Preface

The global technology ecosystem stands at a historical point of transition between the 3G- and 4G-enabled wireless technologies that launched transformative changes in audio–video communications and 5G-enabled technologies that will enable transformative changes across the entire Internet of Things (IoT). Thus, beyond general communications, broad industries such as transportation, health care, and industrial production are likely to be transformed. The vast increases in bandwidth – and decreases in latency – enable novel business models that cultivate dense networks of person-to-person, person-to-machine, and machine-to-machine pathways. In 2021, the Federal Communications Commission's (FCC) "C-Band Auction 107" sold 280 megahertz of airwaves for $81 billion, reflecting the immense value the market places on the adoption and deployment of 5G technologies.

This book contains the dedicated efforts of a distinguished group of scholars, former government officials, and industry practitioners to set forth a theoretical and empirical basis for sound policymaking in the vital 5G and IoT sector. The chapters are drawn from a conference held in December 2021 by the Center for Intellectual Property x Innovation Policy (C-IP^2) at Antonin Scalia Law School, George Mason University. The contributions are informed by not only economic and legal concepts but also a practically informed perspective on the challenges of securing returns on innovation – an asset that is inherently exposed to expropriation – and the realities of enforcing and licensing IP rights in real-world technology markets. This point is of considerable importance since, in our view, scholarly and regulatory discussions in this area often rely on theoretical models that make little inquiry into "on the ground" conditions in real-world technology markets. Collectively, the contributors to this book bring decades of policymaking experience (at agencies such as the United States Patent and Trademark Office, the US Federal Trade Commission, and the US International Trade Commission), industry experience, and scholarly analysis concerning the legal, economic, and technological issues

https://doi.org/10.1017/9781009274289.002 Published online by Cambridge University Press

involved in formulating and implementing efficient "rules of the game" in global 5G-enabled markets.

While the contributors deploy different approaches to, and reach different conclusions on, these complex issues, the project rests on two common foundational principles. First, responsible policymaking must be grounded in economic theory and empirical evidence, rather than rhetoric, narrative, or ideology. Second, meaningful enforcement of property rights and contracts is a critical predicate for enabling the formation of efficient markets in technological innovations. Just as it is widely agreed that these two key legal inputs have supported unprecedented rates of wealth creation in physical-goods industries in market-oriented economies, so too these same legal inputs – with appropriate modification for the intangible-goods environment – are necessary to support wealth creation in the wireless computing and communications markets that will drive IoT. While this perspective may seem elementary to much of the business community, it has been surprisingly overlooked by much of the regulatory and scholarly community.

The book is divided into five parts that complement each other but can be read separately based on a reader's interests.

Part I, Intellectual Property and Competition Policy in Global Wireless Markets, addresses "big picture" issues underlying past and future development of IP and competition policies relating to mobile communications technologies. In "Restoring and Revitalizing Technology Markets for Mobile Wireless: Geopolitical Dimensions of Patented Technology Embedded in Standards" (Chapter 1), David Teece argues that the transition to IoT will demand a renewed appreciation by policymakers of the critical function played by a robust IP infrastructure in facilitating the research and development, standard-setting, and licensing activities of lead innovators in the global wireless industry. This includes standard-essential patents (SEPs). In "Antitrust Convergence on Substantive Norms for SEP Licensing Negotiations: Should and Could It Be?" (Chapter 2), Maureen Ohlhausen and Jana Seidl similarly underscore the importance of robust patent rights (and caution in using antitrust law to limit those rights) in supporting wireless innovation in general, and US technological leadership in particular, as markets make the investments necessary to develop and adopt IoT technologies. The authors describe incremental steps taken by US policymakers that suggest a growing acceptance of legal innovations in Europe that have promoted a more even playing field in licensing negotiations between innovators and implementers of SEP-protected technologies.

Part II, Patent Holdup, Royalty Stacking, and the FRAND Standard, addresses critical empirical questions that must be addressed to provide a reliable basis for policymaking and adjudication concerning SEP licensing and enforcement. In "Cellular SEP Royalties and 5G: What Should Competition Policy Be?" (Chapter 3), Alexander Galetovic, Stephen Haber, and Lew Zaretzki review a transformative body of empirical research (in which the authors have played a

central role) that has reassessed the factual basis for widely adopted patent holdup and royalty stacking theories in SEP licensing markets. The authors show that empirical studies have repeatedly failed to find evidence for these theoretical assertions of market failure. Rather, the evidence favors the view that SEP licensing represents a case of exceptional market *success*, as indicated by declining quality-adjusted prices, expanding output, and continuous innovation in SEP-dependent technology markets. In "The Fair Division of Surplus from a FRAND License Negotiated in Good Faith" (Chapter 4), Gregory Sidak takes on a difficult theoretical challenge with practical implications for SEP licensing and litigation: Is it possible to reconcile the standard of "fair, reasonable, and nondiscriminatory" (FRAND) licensing with the efficiency objective that underlies contract law? In a novel analysis, Sidak shows that, under certain behavioral assumptions, the "fairness" principle embodied by the FRAND standard can promote efficiency by truncating the range of "reasonable" royalty terms, which in turn can promote mutually beneficial transactions between innovators and implementers.

