

# Introduction

LISA PARKS AND NICOLE STAROSIELSKI

Signal traffic refers to the movement of electronic media across various parts of the planet. It is the aggregate result of a global culture of continuous electronic transmissions. Though electronic signal trafficking can be dated to the rise of telegraphy during the nineteenth century, this book focuses on the contemporary era of media globalization—an era characterized by contradictory global mediascapes and multiple *media infrastructures*.<sup>1</sup> Today, broadcasting, cable, satellite, Internet, and mobile telephone systems are used simultaneously, and sometimes in coordinated ways, to route signal traffic to and from sites around the world. The content and form of contemporary media—whether television programs or online games—are shaped in relation to the properties and locations of these distribution systems.<sup>2</sup> Simply put, our current mediascapes would not exist without our current media infrastructures. As a suggestive concept, then, signal traffic demarcates a critical shift away from the analysis of screened content alone and toward an understanding of how content moves through the world and how this movement affects content's form. The chapters in *Signal Traffic* call attention to the media infrastructures that distribute audiovisual content, the ways industries and people imagine, organize, and use those infrastructures, and the varied scales at which they operate.

Inside this sprawling brick complex in Hamina, Finland (figure 1.1), banks of computers process enormous amounts of data. Located in the icy climate of northern Europe, where the cooling of constantly running electronics is more



**Figure I.1.** A Google data center sits in the icy landscape of Hamina, Finland, where system operation is more energy efficient.

energy efficient, Google paid \$350 million Euros to transform this site from a paper mill into “one of the most advanced and efficient data centers in the Google fleet.”<sup>3</sup> The facility, which once employed 650 workers to turn wood into paper, now employs one hundred Google workers to route bits through networks.<sup>4</sup> Just one node in Google’s expansive global infrastructure, the Hamina data center is used to distribute Internet traffic primarily throughout Europe. The emergence of such data centers in sites around the world evinces a series of changes in infrastructures of media distribution. Beefed-up broadband pipelines, cloud computing systems, digital compression techniques, and protocols are now integral to the movement and storage of audiovisual signals worldwide.

Just as a paper mill can be repurposed as a data center, a massive water tower can double as a cell-phone mast. In this scene in Lusaka, Zambia (figure I.2), another kind of infrastructural archaeology surfaces as antennas that relay mobile phone traffic are mounted on a tower used to distribute water. Space atop the water tower is leased to commercial mobile-phone operators who appropriate the tower’s height to circulate signals and display giant billboards within new “footprints” or “coverage zones.” This layering of an emergent system upon an existing one not only exposes the path dependencies of infrastructural



**Figure I.2.** In Lusaka, Zambia, mobile phone providers lease space on water towers to send signals and advertise their services.

formations but also reveals how an established node can be used to generate new markets and economic potentials. The water tower no longer only distributes water: it develops a “second life” by hosting a mobile phone tower. As mobile-phone infrastructure is bundled with water infrastructure, sociocultural and economic activities around this node have the potential to alter and expand. In other places around the world, too, mobile-telephone towers have been propped upon skyscrapers, church steeples, minarets, or giant standalone poles; they are sometimes even camouflaged as trees.<sup>5</sup> Built environments have been transformed into wireless footprints. Media and communication researchers have begun to explore the sociocultural and economic relations of mobile telephony, but few have considered the complex materialities of its infrastructure.

Finally, this photograph (figure I.3) features the landing station of the first telephone cable across the Pacific, a link that solidified Hawai'i's position as a communications hub during the 1950s and 1960s. Today, fiber-optic cables extend this legacy, shuttling mobile telephone conversations and Internet traffic across O'ahu's shores. This first cable station at Hanauma Bay, buried



**Figure I.3.** At Hanauma Bay, Hawai'i, a Cold War–era undersea cable station was buried underground in order to protect it from attack.

underground like many Cold War–era infrastructures, was disguised as part of the hillside to protect it from attack.<sup>6</sup> The burying of this station was not its only environmental impact: installers had to dynamite their way through a reef to ensure the cable had a safe path out to sea. More than fifty years later, this path has become a corridor of environmental tourism. The hole in the reef, now dubbed the “Telephone Cable Channel,” draws scuba divers and snorkelers through one of Hawai'i’s foremost nature preserves. The cable, once used to traffic telephone calls, has been repurposed by marine scientists to monitor the undersea environment, sensing aquatic life forms and seismic movements on the ocean floor. Critical studies of such sites draw attention to media infrastructures’ entanglements with environmental and geopolitical conditions, from the moment of installation through their residual uses.<sup>7</sup>

