

The state-owned TV tower on Mount Botev, built in the early 1960s in Bulgaria's Balkan Mountains, was one of the country's first TV towers, 2007. Photograph by Ivelin Mincov. <https://commons.wikimedia.org/w/index.php?curid=4077912>.



# Reimagining Media Historiographies and Satellite Technologies in Bulgaria: from Intersputnik to Nanosats

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In 2023, a retrofitted satellite earth station in Bulgaria received international acclaim as the world's fastest-growing satellite interconnection service provider. Originally inaugurated in 1977 as part of the Soviet-led Intersputnik network, the station—now known as Plana Teleport—reported a 24 percent revenue increase between 2020 and 2021.<sup>1</sup> This growth reflects the station's strategic diversification into a broad portfolio of services, which has attracted clients ranging from Disney, Paramount, SpaceX, and Eutelsat to national governments, universities, and private shipping companies. Plana Teleport's recent commercial success has not only earned it global recognition but has also repositioned the site as a critical regional hub for broadcasting and data distribution across Europe, Africa, Latin America, and the Middle East. As such, the station's trajectory exemplifies how repurposed Cold War-era infrastructure can be mobilized in contemporary projects of neoliberal development, technological nationalism, and regional economic transformation.

Intrigued by these developments, we conducted fieldwork at Plana Teleport and at EnduroSat—a Bulgarian nanosatellite manufacturing company—in 2023. One of us, a native Bulgarian speaker based in Sweden, has previously researched data center and internet infrastructures in the Nordic countries.<sup>2</sup> The other, based in the United States, has studied the development of postsocialist satellite and wireless systems in Croatia, Slovenia, Kazakhstan, and Mongolia.<sup>3</sup> Together, we explored Bulgaria's diverse informational landscapes to investigate not only the history of satellite systems in a postsocialist context but also the material conditions shaping satellite futures in the region. What kinds of work do satellite infrastructures perform for Bulgaria and Southeast Europe? Who owns and operates these sites? What are these infrastructures made of—and what do they make? How do processes of media distribution become materialized at and through the Plana station?

Studies of postsocialist media systems have often emphasized narratives of *transition*, highlighting shifts in ownership, governance, and market liberalization.<sup>4</sup> Much of this scholarship focuses on the struggles of public service and independent media to survive in troubled contexts shaped by scarce advertising revenues, opaque ownership structures, and persistent state influence.<sup>5</sup> In these accounts, the trouble is frequently attributed to Eastern European socialism and its enduring impact on media systems and professionals.<sup>6</sup> As a result, postsocialist media environments are often portrayed as arenas for thriving nationalism, hate speech, and authoritarianism.<sup>7</sup> At the same time, media scholars have situated infrastructure development in the region within broader negotiations inside and beyond the Soviet sphere of influence, examining the rise of satellite and internet networks and their complex local entanglements.<sup>8</sup>

These perspectives offer important insights, but they can also reinforce reductive tropes about Eastern Europe, casting media systems in countries like Bulgaria as “lagging behind” their Western counterparts or as “lacking capacities” to establish functioning information societies and participatory citizenship. Such interpretations overlook the uneven and nonlinear trajectories of media systems across the region, including Bulgaria’s emergence as a regional hub for electronic engineering and satellite communications.<sup>9</sup> There is thus a pressing need for more granular, materialist, and locally attuned approaches to media history in postsocialist contexts—approaches that do not simply rehearse narratives of economic liberalization but explore how legacy infrastructures shape and enable new forms of technological and epistemic life.<sup>10</sup>

Scholars such as Bernhard Siegert and Marsha Siefert have traced the histories of “legacy infrastructures” like postal systems, telegraphy, and transoceanic cables.<sup>11</sup> Only recently, however, have researchers begun to explore broadcasting and computing in socialist countries as twentieth-century legacy systems.<sup>12</sup> Many socialist-era broadcast infrastructures—radio relay towers, television masts, and satellite ground stations—have fallen into disrepair, been abandoned, or become obsolete in recent years. Yet others have found “new lives” through their repurposing within contemporary digital media industries. These infrastructures continue to bear traces of their socialist, Cold War–era formation even as they now support emergent commercial media cultures.<sup>13</sup>

As Svetlana Boym writes in her insightful analysis of nostalgia and post-communism, “Technology is not a goal in itself but an enabling medium.”<sup>14</sup> In Bulgaria, satellite infrastructure did not develop in isolation but was historically integrated with state science and technology programs, economic planning, and

socialist internationalism. Once a node in the Intersputnik system designed for geopolitical coordination and national broadcasting, today the Plana station facilitates global media and data flows for a vastly different set of actors. The station is imbricated in digital capitalism, functioning as an infrastructure for regional data and entertainment services, big tech ventures, natural resource extraction, and military communication. Rather than treating legacy infrastructure as static or irrelevant, we show how such systems remain embedded in material relations that produce new trajectories of change, while also generating knowledges about those changes.

In the broader context of the so-called NewSpace era—dominated by companies like SpaceX, OneWeb, and Blue Origin—this article offers a grounded counterpoint by examining satellite histories and materialities through a repurposed Intersputnik earth station in Bulgaria.<sup>15</sup> In the process, we experiment with ways scholarly knowledges on postsocialism and satellite technologies can take shape when we move beyond institutional, corporate, or state records and toward a phenomenological-materialist approach that engages physical sites, objects, and sociotechnical relations.<sup>16</sup> To investigate Bulgaria’s legacy infrastructure, we draw inspiration from media archaeology, particularly the work of Siegfried Zelinski, Wolfgang Ernst, and others who challenge teleological accounts of media history. In *Deep Time of the Media*, Zelinski suggests “The history of the media is not the product of a predictable and necessary advance from primitive to complex apparatus.” Instead, he formulates a “variantology of the media” by excavating forgotten or marginal experiments in the history of technical seeing and hearing, and drawing attention to early visionaries whose conceptual foundations were often overlooked or misunderstood in their time.<sup>17</sup>

