modulation types. A lesser factor is IF bandwidth. Wideband receivers will generally have lower immunity than narrow-band design.

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[6] In this regard, and consistent with the Wi-Fi Alliance's comments in ET Docket No. 02-380, the Wi-Fi Alliance believes that a date certain transition of analog television broadcasters to their digital allotments would promote spectrum efficiency by creating incentives for the deployment of digital television receivers with greater immunity.

The Wi-Fi Alliance notes, as a final matter, that immunity performance invariably leads to design cost increases. Improving a receiver's immunity performance often requires the use of front end circuitry with higher overload capability which in turn requires increased power dissipation in those devices. The FCC should therefore exercise some caution to retain the flexibility to adopt receiver immunity criteria that are reasonably related to the types of products at issue.

In sum, the Wi-Fi Alliance commends the FCC for undertaking the study of improving overall spectrum utilization through the development of reasonable receiver immunity criteria for radio-based services. While the Wi-Fi Alliance supports these efforts, the FCC must ensure that reasonable measures to eliminate poor radiofrequency engineering do not intrude into more generalized requirements that impinge on manufacturers' ability to make reasonable design

choices with respect to receiver performance and interference robustness. The Wi-Fi Alliance looks forward to continuing to work with the FCC in the development of rules and policies to address receiver immunity on a going-forward basis.

Respectfully submitted,

WI-FI ALLIANCE

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