In this book we conceptualize sites such as data centers, mobile-telephone towers, and undersea cables as *media infrastructures*—situated sociotechnical systems that are designed and configured to support the distribution of audiovisual signal traffic. Media infrastructures are concentrated in particular locations and spread across vast distances. They are highly automated, relying on sensors and remote control, and require human labor for their design,

installation, maintenance, and operation. They operate ethereally, transmitting signals at the speed of light, and are grounded in bunker-like facilities heavily secured on earth. Media infrastructures are material forms as well as discursive constructions. They are owned by public entities and private companies and are the products of design schemes, regulatory policies, collective imaginaries, and repetitive use. Interwoven within political-economic agendas, media infrastructures have historically been used in efforts to claim and reorganize territories and temporal relations.<sup>8</sup> Their material dependence on lands, raw materials, and energy imbricates them within issues of finance, urban planning, and natural-resource development.

What can media and communication studies gain by adopting an *infrastructural disposition*? First, a focus on infrastructure foregrounds *processes of distribution* that have taken a backseat in humanities-based research on media culture, which until recently has tended to prioritize processes of production and consumption, encoding and decoding, and textual interpretation.<sup>9</sup> In humanistic media studies there is a serious disjuncture between the amount of scholarly attention dedicated to screened entertainment and the amount devoted to understanding the infrastructures that distribute the signals that become entertainment, whether they exist under the sea, across lands, or “in the cloud.”<sup>10</sup> Beyond a concern with the physical systems of media distribution, critical analysis of infrastructure involves interrogating the standards and formats necessary to route content across these systems, whether compression technologies or Internet protocols.

Second, a focus on infrastructure brings into relief the unique *materialities* of media distribution—the resources, technologies, labor, and relations that are required to shape, energize, and sustain the distribution of audiovisual signal traffic on global, national, and local scales. Infrastructures encompass hardware and software, spectacular installations and imperceptible processes, synthetic objects and human personnel, rural and urban environments. Drawing from work in new materialisms and feminist science and technology studies, media infrastructure studies set out to understand the materialities of things, sites, people, and processes that locate media distribution within systems of power.<sup>11</sup> As Diana Coole and Samantha Frost write, “Materiality is always something more than ‘mere’ matter: an excess, force, vitality, relationality, or difference that renders matter active, self-creative, productive, unproductive.”<sup>12</sup> Using a combination of discursive, archaeological, phenomenological, and ethnographic approaches, *Signal Traffic*'s contributors investigate the complex materialisms of infrastructure in a range of locations, from architectural designs in New York City to cybercafés in Turkey, from mobile phone networks in the Middle East to

undersea cables in the Pacific. By exploring material forms and practices across national contexts, their chapters bring new settings, objects, and stakeholders into the arena of media and communication research.

Third, a focus on infrastructure compels critical assessment of the relation between *technological literacies* and public involvement in infrastructure development, regulation, and use. Arguably, one of the reasons that infrastructures and “public utilities” have been so steadily privatized by governments over the past several decades is a **lack of citizen knowledge about and interest in such systems**. As scholars have observed, infrastructures are defined by their **invisibility**: most of us hardly notice them until they fail or break down.<sup>13</sup> **Public access to technical knowledge about infrastructures is not equal**; rather, it is guided and constrained by social hierarchies of gender, race/ethnicity, class, generation, and nation. Capitalist societies generally educate people to appreciate the “conveniences” and “choices” of modern consumer technologies, but to remain blind to the infrastructures that support them. As a result, infrastructural changes often occur quickly and without notice, short-circuiting citizen-users’ ability to participate in system development. What would it take to arouse greater public interest in media infrastructures? What kinds of scholarship and teaching would help to catalyze and sustain broader citizen involvement in infrastructural matters? It is our hope that the critical study of media infrastructures will deepen scholarly and public engagement with such questions.