While we take inspiration from Zelinski’s meticulous and imaginative charting of media’s *longue durée*, we historicize media technologies in a more recent conjuncture. More specifically, we investigate the material objects and temporal relations that constitute satellite infrastructure in Bulgaria. In this way, our approach is more in sync with Wolfgang Ernst’s model of media archaeology, which is focused on technicity and operation. For Ernst, media archaeology is not simply a method of historical recovery but is an “operative” mode of analysis concerned with how media technologies physically function. He describes this as an approach that “makes the machines speak”—examining media devices on their own terms, through their logics, timings, and signal processing protocols.<sup>18</sup> For Ernst, “media archaeology is both a method and an aesthetics of practicing media criticism, a kind of epistemological reverse engineering, and an awareness of moments when

media themselves, not exclusively humans anymore, become active ‘archaeologists’ of knowledge.”<sup>19</sup> His approach attends to discontinuities, disruptions, and technical time, rather than narratives of smooth development or social use.

While we share Ernst’s commitment to material specificity, our work departs from his tendency to abstract technology from its social, political, and affective contexts. Ernst’s materialism, though ostensibly grounded in the physical operations of machines, often results in a kind of formal abstraction—an idealism that privileges the internal logic or temporality of the technical system over its embeddedness in social and embodied worlds. What presents itself as an analysis of material processes thus becomes an analysis of idealized forms: the *machine* is treated less as a situated apparatus than as an abstract model for thinking. Against this tendency, our approach insists on the messier materiality of media in the making, where technologies emerge through layered encounters among bodies, materials, and environments.<sup>20</sup>

We are less concerned with what machines “say” in isolation, or with applying what Ernst calls “the ‘cold gaze’ of distanced understanding” to an autonomous, technical “microstage where there is no human interference.”<sup>21</sup> Instead, we investigate how satellite systems speak through and with people, institutions, territories, and histories—how they materialize through dynamic interrelations rather than in isolation. Our approach thus diverges from media archaeology by embracing a feminist and phenomenological mode of media historiography, one that situates technical objects within lived experience, social memory, and regional specificity.<sup>22</sup> To support this orientation, we turn to Sherry Turkle’s concept of “evocative objects,” and approach satellite infrastructure not only as technical designs and operations but also as sites of affect, labor, and connection. As Turkle suggests, objects carry the power to elicit feeling, reconstitute relations, and draw abstraction into the immediacy of lived experience.<sup>23</sup> Encounters with satellite infrastructure are embodied and sensory, materializing vast technical networks in the realm of human perception and practice. In this sense, infrastructures are not only instruments of transmission but also nodes of attachment, inquiry, and meaning making. Our approach, then, seeks to bridge two strands of research that Ernst positions as incompatible—media archaeology and media phenomenology.<sup>24</sup>

In formulating this approach, we weave together insights from feminist theory, science and technology studies (STS), new materialisms, and media ecologies.<sup>25</sup> Scholars such as Donna Haraway, Annemarie Mol, Bruno Latour, and Karen Barad have shown that materialities—whether of bodies or of technological objects—

do not preexist their contexts but emerge through material-discursive practices shaped by power relations, norms, and values. Such practices define what comes to matter, and how. Drawing on phenomenological embodiment, situated knowledges, and materialist specification, we develop a historiography of media that foregrounds how historical and technological knowledges are produced beyond the conventional archive: how knowledge making is embodied and sensory, experientially and materially entangled with the objects we study, and how such practices matter for making differences in the world. Such concerns have long been at the heart of feminist epistemologies.<sup>26</sup>

Extending this line of thought, we turn to Karen Barad's concept of "intra-action," which posits that knowledge and technology are not separable entities but co-emerge through specific material-discursive practices. As Barad reminds us, "practices of knowing are specific material engagements that participate in the world's becoming."<sup>27</sup> Following this, encounters with legacy satellite infrastructures—repurposed control rooms, dish yards, towers, libraries, and lands—become participatory acts of world making. These sites and objects are not inert remnants of a socialist past but active agents in ongoing technological, political, and affective processes.

Building on this understanding, we move beyond the archival and operative emphases of media archaeology toward an embodied, situated, and feminist media historiography. Our approach resonates with Jack Halberstam's queer notion of "scavenger methodology," which involves eclectic and reparative practices that assemble knowledge from fragments, minor histories, and nontraditional sources.<sup>28</sup> Rather than rely solely on institutional or corporate records, we work with the residues and remainders of infrastructure: mundane technical objects, old satellite dishes, disintegrating newspapers, and personal recollections. These scavenged materials are not peripheral to the history of Bulgarian satellite systems but core to understanding how legacy infrastructures endure, adapt, and continue to matter. In reframing such artifacts, we move away from narratives of technological transition or decline, instead emphasizing the layered temporalities, residual affects, and speculative futures that persist within sites like the Plana station. Neither relics of the socialist past nor fully assimilated into Bulgaria's present, such infrastructure sites are in-between, unfinished, and materially dynamic.

The article unfolds through three movements. It begins by situating the emergence of broadcasting, electronics, and computing in Bulgaria, focusing on the Shipka earth station—later renamed the Plana Teleport—as a key node in Cold War satellite networks. We then offer extended analyses of three evocative objects—a dish, a

crank, and a fence—based on our embodied encounters at the Plana station. The analysis details the entanglements of satellite infrastructure with broader industries, histories, and lived experiences, and interrogates how knowledge about such systems is produced. Our method stages a patchwork of intra-actions across multiple sites: the control rooms and dish yards of Plana, the surrounding mountain landscapes, archival holdings at the Bulgarian State Library, and conversations with former telecom officials, local residents, and technicians. We also visited EnduroSat’s corporate headquarters in Sofia, interviewing senior executives and touring their cubesat design and testing labs. These encounters inspired our experimentation with practices of media historiography and focus on the temporality and materiality of satellite-related objects and infrastructure. Ultimately, our analysis suggests that socialist-era infrastructures are neither inert relics of the past nor entities fully absorbed into digital capitalism, but dynamic, layered formations that endure across multiple temporalities and material forms.

