

## Chapter 10 – RECOMMENDATIONS

It is likely that the IEEE 802 standards will be used in military communications systems. They have therefore been thoroughly defined in this report. However, this is a standard in rapid development and since the main body was written, new exiting parts of this standard have emerged which are likely to have significant impact on military communication. One of these activities is the term Cognitive Radio (CR).

The basic premise of CR is that radios can better use the available spectrum by detecting their environment and adapting accordingly. Regulatory agencies such as the Federal Communications Commission (FCC) require that 802.11a radios detect radar signals and avoid interfering with them. This ability to dodge radar requires a significant amount of CR-type adaptability and it is just the beginning of wireless LAN (WLAN) CR capabilities.

WLAN radios may detect a wide variety of radio environment characteristics. These include traffic statistics and other RF events that are identifiable (such as radar, Bluetooth, microprocessor noise or microwave oven noise). They also include such WLAN side effects as collisions, failed packets, adjacent channel interference and hidden stations and unidentifiable noise sources.

By recording RF events, identifying them when possible and responding appropriately, the WLAN radio improves its ability to optimise throughput. Given the amount of interference that can exist in the unlicensed WLAN bands, the radio's CR capabilities are crucial for achieving the robust performance that users expect.

The IEEE will begin work in November 2004 on a standard for fixed-access systems that would use so-called cognitive radio techniques to tap unused swaths of spectrum. The effort, building on the Federal Communications Commission's proposal to open up 300 MHz of unused UHF/VHF spectrum, marks a milestone for software-defined radio (SDR).

These frequency bands are today mainly used for analogue TV broadcasting and military systems. As analogue TV is converted to digital TV (DTV), unused slots become available since DTV uses less spectrum than analogue systems. These frequencies are associated with little path loss and simple technology (CMOS and SDR) and are those, which could make a system cheap to deploy! They are ideally suited for command post inter communications where vehicles are up to a kilometre apart and there is a need to communicate while on the move with LAN rates up to 1 Mbit/s.

The IEEE 802.22 working group is expected to define the media-access control and physical-layer specs for a cognitive air interface that would enable fixed, point-to-multipoint systems working in unused TV spectrum between 54 and 862 MHz to sense and tap available spectrum in that space. This is ideal spectrum for deploying regional networks in sparsely populated areas. In that application, 802.22 nets, which could propagate signals up to 40 kilometres, would be rural complements to 802.11 local networks and 802.16 metropolitan backhaul links.

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