## Paths to Media Infrastructure Studies

The kinds of systems we define as media infrastructures have historically been referred to by media and communication scholars as *telecommunication networks*. Key research on networks from the telegraph to the Internet have been penned by Harold Innis, James Carey, Herbert Schiller, Benedict Anderson, Armand Mattelart, Manuel Castells, Monroe Price, Jill Hills, and Dan Schiller, among others.<sup>14</sup> Collectively, their scholarship has described the political and economic strategies and regulatory structures that undergird the development of national and international telecommunication systems, the cultural impacts of their emergence, and the imperializing dimensions of their use. This work has articulated the rise of telecommunication networks with the administrative maneuvers of states, governmental agencies and multinational corporations, processes of modernization, urbanization, and globalization, and various stages and forms of capitalism. In other fields, such as **history, science and technology studies, geography, and anthropology**, scholars have approached infrastructures

as large technical systems, urbanization campaigns, and sites of material culture. This interdisciplinary scholarship, which we call *critical infrastructure studies*, draws upon methodologies and frameworks across the humanities and social sciences to historicize and analyze infrastructures ranging from bridges to power grids, from railways to sewer systems.<sup>15</sup>

Building upon this research, we understand media infrastructures not only as telecommunication networks owned and operated by governments, militaries, and corporations, but as complex material formations that operate at multiple scales. We describe these formations using a *relational approach* that recognizes the industrial, physical, and organizational interconnections of media infrastructures with other systems. We address the *different and uneven conditions* that shape and characterize media infrastructures around the world as well as the *labor, maintenance, and repair* required to build and sustain them. Our approach also considers the natural resources that media infrastructures require and the environmental impacts they produce. We further attend to the myriad ways people encounter, perceive, and use media infrastructure—that is, the *affective relations* they generate and become part of. Finally, critical studies of media infrastructures, we believe, can provide a platform for *innovative methodologies* by activating and combining approaches such as archaeology, political economy, phenomenology, ethnography, and discourse analysis. In the sections that follow, we further discuss these critical issues and some of the research that informs them.

## Scale

One of the most distinctive aspects of media infrastructures is their scale: they span continents, oceans, and atmospheres, and can leave long-lasting traces. Some work in critical infrastructure studies foregrounds the significance of scale by documenting the relations between large technical systems and processes of industrialization. In his influential book *Networks of Power*, Thomas Parke Hughes uses the case of electrical systems to extrapolate several phases of infrastructure formation, including invention and development, transfer between regions and societies, system growth, and the attainment of technological momentum.<sup>16</sup> By establishing a general framework for studying infrastructures as large technical systems, Hughes inspired histories of other such systems, including railroads, telecommunication, air-traffic control, and gas networks.<sup>17</sup> Historians of nineteenth-century culture and technology, for instance, have described how large networks of transportation

and communication “annihilated” space and time, facilitated standardization, and reshaped everyday life. Building on the work of Hughes and others, Paul Edwards argues that large-scale infrastructures are core to the experience of modernity, observing, “To be modern is to live within and by means of infrastructures.”<sup>18</sup> Yet Edwards insists that mesoscale studies of infrastructure, such as Hughes’s, tend to generalize about and normalize conditions of modernity, failing to account for the fact that people often “inhabit, uneasily, the intersection of . . . multiple scales.”<sup>19</sup> *Signal Traffic* heeds Edwards’s call for more macroscale and microscale studies that explore a broader range of national and user contexts and attend to variable infrastructural conditions.

Approaching infrastructure across different scales involves shifting away from thinking about infrastructures solely as centrally organized, large-scale technical systems and recognizing them as part of multivalent sociotechnical relations. Rather than take an overarching or mesoscale view, digital media and informatics researchers have honed in on the macroscale and microscale elements of networks, protocols, and bits, investigating material-semiotic and experiential dimensions of digital technologies. Foundational studies by Wendy Chun and Alexander Galloway, for instance, have foregrounded the macro-level fiber-optic networks and microscale protocols through which data circulate, respectively.<sup>20</sup> Jean-François Blanchette has delved into the nitty-gritty of computing by examining bits, insisting that they “cannot escape the material constraints of the physical devices that manipulate, store and exchange them.”<sup>21</sup> These works, among others, have contributed to emergent fields of software studies and platform studies, the latter of which examines the hardware on which software runs and digital media are materialized.<sup>22</sup>

In an effort to recognize the range of scales at which infrastructures operate, the chapters here investigate the dynamic components of media infrastructures in ways that enrich and deepen macroscale and microscale analysis. Building upon Galloway’s research, in this book Paul Dourish explores key design issues in the development of Internet protocols and demonstrates how and why the size of data packets traversing through networks matters. Decisions about whether a message should be broken into 64-byte or 32-byte “payloads,” he reveals, are related to the divergent characteristics of national infrastructures and geographies. Jonathan Sterne’s chapter similarly moves between scales, charting the historical emergence of microscale compression technologies in relation to macroscale transmission lines. As these chapters explore how microscale processes and macroscale architectures inflect one another, they bring the complex materialities and relationalities of media infrastructures into focus.