### **Mountains and Electronics: Before Bulgaria’s Intersputnik Station**

Objects and technologies of media transmission are always products of particular historical, industrial, and cultural contexts. Twentieth-century histories of electronic media in socialist countries are unique, even if those countries share certain technological, political, and economic conditions. Bulgaria’s mid-twentieth century media history is distinguished by two factors: its mountainous broadcast infrastructure and its burgeoning electronics industry. Both factors impacted the country’s capacity to build an Intersputnik earth station by the late 1970s, and to become one of the first Eastern European countries to operate satellite broadcast infrastructure. As historian of technology Victor Petrov writes, state programs and investments from the 1950s through the 1980s helped to create a national culture of engineering and expertise in electronics and computer manufacturing.<sup>29</sup> The expertise cultivated during the socialist era continues to shape Bulgaria’s tech industry, informing both the repurposing of this earth station and the country’s current nanosat developments.

Between the 1950s and the 1970s the Bulgarian government launched a series of initiatives to bolster national television infrastructure and catalyze new economic sectors. In 1958 the Ministry of Communication institutionalized national television with the construction of the 106-meter Borisova Gradina TV tower in Sofia. TV broadcasting began the following year. Initially, television signals were “confined to the Sofia plain” because the country’s mountainous terrain made long-distance transmission impossible. To extend coverage across the country, Bulgaria began

building three high-altitude relay stations in 1960, including a twenty-kilowatt transmitter atop Mount Botev, the tallest peak of the Balkan Mountains at 2,376 meters (7,795 feet) above sea level.<sup>30</sup> This mountaintop facility alone covered 17–20 percent of the nation’s territory, at a time when only ten thousand TV sets existed in the country. By 1962, Bulgaria had five broadcast stations airing twenty radio programs, with television and radio signals transmitted in twelve languages across the socialist bloc and beyond.<sup>31</sup> Through its mountaintop relays, Bulgaria established links with broadcasters in Bucharest, Moscow, Budapest, Prague, Vienna, Berlin, and Warsaw. These investments not only laid the foundation for a national television system but also integrated Bulgaria into a wider network of socialist and communist state broadcasting.

By 1966, television ownership in Bulgaria had risen to 287,000 sets, and Bulgarian National TV (BNT) broadcasts reached 60 percent of the country, supported by transmitters in major metropolitan centers like Plovdiv, as well as smaller towns like Pernik and Rousse.<sup>32</sup> The expansion of Bulgarian over-the-air broadcast television—today regarded as legacy infrastructure—was shaped both by socialist state priorities and by Bulgaria’s distinctive topography. A recent study of Bulgaria’s radio and TV transmitters reveals how mountainous terrain determined the historical siting and material form of broadcast infrastructure, emphasizing the topographical uniqueness of this system.<sup>33</sup> Television, after all, has always been about the practical questions of how and where signals could be transmitted and received, and by whom. In the 1960s, Bulgaria’s ability to connect with and share programming across other socialist national broadcasters laid the groundwork for the construction of an Intersputnik satellite station at Plana a decade later, which integrated Bulgarian television into a global communications system.<sup>34</sup> The expansion of terrestrial broadcasting was thus crucial, but it was only one of several developments that enabled the emergence of a Bulgarian satellite industry.

Another key precondition of Bulgaria’s Intersputnik station was the country’s burgeoning electronics industry. The establishment of the Bulgarian Academy of Sciences in 1947 helped to cultivate scientific and technical expertise, and by the 1960s Bulgaria had become “the socialist bloc’s biggest electronics producer.”<sup>35</sup> As historian Victor Petrov observes, “Bulgarian socialism had a different language and image than most of its allies,” positioning the country as a hub of “high technology” rather than heavy industry. Several decades after World War II, Bulgaria was producing computers, electronics, teleprocessing systems, and even space exploration instruments.<sup>36</sup> By the 1980s, it controlled 45 percent of electronic exports within the Eastern Bloc and was described as the “Silicon Valley of the

East.”<sup>37</sup> Employing thousands of trained specialists in electronics, machine building, and power engineering, Bulgaria became a leader in computer manufacturing and carved out niches for itself both within Eastern Europe and in the global market.<sup>38</sup> As Petrov emphasizes, “the size of the sector relative to the rest of the economy, the prestige that the party wanted to derive from it, and the international openings it entailed for a socialist economy” made the entire nation invested in the project of electronics.<sup>39</sup>

Given Bulgaria’s growing electronics sector, it is not surprising that the country began using that expertise to develop satellite, space, and computing technologies.<sup>40</sup> In 1969 Bulgaria established the Scientific Group of Space Physics, later renamed the Space Research and Technology Institute. Its scientists developed the P-2 instrument, which studied the plasma environment in orbit aboard the Soviet Union’s Intercosmos-8 satellite, launched on November 30, 1972.<sup>41</sup> The tracking of satellites and space technologies required computers for telemetry calculations. In 1969 Bulgaria joined the Council for Mutual Economic Assistance (Comecon) Intergovernmental Commission for Computer Technology, and during the early 1970s assisted the U.S.S.R. with the assembly of RYAD computers (comparable to the IBM 360 series).<sup>42</sup>

