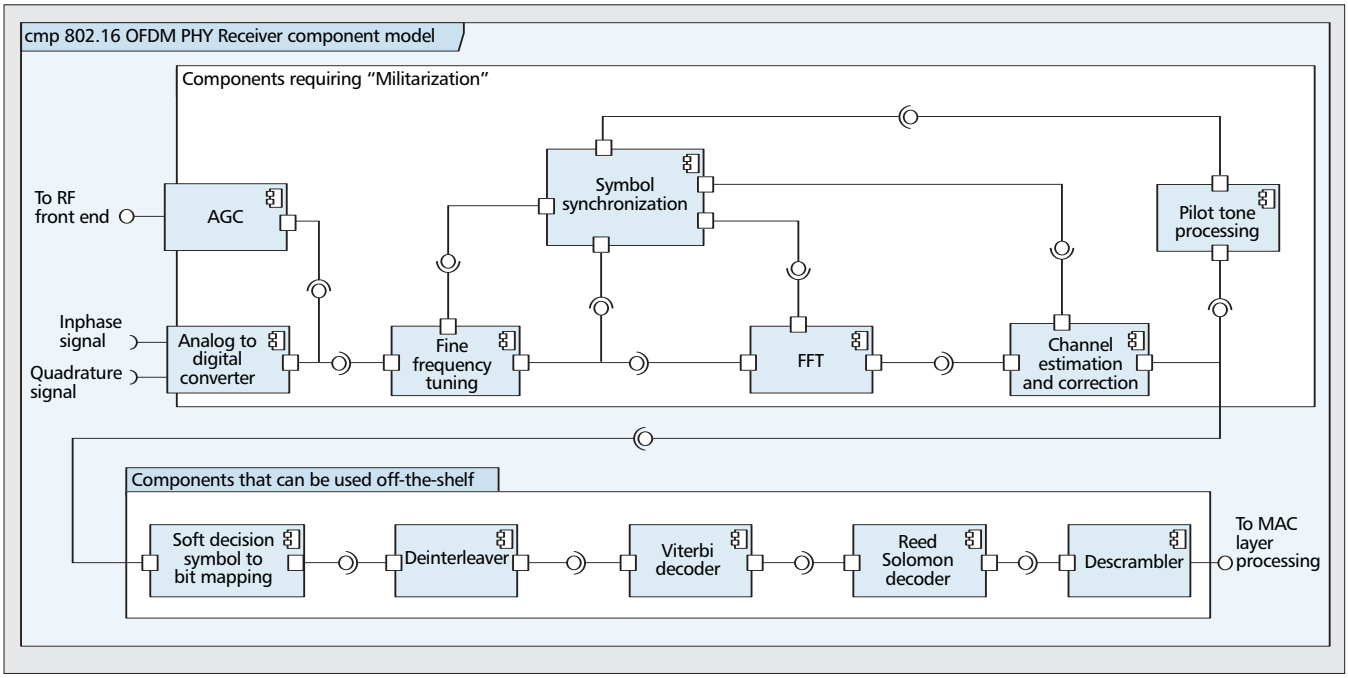

Figure 1. *802.16 WirelessLAN OFDM PHY Receiver showing components that may require "militarization" and components that can be implemented using off-the-shelf technologies*

munications systems favor the use of ad-hoc networks, where the network can "self-heal" when a failure occurs in one or more communication nodes. While some commercial networking technologies, such as Bluetooth and the 802.16-2004 mesh architecture, support some level of this type of operation, modifications to the data link layer are generally required to fully address the military requirements. In a consumer wireless terminal, these functions are often implemented in software running on a general purpose processor contained within an integrated SoC device. Reprogramming this processor to support the necessary modifications to the data link layer is a relatively straightforward process. As such, defense OEMs developing radio technology can instantiate the "militarized" data link functionality on an integrated SoC device targeted at commercial wireless systems as long as the modified software does not exceed the capacity of the embedded general purpose processor.

With these differences in the operating requirements between commercial and defense communications systems in mind, it is clear that the military generally cannot use RF and baseband signal processing technologies targeted for use in commercial wireless terminals "as is" in solving the size, weight, and power problems inherent in network-centric operations. Elements of these technologies, however, can be leveraged to support "militarized" versions of the commercial waveforms, utilizing existing "off-the-shelf" intellectual property where possible in supporting common waveform functionality that is mixed and matched with modified functionality to support military requirements. This paradigm is already being followed in a number of defense communications programs. For example, consider the multi-user objective system (MUOS) [4]. This system is being designed to provide a next-generation UHF satellite communications network, enabling wideband communications with the war fighter throughout the battle space. To achieve this goal, MUOS leverages the third generation partnership program's UMTS architecture, utilizing the wideband CDMA (WCDMA) air interface standard as a baseline technology and modifying it as necessary to support the military's operational requirements [5]. This allows "off-the-shelf" WCDMA signal processing technologies to be utilized in the radio terminal devices, which will ultimately allow soldiers to use cell phone-like radio terminals in a tactical military setting.

So, can the military adopt commercial air interface standards and thus leverage the RF and baseband signal processing technologies developed for the consumer wireless market to manage size, weight, and power in defense communications? The answer is "sort of." Commercial air interface standards can act as a baseline for military radio technology developers, allowing defense radio OEMs to leverage commercial technology where possible to manage size, weight, and power in supporting network-centric operations. Furthermore, if the modifications necessary to "militarize" the commercial waveform are performed correctly, the potential exists to allow the radio terminals supporting the "militarized" waveform to interoperate on the associated commercial networks, further enhancing its overall utility.

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