## Relationality

In addition to recognizing the multiscalar dimensions of infrastructures, *Signal Traffic's* contributors emphasize the layering or bundling of distinct systems (such as that of water and mobile telephony discussed earlier) as well as the interconnections between infrastructures, environments, and users. Researchers in science and technology studies approach infrastructures as dynamic sociotechnical formations and organizations rather than as isolated or static machines. According to Susan Leigh Star and Karen Ruhleder, infrastructure encompasses both technical bases and social arrangements, extends beyond single events and sites, connects with existing practices and standards, and must be learned and naturalized over time by users.<sup>23</sup> As such, infrastructure is fundamentally a relational concept rather than a concrete object; it “is something that emerges for people in practice, [and is] connected to activities and structures.”<sup>24</sup> Blending approaches from sociology, communication, and anthropology, Susan Leigh Star and Geoffrey Bowker have revealed how infrastructures are embedded in everyday practice, foregrounding the hidden labor they rely upon as well as how they are contingent on social structures. For them, infrastructure refers not only to tubes and pipes but includes “soft” systems of organization and knowledge, ranging from professional societies to classificatory procedures. Infrastructure studies, their work demonstrates, is not simply a quest to understand large technical systems; rather, it explores processes and changes at a “mundane scale” and treats them as part of the building of organizations and production of knowledge.<sup>25</sup>

Some research on infrastructure, including that of Bowker and Star, builds upon and extends Actor-Network Theory (ANT), developed by Michael Callon, John Law, and Bruno Latour.<sup>26</sup> ANT insists on the complex relationalities of social and technical systems, and it troubles the tendency to reduce or ignore the agential aspects of nonhuman objects as well as the responsibilities that humans delegate to them.<sup>27</sup> Researchers in the areas of organizational communication and informatics have drawn upon ANT to create an interdisciplinary field known as *information infrastructure*. Work in this field has set out to rethink the ontology of infrastructures, critiquing assumptions of their stability and manageability, and treating infrastructures as “performative forces that evolve dynamically” and as phenomena that are “generated and regenerated in open-ended relationships.”<sup>28</sup>

Other theorizations of relationality have emerged in recent work on “new materialisms,” which, like ANT, emphasizes complex relationships between human and nonhuman actants. Karen Barad’s reconceptualization of materiality,

















Collectively, the work in *Signal Traffic* sets out to extend materialist studies of media technologies by rethinking and expanding the concept of infrastructure, exploring physical installations, objects, sites, and processes in detail, analyzing industrial transitions, and probing the sociohistorical conditions and power relations that give shape to particular infrastructural formations. Contributors approach the global mediascape as a contradictory and contested domain that must be engaged in multiple ways, from historical, political economic, and sociotechnical perspectives. They explore media infrastructures from the top down and the bottom up, in urban and rural space, and in high- and low-tech conditions. They are mindful of blockages as well as flows, and pay attention to the intersections of meso, macro, and micro scales and processes. The book features field-based ethnographies and archival research alongside studies of industrial forces, technical design, and labor. It explores contemporary media infrastructures such as the Internet and mobile phone networks in relation to water systems, solar power, and human energy. And as the book traces the emergence of infrastructural hardware and installations, it also includes discussions of “soft” infrastructures such as daily routines, marketing, and knowledge practices. *Signal Traffic* engages with media infrastructure as a concept and material formation, positions it in relation to the politics of difference, and tracks it across different parts of the world, from Sweden to Palestine, from Turkey to Zambia.