By the late 1970s, Bulgaria had established a national television network and a robust electronics industry, and was actively developing its own satellite, space, and computer technologies with Soviet support and oversight. Bulgaria’s development of these technologies was based on government-sponsored educational and engineer training programs that cultivated the local knowledge and skills needed to operate emergent communication systems.<sup>43</sup> During this period, Bulgaria also designed and built its own satellite—Bulgaria-1300. Named to commemorate the thirteen hundredth anniversary of the nation’s founding, the first Bulgarian satellite fused together nostalgia and technological nationalism as it articulated the country’s powerful pre-Ottoman era regional influence with its modernizing satellite future. The satellite was launched from the Soviet Union’s Plesetsk Cosmodrome on August 7, 1981, and was equipped with twelve different instruments for studying Earth’s ionosphere and magnetosphere.<sup>44</sup> These space-age achievements were aided by the country’s economic position during the early 1980s, when Bulgaria controlled a 45 percent market share of electronic exports within the Eastern Bloc.<sup>45</sup>

In 1983 the Academies of Sciences of the Socialist Countries convened in Sofia to discuss the “conception of next generation of computer systems” in socialist countries. The meeting gathered scientists from eleven Eastern Bloc nations to a wide range of topics, from “systems knowledge processing” and “image processing

and computer graphics systems” to “computer networks.” Bulgaria assumed a leading role in several of these discussions, including those on “new external storage devices” and “informatics for education.”<sup>46</sup> Participation in such gatherings helped to bolster Bulgaria’s international standing in electronics and computing. By 1985, the country was exporting electronic equipment to twenty nations, including data-processing technologies such as the Estel 21 system and ES 2335 processor.<sup>47</sup> The technological advances of this era expanded Bulgaria’s involvement in terrestrial computing, orbiting satellites, and space-based computing.

Combined, these developments laid the groundwork for Bulgaria’s establishment of the Shipka/Plana teleport. Satellite technologies in Bulgaria emerged from the interplay of an enduring engineering culture, projects of technological nationalism, and shifting market logics, together with the material relations of particular installations and the local systems that sustained them. As we discuss in the next section, the Plana station exemplifies how satellite infrastructures take shape through contingent processes that often defy the neat scripts of state planning or technological determinism.

### **Shipka Earth Station/Plana Teleport**

Since the late 1950s, satellite earth stations have been built around the planet to support the tracking and communication of satellites and spacecraft launched by the U.S.S.R., the U.S., and other nations. Their siting and design depended on a combination of factors, including the physics of telecommunications, geopolitical alliances, environmental conditions, and available labor and energy resources.<sup>48</sup> Bulgaria’s Intersputnik earth station, built in 1976 in a rural field thirty kilometers south of Sofia and surrounded by mountains, became the third Intersputnik earth station in the world. It formed part of an international satellite network still encompassing twenty-five nations and twenty-four stations across five continents. The network was designed to interconnect Eastern Bloc countries during the 1960s and 1970s and to counterbalance the geopolitical reach of the U.S.-led Intelsat system. Through Intersputnik, television and radio broadcasts were shared internationally, and telephony services expanded across member states. As Evans and Lundgren note, Intersputnik’s development required intricate institutional negotiations, technical collaborations, and knowledge exchanges among Eastern Bloc governments and broadcasters within and beyond Europe.<sup>49</sup> The Plana station repeatedly earned recognition as the premier Intersputnik facility, emphasizing Bulgaria’s technological sophistication and strategic importance within Eastern Bloc satellite communications.<sup>50</sup>

From 1976 to 1990, Bulgaria's Intersputnik earth station carried the name Shipka, a term layered with meanings and national symbolism. It invoked the rosehip plant central to Bulgaria's rose industry, the Shipka national memorial complex commemorating Bulgarian soldiers who fought the Ottoman empire in 1868, and the peak of the Stara Planina mountains bearing the same name. In short, "Shipka" articulated the station as both a technological project and nationalist monument. Photographs on the wall of the station's break room record its early history: the phased construction of the site, workers assembling the massive antenna, and posed shots of crews in front of the finished facility. Designed by architect Liubomir Popdonev, the main building typified the modernist aesthetics of Intersputnik stations, with its circular floor plan, curved contours, and reinforced concrete-and-steel structure evoking the form of a spacecraft.<sup>51</sup>

Local sources document the impacts of Shipka's construction. In a coauthored book on the history of the Plana village, former mayor Evtim Zlatkov recalls how residents anticipated that new resources would accompany the project.<sup>52</sup> Indeed Plana's water infrastructure was installed in 1976, the same year the earth station was completed.<sup>53</sup> Yet construction traffic took a toll: heavy-duty vehicles carrying building materials to the Shipka site severely damaged the only road linking Plana to Sofia, disrupting local mobility and trade.<sup>54</sup> Although community members launched a road repair campaign, the road was not reconstructed until a decade later.<sup>55</sup> While the station's construction temporarily limited the physical and socioeconomic mobility of Plana's residents, its operations simultaneously extended the community's electronic and symbolic connections with the world beyond at a time when international travel remained tightly regulated for most Bulgarians.<sup>56</sup>

After the Iron Curtain's fall in 1989, Bulgaria's participation in the Intersputnik network was restructured. The financing of the earth station underwent a series of changes as Bulgaria shifted from a planned to a market economy. A loan from the World Bank and the Bulgarian government funded the purchase and installation of an even larger 18.3-meter Intelsat dish antenna at the station. The intent was to reorient the station's operations toward Western media markets.<sup>57</sup> During this



period, the Plana station continued to be administered by the Bulgarian State Telecom, which was privatized and rebranded as Vivacom in 2004. Despite the addition of a new Intelsat dish, the station struggled to formulate a commercially viable model in a liberalizing telecom market and faced the possibility of shut down. The broadcasting services director who led this transition, Vladimir Rangelov, recalls this period as the tragic ending of a facility that he perceived to be of enormous value: “All operations at Plana stopped in 2007. [The management] decided to shut down and scrap the station.”<sup>58</sup>

A Bulgarian Telecommunication Company (BTC) employee at the time, Rangelov convinced the company’s management to let him try to build the earth station’s business and create a regional teleport. They agreed, and since 2007 Rangelov has played a key role in signing new contracts with national and international clients and leading the teleport’s commercial development. An autodidact, Rangelov taught himself about satellite technology and industry by interviewing former staff of the Intersputnik station and by studying every inch of the station, all its equipment and systems. Rangelov also read books about satellite engineering, attended trade conferences, and connected with high-powered leaders in the satellite and media industries. The former Intersputnik station assumed a second life largely through this informal training, intergenerational knowledge sharing and social network building, and insistence on the potential value of the station to Bulgaria’s economic and communication futures. In other words, this disused legacy infrastructure, deemed to belong to a past era and a political regime whose rule was over, was retrofitted to stimulate regional, cross-sector industrial developments and satellite futures within a neoliberal economy.

