

Introduction

This book is intended for people who want to learn more about wireless multimedia solutions based on IEEE Std 802.15.3™. This is a new IEEE standard designed to specifically address the needs of high-speed, low-cost portable multimedia devices. Because of this focus, the standard is very different from other IEEE 802® wireless standards. This book addresses four main areas of IEEE Std 802.15.3: history, applications, implementation, and justification.

The history of the 802.15.3 standard is described in Chapter 1. This chapter also includes some of the key points of the IEEE standards process, especially as it relates to the development of 802.15.3. The 802 Task Groups use a cryptic document naming system, which is explained in the chapter as well. This will make it easier for people who are new to IEEE standards to find information from the Task Group's web site.

The applications of IEEE Std 802.15.3 are discussed in Chapter 2. While a wide variety of applications are enabled with 802.15.3, the design of the protocol focused on two areas: high-throughput and low-latency. For some applications, a steady, high-throughput connection is all that is required. Other applications require a predictable, low latency, but do not require quite as much bandwidth. While the focus of 802.15.3 is on quality of service (QoS) support, it also handles asynchronous applications efficiently.

Chapter 3 provides a high-level overview of the standard. Following the overview, the medium access control (MAC) is described in detail in Chapters 4, 5, and 6. Chapter 4 covers the operation of the MAC and includes message sequence charts that illustrate the various operations of the protocol. Chapter 5 describes the operation of dependent piconets, which can be used to improve the coexistence of 802.15.3 piconets as well as coexistence with other wireless networks. Chapter 6 completes the discussion of the MAC functionality by providing a description of the optional security methods supported by the standard.

The physical layer (PHY) is discussed in detail in Chapter 7. In addition to a discussion of the characteristics of the PHY, this chapter provides additional information regarding the anticipated performance of the PHY in typical applications. At the higher data rates supported by 802.15.3, delay spread is an important factor in the operation of the PHY. Chapter 7 provides references to justify the delay-spread numbers used in the selection criteria for 802.15.3. The chapter finishes with a survey of some radio architectures that may be useful for the implementation of highly-integrated, low-cost radio frequency integrated circuits (RFICs) for 802.15.3.

Chapter 8 discusses the interfaces that were defined in IEEE Std 802.15.3. These interfaces support connections with higher layers in the protocol stack, e.g., IEEE Std 802.2[™] and IEEE Std 1394[™]. Although the interfaces are optional to implement, they do provide insight into the operation of the protocol.

The final chapter in the book, Chapter 9, deals with the issue of coexistence. Because unlicensed allocations do not guarantee clear radio spectrum, wireless devices need to be able to handle the presence of interferers from a wide variety of sources. In the 2.4 GHz band, these include microwave ovens, IEEE Std 802.11b[™] and IEEE Std 802.11g[™] wireless local area networks (WLANs), IEEE Std 802.15.1[™] personal area networks (PANs), etc. Simulation results for 802.15.3 coexisting with these types of interferers are presented in the chapter. In addition, the techniques provided by 802.15.3 to enhance the coexistence with these networks is also discussed in the chapter.

Throughout the book, additional information is given that provides justification for the choices made in the standard. The development process was iterative and so some ideas were introduced, only to be discarded later as further analysis showed problems with the proposed solutions. In some cases, functionality was cut from the standard, not because it was broken, but rather that its marginal utility was too low to justify the added complexity.