Part III, Patent Holdout and the Rise of "Efficient" Infringement, addresses the consequences of the stringent limitations that regulators and some courts have imposed on SEP owners' ability to secure injunctions against infringing users. In "Efficient Infringement in the SEP Space" (Chapter 5), Kristen Osenga documents how theoretical concerns over patent holdup have supported limitations on infringement remedies that encourage infringers, especially the most well-resourced infringers, to engage in patent "holdout" and compel SEP owners to undertake costly and lengthy litigation around the world. The unfortunate result: Successful innovators are increasingly unable to secure positive returns on investments in research and development. In "Restoring Deterrence: The Case for Enhanced Damages in a No-Injunction Patent System" (Chapter 6), Jonathan Barnett and David Kappos propose a policy innovation to deter patent holdout even in a legal environment in which injunctive relief is largely unavailable. Specifically, the authors propose requiring the award of enhanced damages against adjudicated infringers to mimic the deterrence effect of the "missing" injunction, adjusted to reflect potential underenforcement and overenforcement effects. The predicted fortunate result: The market will shift away from value-depleting litigation and toward value-enhancing dealmaking.

Part IV, Transactional Solutions: Redesigning SEP Licensing Markets, leverages theoretical analysis and industry experience to present practical proposals to mitigate the litigation-related and other transaction costs that can encumber SEP licensing negotiations between innovators and implementers. In "Designing SEP Licensing Negotiation Groups to Reduce Patent Holdout in 5G/IoT Markets" (Chapter 7), Bowman Heiden, Igor Nikolic, and Ruud Peters assess recent proposals to enable licensees to negotiate collectively with SEP owners through licensing negotiation groups (LNGs). Whereas LNGs have been proposed to mitigate the risk of patent holdup, the authors argue that LNGs may be a useful tool to mitigate the risk of

patent holdout, especially in light of the fact that the licensee population for 5G technologies, which extend across various industries, is expected to be more numerous and heterogenous than has been the case in 3G and 4G wireless technologies (which have mostly been applied in mobile communications). In "How to Create a Smoother SEP Licensing Ecosystem for IoT" (Chapter 8), Ruud Peters, Fabian Hoffmann, and Nikolaus Thumm propose modifications to SEP licensing practices to address the expected increase in transaction costs in the 5G/IoT ecosystem. These modifications seek to mitigate the risk of negotiation failure and ensuing litigation through a suite of mechanisms designed to increase transparency in SEP licensing, to increase assurance that a licensed SEP is valid and essential, to enhance implementers' incentives to negotiate a license (rather than "use and then litigate"), and to increase the likelihood that a licensee ultimately bears a "reasonable" aggregate royalty for use of the total SEP stack.

Finally, Part V, Patent Enforcement, Wireless Markets, and Global Competitiveness, addresses the geopolitical issues that are being increasingly raised by IP and competition policy in wireless communications markets. In "The Geopolitical Implications of Patent Holdout and the Ensuing Race to the Home Court" (Chapter 9), Jorge Padilla and Andrew Tuffin discuss the danger posed to standardization in wireless technology markets by strategic efforts to initiate SEP-related litigation in courts that are perceived to favor the interests of innovators or implementers. These global forum-shopping strategies have been promoted by certain courts' willingness to determine FRAND royalty rates on a global basis and to issue "anti-suit" and "anti-anti-suit" injunctions to interfere with litigants' ability to seek injunctions, or initiate related SEP litigation, in foreign jurisdictions. In "China's Practice of Anti-suit Injunctions in SEP Litigation: Transplant or False Friend?" (Chapter 10), Mark Cohen provides a comprehensive account, using primary Chinese sources, of the proliferating use of anti-suit injunctions by Chinese courts, usually for the purpose of barring SEP owners (typically, foreign companies) from pursuing infringement actions against implementers (typically, Chinese device makers) in courts outside China. Showing how these legal developments are part of a larger and long-standing effort by Chinese policymakers to secure technological independence and leadership in critical industries, this contribution delivers important and novel insights as SEP policy discussions increasingly integrate geopolitical considerations into the conventional focus on competition and innovation policy concerns. Finally, in "Patents and Competition: Commercializing Innovation in the Global Ecosystem for 5G and IoT" (Chapter 11), Scott Kieff and Thomas Grant close out our book with a return to the "big picture" issues with which it starts. In particular, the authors emphasize the enabling function played by a secure IP infrastructure in facilitating surplus-enhancing cooperative activities between the holders of innovation and non-innovation assets in technology markets. This "win-win" enabling effect stands in contrast to the conventional emphasis on the "win-lose" exclusionary effect of IP rights in the litigation context. The constructive

transactional role played by patents and other IP rights, in conjunction with contract, is demonstrated by the standardization and licensing structure that supports 3G and 4G wireless markets and is expected to continue and intensify as wireless technologies are applied across a broader variety of markets as the digital economy migrates to the IoT.

We conclude on a sad note. During the editing of this book, our dear colleague, Alexander Galetovic, passed away. Alex's untimely passing has left a hard-to-fill void in the economic and empirical analysis of IP and competition policy issues in global wireless markets. Alex's unparalleled dedication to meticulous empirical scholarship yielded breakthrough results that challenged settled assumptions – widely accepted but never rigorously tested – in this economically and socially critical industry. This achievement has promoted a more balanced discussion of the complex IP and antitrust policy issues raised by wireless communications markets, leading to incremental policy changes by US and European regulators. We hope that this book (including Alex's coauthored contribution) will similarly provide an economically and factually informed foundation on which policymakers and scholars can build when proposing and taking action in this vital sector of the global digital economy.