Guided largely by Rangelov’s efforts, Bulgaria’s Intersputnik station was renamed the Plana Teleport and transformed from a site with three dishes and no clients in 2007 into a bustling facility with 65 antennas and nearly 50 clients by 2023, including companies like Eutelsat, Disney, Paramount, and Starlink. When we visited the station with Rangelov, the scale of this transformation became apparent. Located an hour’s drive from Sofia, the earth station sits on the forested foothills of the Vitosha and Plana mountains, surrounded by farmland and scattered villages. Reaching the station requires driving through a winding mountain road. Upon approach, a dedicated twenty-kilovolt power line, threading through the forest, discreetly signals the teleport’s presence. The final stretch of road—built for and maintained by the station—stands in stark contrast to the nearby rough municipal roads and serves as the main artery for staff, delivery trucks, state officials, and international clients.

**These early photographs show phases of the Shipka station’s construction and are proudly mounted on the wall of the employees’ break room at Plana Teleport, 2023. Photograph by Julia Velkova.**

The facility occupies a fourteen-acre (60,000 square meter) parcel secured by the Bulgarian government. Its main buildings and dish yard sit in a field of grass, 1,100 meters above sea level, in a microclimate that, according to locals, has the most days of sunshine and clear weather per year in Bulgaria—making it a prime site for satellite communication. The teleport is situated within a landscape shared by a horse stable, hiking trails, and a research center that monitors astronomical and geodetic instruments.<sup>59</sup> A security fence, surveillance cameras, two entrance guard dogs, and an armed guard inside mark the local boundaries of this network node.<sup>60</sup> Together these human and nonhuman actors sustain the station's operations and support its role in global satellite communications.

Inside the dish yard, a newly zoned plot hosts a SpaceX Starlink gateway, while two large C-band antennas installed some years earlier continue to provide broadcast services to the African continent—evidence of the site's expanding industrial relations. Over the past fifteen years, the Plana Teleport has also integrated into national and international fiber networks, including transoceanic cable systems. Between 2013 and 2023 Vivacom invested more than \$10.8 million to develop its satellite services, and since then the Teleport has steadily increased its earnings, landing on the World Teleport Association's list of the ten fastest-growing satellite companies for four consecutive years.<sup>61</sup> Such developments position the Plana Teleport both as a local landmark and as an emergent hub within the global satellite industry.

Historically, Shipka had been a closely guarded, secret facility, yet when Rangelov provided us with a tour of the station, workers at the security gate and in the server and control rooms and dish yard gave us warm welcomes. We were allowed to move through areas inside and outside the station, and, in the process, encountered many objects. One room was full of abandoned equipment—old mainframe computers, amplifiers, and monitors—and contained the first satellite tracking equipment in Bulgaria. Other rooms were packed with server stacks, pulsing with blinking lights and whirring fans. The dish yard hosted antennae of different generations, shapes, and sizes owned by state and commercial entities. Our embodied encounters with these technological objects attuned us to their varied histories, which resist simple transition narratives, and prompted us to isolate and analyze several objects in greater depth. These practices allowed us to critically investigate the station's material transformations over time. Understanding legacy infrastructures like this earth station requires attention not only to institutional trajectories but also to the particularity of its parts—parts that evoke the station's unique relations to time and space, power and history. Climbing onto the earth station's dish platform and moving toward the air through which satellite trans-

**A Soviet-era mainframe  
computer system still sits  
inside the Plana Teleport, 2023.  
Photograph by Lisa Parks.**

missions pass led us to focus on three distinct yet interrelated objects tied to satellite pasts and futures—a dish, a crank, and a fence.

### **Satellite Objects in Bulgaria: Dish, Crank, Fence**

Our sensory encounters with the Plana station and its components inspired an analytical approach that foregrounds the material specificity of satellite histories in Bulgaria while also attending to the objects that make satellite communication possible more broadly. This approach departs from strains of media archaeology that privilege abstraction and technical lineage while minimizing the embodied and social dimensions of media history. Scholars such as Zelinski and Ernst have offered insightful accounts of media technologies, but, as suggested above, they tend to treat them as immaterial logics rather than lived environments. By contrast, our analysis considers how components such as a dish, a crank, and a fence invite handling, movement, and attention in ways that bring forth the material specificity of satellite history. Building on science and technology studies, material culture studies, and streams in anthropology that emphasize the sociopolitical lives of objects, we consider how seemingly mundane objects—often dismissed as unremarkable, even by industry professionals—can evoke overlooked dimensions of satellite technology and situate it within a postsocialist context.<sup>62</sup> These objects are not singular to Plana; similar forms support satellite communication around the world. What embodied encounters with them reveal, however, is how infrastructures exist not as abstract systems or static remnants, but as material, affective, and sociotechnical relations that activate new understandings of media history.