## The Collection

*Signal Traffic* is organized into three parts. The first, “Compression, Storage, Distribution,” features historical and contemporary conceptualizations of media infrastructures as well as analyses of the changing capacities to format, store, and distribute media, whether on disks, through cables, or in clouds. The section opens with Jonathan Sterne’s genealogy of media compression techniques and their relation to infrastructures that have historically been developed and scaled to carry or transmit certain loads or capacities. Sterne suggests that by examining compression—a process that accommodates signals to infrastructures—it is possible to rethink and rewrite media history away from a general history of verisimilitude and toward a general history of compression. This historiographic intervention might turn further attention to experiences and aesthetics that emerge around media in limited definition. It might also facilitate an understanding of the ways that compression both renders representation adequate to infrastructure and exposes the limits of transmission. In the end, Sterne observes, compression techniques also work

upon infrastructures, making them adequate to the representational loads that pass through them. Using examples ranging from audio compressors to the optical telegraph, Sterne demonstrates that content and infrastructure exist in relations of “circular causality.”

Also exploring the relationship between media content and the capacity of hard infrastructure, Nicole Starosielski’s chapter, “Fixed Flow: Undersea Cables as Media Infrastructure,” offers a framework for understanding how particular technologies, social practices, and natural environments can be conceptualized as media infrastructures. Drawing from work by Susan Leigh Star and Karen Ruhleder, she develops a relational approach to media infrastructure that delineates the multiple routes and effects of global undersea cable networks. Her chapter describes five of the ways undersea cables function as a media infrastructure: they become resources for media activity; alter our everyday experience of media temporality; shape our susceptibility to media censorship and surveillance; solidify global relationships of media power; and serve as a platform where publics can affect the dissemination of media content.

Shifting the focus from transoceanic cables to data centers and cloud computing, Jennifer Holt and Patrick Vonderau’s chapter explores how recent depictions of data-center visibility function both as a mode of claiming corporate territory and as an obfuscation of the less picturesque dimensions of cloud infrastructure. As Holt and Vonderau excavate the material support systems, standards, protocols, and constraints of cloud computing, they suggest that analyzing media infrastructure industries, such as the companies that run cloud systems, presents particular challenges for researchers. According to Holt and Vonderau, the structural convergence and functional heterogeneity of media make it difficult to apply some of the tried and true concepts in media and communication studies, such as the distinction between public and private. Using the Swedish data center as an example, Holt and Vonderau decipher the backend of Internet architecture and data-trafficking policies, and they highlight the importance of a relational perspective in understanding data centers as dynamic infrastructure nodes.

In “Deep Time of Media Infrastructure” Shannon Mattern establishes the significance of historical media infrastructures that precede the digital era. Adopting a media archaeological approach, Mattern explores how historical networks layered in urban space shape contemporary media systems. These networks extend back far beyond nineteenth-century telegraph wires to include much earlier Greek-inspired aural, inscriptive, and architectural forms. Suggesting that research on early media infrastructures can usefully inform studies of the media city, which typically begin with modern media and rarely include

discussions of infrastructure, Mattern delineates a number of potential interdisciplinary engagements for media infrastructure studies, ranging from geology to architectural history. Her chapter closes with an important discussion of what media studies can gain from further engagement with archaeological and infrastructural research.

The book's second part, "Resources, Environments, Geopolitics," features a series of site-specific case studies that explore how different configurations of energy, territory, state power, and local practices affect the shape and form of infrastructures as well as knowledge about and access to them. The part begins with Lisa Parks's chapter "Water, Energy, Access: Materializing the Internet in Rural Zambia." Drawing on ethnographic fieldwork, Parks describes a particular rural configuration of Internet infrastructure and shows that access in this location is contingent on water resources, which not only generate hydroelectricity for the Zambian power grid but are also necessary for prospective Internet users' everyday survival in the community of Macha, Zambia. Her chapter foregrounds the struggles and contestations that are part of infrastructure development; the energy and biopower that infrastructures rely on; the relationality of water, transportation, and information systems; and the alternate ways that people imagine, use, or respond to infrastructure, which may range from intense curiosity to patent disinterest.

Also concerned with the topic of energy, Toby Miller's chapter, "The Art of Waste: Contemporary Culture and Unsustainable Energy Use," provocatively challenges media and cultural studies to confront the environmental impacts of the global digital economy. After critiquing an array of intellectual and corporate discourses that celebrate the beneficence of digital technologies, Miller proposes what he calls the "art of waste" and brings a discussion of e-waste together with critiques of the art of labor and the cognitariat. As he insists, "rather than seeing new communication technologies as magical agents that can produce market equilibrium and hence individual and collective happiness, we should note their other impacts." The chapter concludes with a discussion of e-waste-related art projects, which, Miller argues, have the capacity "to exemplify and criticize a state of affairs that must not be allowed to continue." Miller's chapter thus addresses macrolevel environmental and resource questions that underpin the critical study of media infrastructures.

