Foreword

We are living in the most exciting time in the history of human communications.

We hold powerful computers in the palms of our hands. These computers connect to networks that carry massive amounts of digital data around the globe and back again in just seconds. Our wireless networks enable innovative software applications to get us where we're going and to stay connected with family and friends. Life-altering opportunities exist because telemedicine and distance learning are available for most communities, including those in rural areas.

As much as modern wireless telecommunications improves the quality of our lives, we take for granted the networks that make it possible. We overlook the huge task of designing and deploying these systems.

As elaborated by John Rowe in the first section of *Firmly Anchored in Midair*, our mobile networks require deploying all manner of wireless infrastructure. The US telecommunications services industry generates

combined annual revenues of around $500 billion. This is a big, growing, complex and highly regulated field. It requires experts who know how to navigate its complexity. Yet, because wireless is a relatively new industry, there is little or no formal training available in academia or in the private sector on how to site wireless networks.

John Rowe's book fills a yawning gap, and will serve as a guidebook for those who fill the role of site acquisition for all manners of infrastructure, including towers, fiber optic transport systems, traditional antennas, small antennas, and distributed antenna systems. This integrated ecosystem, known as heterogeneous networks (het-nets), is centered around the traditional cellular communications tower and other suitable elevated structures, which provide wireless carriers over-the-air umbrella bandwidth to meet the ever-growing communications transport requirements of consumers, public safety, and commerce.

The reality is that mobile connectivity requires that antennas are elevated on towers, on buildings, or along streets. The antennas need to be placed in specific locations to reach areas travelled, if only periodically, by those who use the system. For the first time in the thirty-four-year history of commercial mobile services, the detailed process of how to secure the best spots to place communications antennas—professionally, effectively, and efficiently—is articulated by John Rowe in this *Handbook of Wireless Site Acquisition and Permitting*.

Mobile data traffic is on pace to grow twice as fast as fixed internet traffic worldwide in the next five years. By 2021, there will be 5.5 billion mobile users, up from 4.9 billion in 2016. There will be a total of approximately 12 billion mobile-ready devices or connections in use globally. While most of this growth in demand is expected to come from smartphone use, which accounts for most of today's wireless connections, the number of machine-to-machine connections is growing exponentially. The explosive growth predicted over the next five years underscores a critical need to prepare a trained workforce and to reinforce public policies to support the burgeoning demand for mobile data utilization.

This tremendous growth in demand for more system coverage as well as more network capacity brings with it economic and job oppor-

tunities, as well as logistical challenges. It is incumbent on the wireless sector and the public sector to work together for the U.S. to keep pace with our citizens' appetite for mobile services and to remain a global leader of innovation through communications technology.

To ensure that wireless services keep up with market demand, entrepreneurial efforts are necessary to respectfully and responsibly build and deploy every kind of wireless infrastructure. A diverse yet integrated infrastructure ecosystem, or het-net, enhances efficiency in the use of spectrum and provides wireless carriers the bandwidth needed to meet growing network demands. Used efficiently, spectrum, a finite and limited resource, maximizes the dissemination of data for public and commercial purposes over allocated radio frequencies.

Communications networks are evolving to incorporate state-of-the-art technologies and accommodate emerging next-generation equipment and applications. This will enable 5G connectivity, the internet of things, the smart city revolution, and the nation's First Responder's Network Authority (FirstNet) for public safety, emergency, and mission-critical communications.

The seemingly never-ending growth in the number of connected devices and machines will certainly strain the capabilities of today's wireless infrastructure. As an estimated 20 billion connected things are activated by 2020, hundreds of billions of investment dollars in new wireless infrastructure and hundreds of thousands of new communications antennas will be needed to accommodate this demand.

In this book, John Rowe focuses on two primary methods wireless carriers can use to expand mobile system data capacity: (1) purchase expensive and scarce spectrum, and (2) develop more facility infrastructure, or densification. A third avenue is through technological efficiency. Wireless carriers are maximizing all three approaches, but when wireless infrastructure is deployed, it immediately addresses the need for more signal coverage and system capacity. It has and continues to provide the lion's share of new wireless bandwidth.

The reality is that we need more wireless infrastructure. Although towers are already pervasive, the voracious consumer appetite for wireless data has accelerated the need for growth in all kinds of infra-

structure, large and small, the near term. We're now standing on the precipice of the 5G evolution. The goal for wireless carriers and the businesses that support their growth is rapid commercialization. But this technology cannot reach its intended audience without exponentially increased wireless infrastructure deployment and the backhaul systems to support it.

This book has come just in time to assist the wireless industry and local jurisdictions across the U.S. in grappling with the siting challenges before us. Industry professionals, working with governmental officials, can help simplify and standardize applications and processes for wireless facility permits. Only with a paradigm shift in the policies, procedures, and processes employed by local permit authorities and industry practitioners regarding wireless infrastructure design, deployment, and management can our society reap its full benefits. The process for local jurisdictions to accept, review, and approve permit applications for wireless facilities needs to be accelerated so wireless investments can be made with predictable outcomes. Just as public rights-of-way have been made available for utility and cable television franchises, they also need to be readily available for wireless antennas and backhaul.

This handbook presents the essentials functions of site acquisition professionals. It is the kind of work that drives the Wireless Infrastructure Association. WIA represents the businesses that develop, build, own, and operate the nation's wireless networks. Our members are the wireless carriers, the infrastructure providers, and the professional service firms that collectively own and operate telecom facilities around the country.

WIA advocates for the wireless industry on the federal, state, and local levels. We work to support policies that promote the efficient and responsible deployment of wireless infrastructure. WIA's goal is to work with all levels of government to facilitate more efficient broadband deployment.

I've spent my career in Washington working on Capitol Hill, in addition to serving as a Commissioner of the Federal Communications Commission. I understand firsthand that government can cause real

problems. I also know that by working with the private sector, government can help. It will take the kind of knowledge and sensitivity to local concerns John Rowe expresses in this manual for successful outcomes to result.

Our work at WIA has streamlined the process of siting on the local and federal level, saving wireless companies untold millions of dollars and assisting them to deliver improved wireless service to communities across the country. And we're now poised for even greater progress. Even so, navigating today's siting process—even streamlined ones—can prove challenging.

This book provides the most comprehensive guide to navigating the often-complicated site acquisition and permitting processes. John Rowe understands how the systems work not just from a theoretical perspective—he has hard-won decades of experience as a leader on the ground getting infrastructure sited. Now he has shared his expertise nationwide and created a textbook that is sure to benefit anyone and everyone involved in wireless infrastructure projects and business.

It is worth remembering that virtually every piece of infrastructure—from conventional communications cell towers and small antenna cell sites elevated above ground, to the fiber optic transport networks placed underneath the ground—has been installed with approvals from local jurisdictional officials. Because government and industry worked together, the US is the world leader in mobile communications. We've built networks that are the envy of the world.

We need more wireless infrastructure because it is essential to economic growth, job creation, and global competitiveness. American businesses already invest over 30 billion dollars every year in the wireless infrastructure we depend on every day. Studies show that this translates into 1.3 trillion dollars in economic growth and three million new jobs.

The only way cities and towns of all sizes in all parts of the country are going to keep up with the ever-increasing demand for more capacity is through more wireless infrastructure. This book will prove essential in paving the way where the rubber meets the road. The next generation of workers who will find and prepare the best sites to build

out these expanded wireless networks will need professional training. With its comprehensive and insightful understanding, John Rowe's book will become essential reading for all professionals involved with the process, and will find its way into the training efforts of WIA and all others who seek to create the wireless workforce of the future.

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