As Sherry Turkle suggests, “choose an object and follow its associations: Where does it take you; what do you feel; what are you able to understand?”<sup>63</sup> Her concept of “evocative objects” highlights the dynamic relations between thinking, knowing, and feeling, offering ways to make theory tangible while defamiliarizing established categories. For us, evocation involves a sensory practice of noticing and analyzing how objects carry implicit properties that reveal, or even embody, dimensions of broader systems.<sup>64</sup> While Turkle encourages “people to use objects to bring theory down to earth,” Joe Dumit’s “implosion method,” examines an object’s multifaceted



“story.”<sup>65</sup> This approach, which draws on work by Donna Haraway and Gilles Deleuze, considers how objects enfold heterogeneous forms of labor, matter, desire, and politics. To “implode” an object, Dumit and Haraway propose, is to awaken to its complex embeddedness in the world, analyzing the material relations, power structures, and knowledge that sustain it—essentially asking: “How is the world in ‘it’? And how is ‘it’ in the world?”<sup>66</sup> These material relations involve both the physicality of objects that make media, and the specific conditions—economic and social relations, resources, experiences, and forces—that are mobilized in their production.

By analyzing a dish, a crank, and a fence we intend not only to “implode” these objects but also to suggest new entry points for historicizing satellite infrastructure, and media technologies more generally. A focus on everyday objects that are integral to satellite broadcast operations extends historical understandings of technology beyond institutional narratives or accounts of postsocialist decline, emphasizing the multiplicity and contingency of things that sustain Bulgaria’s satellite operations. Our study of these evocative objects at the Plana earth station highlights how satellite components are situated in time and space and how knowledge-making practices render them intelligible. At the same time, it demonstrates that global satellite systems rest on an array of ordinary yet indispensable material supports.<sup>67</sup>

### Dish

Upon our arrival at the Plana teleport in the spring of 2023, we encountered large and small dish antennae arrayed across the green field, mounted on the station’s walls, perched on the rooftop, each tilted toward a different point in the sky. Each dish carries its own history and performs a unique role in shaping satellite economies for Bulgaria, other regions, and various customers. The diversity of the dishes’ shapes, sizes, and ages prompted us to consider how these objects participate in multiple projects of scale and region making. As Barad points out, scales are produced intra-actively through one another, shaped by the interplay of local, regional, national, and global forces. “Connectedness,” Barad notes, should not be understood as linkages among preexisting nested scales but as the agential enfolding of different scales through one another, realized discursively and materially.<sup>68</sup>

As we walked through the field of dishes, Rangelov shared histories of each one. These details inflected our embodied experiences of these objects as well as our analyses of their discourses, materialities, and uses. The accounts confirmed the dishes’ connections to neoliberal developments, technological nationalisms,

**The dish yard at Plana Teleport features satellite dishes of different sizes and eras oriented toward multiple orbital positions, 2023. Photograph by Julia Velkova.**

and regional economic transformations—to speculative projects and futurities in Bulgaria and beyond.<sup>69</sup> Each dish has a story: It is manufactured in a particular place, from specific materials, by certain workers, transported to a locale, and installed and (re)used in ongoing operations. A satellite dish materializes state and commercial investments, design and installation practices, and processes of uplinking and downlinking. It is also tied to questions of mobility, pleasure, and taste.<sup>70</sup> Each dish embodies a history of signal transmissions that link people, places, and industries across multiple spatial and temporal scales.

Rangelov mentioned the operators of various dish antennae as we moved through the field. We began near the newer 18.5-meter C-band antennas, walked to smaller commercial and collocated antennas, and ended up on the station's rooftop beside the imposing Soviet-era Intersputnik dish. Over decades, the twelve-meter Intersputnik dish has retained its iconic status and national significance, enduring turbulent political and economic shifts. A national legacy, it has uplinked and downlinked countless signals over its forty-nine years, interconnected dozens of countries, and served as a symbol of Bulgaria's technological modernity. Beyond its role as a national focal point, the dish evokes broader matters. Its carefully architected form produces an abstracted biomimicry—an enlarged ear attuned to ethereal listening or “an eye turned towards the Cosmos,” as the headline of *Otechestven Front Daily*, a socialist Bulgarian newspaper put it.<sup>71</sup> Curving upward and outward, the dish gestures toward extraterritorial domains—orbit, air, and spectrum—signaling its role in shaping planetary politics, technoscientific planning, and informational economies via the circumterrestrial realm. Its imposing mass recalls the entrenched architectures of Cold War geopolitics even as it prefigures more fluid, networked systems of global communication, surveillance, and market-driven connectivity. The dish's weathered surface registers the technicity of upkeep—the cyclical regimes of labor, calibration, and decay that undergird its function within planetary systems. As an evocative object, the dish gathers and refracts temporalities, political economies, and lived experiences—cupping and redirecting them to produce satellitized futures.

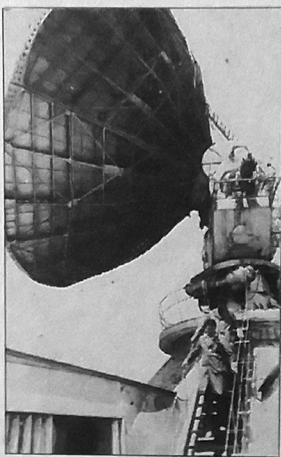
As the oldest dish on the lot, our embodied encounter with its physical presence, the narratives of its histories and futures, the workers who maintain and



operate it revealed how, despite its age, this object is articulated as a source of national pride and interwoven with practices of knowledge, labor, and care. The dish's significance was nationally recognized when, in 1989, Bulgaria's daily newspaper *Rabotnichesko Delo* (*Workers' Cause*) reported that the Shipka Intersputnik station received a regional award for the second time. The article featured a photograph of station workers, Todor Petrov, Detelina Pavlova, and Milcho Zarkov celebrating inside the facility after two engineers, Milan Modev and Simeon Gyrov, completed an inspection.<sup>72</sup> The dish was therefore not only an instrument of transnational broadcasting but also a hub of daily labor, career-making, and social interaction. Even now, workers continue to carry out routine maintenance and repairs on the Intersputnik dish, which remains central to Rangelov's accounts of the station's past and its future significance.