Weaving geopolitics into this part's discussion of energy resources and media infrastructures, Helga Tawil-Souri's chapter details the conditions and contestations underlying cellular phone infrastructures in Israel-Palestine. As she shows how cellular infrastructures in the occupied territories are dynamic manifestations of territorial disputes and tensions, Tawil-Souri argues that

the arrangement of telecommunication systems is not merely a metaphor for the conflict; rather, “it is the conflict in material form.” Her chapter focuses on three locations—Migron, Ramallah, and Qalandia—and describes the material infrastructures and regulatory regimes that shape conditions in each. Rather than connecting people, she argues, these infrastructures are critical dimensions of state power and territoriality, and as such they function in ways that divide and disconnect.

The book’s third part, “Content, Protocols, Platforms,” opens with Paul Dourish’s meticulous analysis of the materialities of Internet protocols. Returning to some of the issues addressed in Sterne’s chapter, Dourish focuses on the relationship between content and conduit, which involves both the compression and modulation of signals. Dourish argues that we need to look not only at the materialities of hard infrastructural elements—from buildings to antennae—but also at the materialities of protocols themselves. He directs attention to the relationships between infrastructures and experience, and the micro-level processes by which digital experiences are produced. To address these concerns, Dourish details the development of Internet routing protocols, tracing how they tie networks together and mediate between hard infrastructure and the circulation of content. He contrasts two different protocols, the Routing Information Protocol and the Exterior Gateway Protocol, which emerged in different historical moments and cultural conditions. Examining the social construction of these network protocols, he reminds us, can help us to differentiate the actual Internet—which grows out of specific material constraints—from a possible or imagined Internet.

Also concerned with the issue of Internet protocols, Sarah Harris’s chapter, “Service Providers as Digital Media Infrastructure: Turkey’s Cybercafé Operators,” approaches the topic in a different manner, focusing on circumvention practices in Turkey. Building upon the literature on infrastructural labor, Harris documents the critical role of service providers in the development of today’s digital media systems. She illustrates how an ethnographic approach to media infrastructures helps to connect hard infrastructural forms, such as wires, transmissions towers, and buildings, with soft infrastructural forms, including institutions, protocols, and social practices. Harris suggests that the work of Turkey’s cybercafé operators forms a key component of Internet infrastructure, critically shaping the social topography of media in the country. The cafés and their operators coordinate disparate technologies and communities and are sites where different protocols are negotiated. At the same time, Harris shows, in these locations state infrastructural control, surveillance, and censorship can be undermined.

Also delving into particular protocols and platforms, Christian Sandvig's chapter, "The Internet as the Anti-Television: Distribution Infrastructure as Culture and Power," investigates the architecture used to distribute video over the Internet. Noting the unprecedented volume of online video that now circulates, Sandvig suggests that this distribution has "enabled a radical approach" by generating forms of labor and content that traditional media industries have never seen before. Suggesting that "television and Internet traffic were at first like oil and water," he explores how computer pioneers thought about television in the 1960s and charts a path to more recent practices of caching, streaming, and multicasting. The case of Internet video distribution, he argues, reveals how crucial the study of infrastructure is to understanding the shape, form, and function of media technologies.

Concluding the book, Charles R. Acland's chapter, "Consumer Electronics and the Building of an Entertainment Infrastructure," shifts the discussion away from Internet protocols and describes an emergent constellation of protocols and platforms within contemporary Hollywood. Returning to issues raised by Holt and Vonderau and Starosielski in the book's first part, Acland's chapter explores how Hollywood's "technological tentpoles"—films that strategically promote cross-media commodities and new generations of devices, platforms, and hardware—serve as vehicles for the advancement of a broader technological system. As Acland puts it, a "dispersed network of devices forms an entertainment and informational infrastructure upon which dominant cultural and economic practices transpire." Moving between entertainment industry events and a proliferating field of consumer electronics, Acland shows how audiovisual infrastructure is a product not only of economic priorities, but also of the conceptual frames that are circulated about them.

## Notes

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