As the only Intersputnik antenna still in operation in Europe, this dish remains a key component of Bulgaria's national scientific infrastructure. Today, it supports multiple communicative functions, including direct links between Bulgaria and Latin America—particularly Cuba—and the Bulgarian scientific mission on the South Pole. Other dishes at Plana Teleport are less publicly visible yet provide commercial services such as relaying hotel television channels, enabling remote operation of regional oil exploration, or broadcasting Serbian-language television, to name a few examples. Another balloon-shaped spherical antenna at the station produces new telecom commodities through the “space-as-a-service” concept, uplinking and downlinking data from low-earth-orbit satellites manufactured by the Bulgarian company EnduroSat, discussed below. These antennas do more than transmit and receive signals: They sit at the fulcrum of regional economies and connectivity services.

Approaching the dish as an evocative object brought forth awareness of the many antennas, clients, laborers, and uses that sustain the Plana station's operations and revenue. Dishes from earlier generations continue to circulate and be repurposed, connecting the station's socialist legacy to its reconfigured present and imagined futures. Paradoxically, older dishes, like the Intersputnik have enhanced the Plana station's value and competitiveness by enabling affordable niche services, such as the geolocation of marine vessels. Meanwhile, newer cubesat dishes have attracted actors from the data and television industries to Bulgaria. The combined use of the socialist-era Intersputnik dish and newer



Милан Модев и Симеон Гюров са завършили проверката на антенното устройство



Дежурни на смяна пред командния пулт са Тодор Петров, Детелина Павлова и Милчо Зарков

antennae have positioned the Plana Teleport as a dynamic node within global satellite infrastructure and services.

### Crank

While standing on the maintenance platform next to the Intersputnik dish, we heard a faint grinding sound. We turned around to find a crank slowly rotating inches away from us. A crank is an ancient technology that enables mechanical power transmission.<sup>73</sup> It relies on a shaft situated near a rotary element to translate linear motion into circular motion. This crank seemed to have a mind of its own; it moved based on system inputs unseen and unknown to us. After asking Rangelov about it, we learned that the crank is connected to an engine and motion system used to move the massive dish. The grinding sound was the crank auto-adjusting the position of the dish to align with a satellite. If this system fails, maintenance workers can use the crank manually to rotate the dish and keep contact with the satellite in orbit. This crank, in other words, turns to enable satellite communication. In the initial years of the station's operation, this crank had to be adjusted manually. Later, satellites in geostationary orbit were synchronized with the earth's rotation, and the dish required only slight readjustment, which could be automated. Standing on the platform on the highest point of the earth station, we watched the crank rotate automatically and reposition the dish to receive signals from a geostationary satellite that slightly drifts. Captivated, we watched the crank for a few minutes and noticed its slow movement steered by a mechanical pendulum, from left to right and back again. As the crank moved, we carefully adjusted our own position on the platform to watch it and secured our grips on the thin iron railing to prevent ourselves from falling over its edge.

As media scholars, we never realized a crank was so integral to satellite communication. Cranks have been essential to manual and automatic recalibrations of many massive satellite dishes since the 1960s. Manufactured in the Soviet Union for this Intersputnik dish, the crank's slow motion intensified our awareness of the

Opposite: A July 13, 1989 clipping from Bulgaria's *Rabotnichesko Delo* (*Workers' Cause*) daily newspaper celebrates a Shipka station award and features photos of employees and inspectors. Photograph of the clipping taken in 2023, by Julia Velkova.

Right: This metal crank is situated on the base of the Intersputnik dish and has been used to adjust the dish's position for decades, 2023. Photograph by Milen Ivanov.



dish's relation to time.<sup>74</sup> A mechanical object made of iron, the crank coordinates two temporal processes. First, it signals the perpetual drift (or asynchrony) between human, technological, and more-than-human forces and, in so doing, exposes the human/economic compulsion to keep them in sync. For instance, the crank helps to regulate the temporality of climate data transmitted from Bulgaria's science team in Antarctica to Plana Teleport. In doing so, the crank keeps these processes "in-time." Second, the crank's slow motion became a figuration of the Intersputnik dish's "untimeliness"; it foregrounded the heft and heaviness of components from an earlier era when objects were manually, rather than digitally, adjusted. Untimeliness does not mean that an object is old, has aged, or become obsolete; rather, something is untimely when it is anachronistic—that is, when its pastness is not yet "used up" and still has value or something distinct to offer in the present, writes Elizabeth Grosz.<sup>75</sup> Made with solid metal and persisting as a mechanical process, the crank appears anachronistic but continues to have steady use and upholds the commercial value of the Plana station services in the present. Put another way, the crank enables the Intersputnik dish to be put back "in-time" economically and materially. In short, this crank has been integral to regional satellite operations and has enabled Bulgaria, which might be considered peripheral to satellite developments, to remain an important actor in the global satellite and logistics industries over time.<sup>76</sup>

Furthermore, the slow, almost continuous, mechanical motion of the crank serves as a poetic defiance of simplistic binaries that segment media eras into digital or analog, postsocialist or socialist, light or heavy, manual or automatic. The crank's circular time movement positions it and the dish as objects that encompass all these terms, and none of them singularly. As an evocative object, the crank brings forth cycles and circularities that complicate teleological understandings of postsocialist media transitions, and suggests the need for further exploration of returns, reworkings, and repurposings, and greater attunement to untimely objects. Media histories that privilege institutional narratives of socialist communication histories tend to erase actors such as the crank as enablers of technological operations and change. Our encounter with the crank turned us toward the power transfers, circular motions, and recalibrations of humans and nonhumans that are core to regional and global satellite transmissions.

## Fence

From the maintenance platform we looked out at the mountains in the distance. They seemed to form a natural barrier around the station. Yet this sense of topo-

**A spiked chain-link fence encloses and secures the Plana Teleport, and sets it apart from the surrounding landscape, 2023. Photograph by Julia Velkova.**

graphical enclosure contrasted sharply with the actual perimeter: a ten-foot-high chain-link fence topped with spikes. Modest in appearance, the fence seemed inadequate for safeguarding the valuable telecom resources inside. Noticing our scrutiny, Rangelov pointed out the less visible security systems that protect the station—security cameras, building access pads, and several armed guards. His comment underscored how infrastructures of security are multifaceted, involving natural, technological, and human elements. In this moment, the fence became more than a physical boundary. It evoked the layered forms of enclosure that structure satellite systems.

Media scholars have noted how techniques of “digital enclosure” trap users in relations with interfaces, online platforms, and economies of monetization that exploit user activity and attention.<sup>77</sup> Such logics emerge from and are embedded in physical infrastructures too. Data centers, for instance, are hidden in Cold War bunkers or behind thick fences, where security measures not only protect but performatively establish the value of what lies inside.<sup>78</sup> Mountains themselves can act as fences, blocking line-of-sight transmissions or shielding adjacent communities from broadcast signals. At the same time, their peaks enable towers to interconnect across distances. At the Plana station, the fence did not simply mark a perimeter; it actively configured how the site was secured, experienced, and imagined in relation to both its immediate landscape and the wider geopolitical and economic terrains it inhabits.

A fence draws a line.<sup>79</sup> It produces an inside and an outside. It designates objects of value and protection, and, in doing so, it encloses, separates, and controls.<sup>80</sup> At first glance, the fence’s connection to satellites may seem counterintuitive, especially given the hypermobilities of objects in orbit. Yet every stage of satellite infrastructure involves fencing. Before a satellite can be launched, its fabrication room must be secured, its launch platform cordoned off, and its orbital slot allocated. The material relations of satellites, it turns out, rely on both literal and figurative fences. The International Telecommunications Union, for instance, manages an elaborate system of invisible fences—orbital paths and positions—that



prevent collisions and minimize frequency interference. On the ground, earth stations and dish yards are fenced to deter interference of a different kind, whether from people, vehicles, or animals.

As an evocative object, the fence crystallizes the paradox of orbital systems built from acts of drawing lines and enforcing enclosures. Satellite constellations themselves encircle Earth, creating a planetary fence that mediates communication. The fence thus reminds us that such infrastructure is not only a vertical “stack” but a situated configuration of intra-actions.<sup>81</sup> It prompts questions: Who or what is being fenced in? Who or what is being fenced out? Who or what is crossing over and why? Earth stations are often sited in remote areas with open pathways to the sky and less potential for electromagnetic or physical interference.<sup>82</sup> Yet their construction can stir local curiosity and concern, as forests are cleared, land is reshaped, systems are buried, and animals displaced.<sup>83</sup> Fences can restrict not only physical access but public knowledge, veiling what happens within. At Plana, the fence, for us, evoked inquiry into how satellite infrastructures figure in local relations of land, labor, and life.

Even as it designates the Plana Teleport as a state-owned facility off-limits to nearby residents and recreationists, the fence intersects with local access roads that link the site to the surrounding terrain. The construction of the Shipka station in the 1970s—and the ongoing need for maintenance crews to service it and nearby facilities—prompted the development of this local road network, which now serves multiple publics. Hikers and mountain bikers, for instance, regularly traverse the four-kilometer stretch from the Plana station to the fenced broadcast relay tower on Muhchel Peak, 4,350 feet above sea level.<sup>84</sup> Built in 1980, the tower originally enabled national television signal reception in the nearby villages, Gorni Okol and Dolni Okol.<sup>85</sup> The fence surrounding the tower both obstructs and intrigues: It regulates and redirects movement and attention, sometimes sparking curiosity about the site’s history, function, or purpose, while at other times rendering it invisible. In this way, the fence shapes the boundaries of perception and knowledge: It mediates how people are socialized to know—or not know—about the satellite and broadcast infrastructures that organize their everyday landscapes and lives.



Relatedly, the very decision to locate the Intersputnik station in Plana can be understood as a form of infrastructural fencing: It cordoned off a remote village to accommodate high-tech communication equipment while relying on expertise drawn from elsewhere.<sup>86</sup> Most local residents, engaged in agriculture and livestock husbandry under Bulgaria's planned economy, were excluded from the specialized labor of dish installation and calibration, which was performed by Soviet and Bulgarian teams, and later by American contractors.<sup>87</sup> Today, the fence remains, with Plana Teleport's staff commuting from Sofia, trained in urban technical universities, and transported to the site by Vivacom.<sup>88</sup> Yet the fenced station has also reshaped local life, diversifying Plana's economy and culture by intertwining agriculture, satellite communication, and outdoor recreation. In this sense, the fence both separates and connects: It encloses a global digital gateway while simultaneously embedding it within the daily rhythms, economic potentials, and social fabric of this rural region.

### **EnduroSat and Satellite Futures**

In previous sections, we explored the mountains, electronics, and evocative objects that figure in the material history of satellite infrastructure in Bulgaria. By approaching infrastructure as a site of encounter and relation, we move beyond state and/or corporate records and institutional perspectives to enliven instead an experimental media historiography shaped by scholarship in feminist STS and new materialisms. Evocative objects are, for us, both figures and forces used to investigate the materialities of satellite infrastructure in Bulgaria and for unsettling ways of knowing and narrating postsocialist media histories.<sup>89</sup> As Donna Haraway reminds us, to figure is to be in a story, to have a role in material-semiotic processes. Figurations are the processes through which objects generate knowledge and meaning. These processes can displace dominant narratives or trouble categories, identifications, and certainties.<sup>90</sup> Our figurations of the dish, crank, and fence summon an array of critical matters: the untimeliness, heaviness, and heterogeneity of dishes and earth stations; the drifts and alignments of interoperability; the fencing in of orbital operations and terrestrial broadcasting. All along we have sought different objects to specify unique satellite histories and materialities in Bulgaria. This pursuit leads us to a final evocative object—a Bulgarian-made cubesat—and a consideration of satellite futures.

Formed in 2015, the Bulgarian company EnduroSat manufactures small satellites known as cubesats and nanosats at facilities in Sofia and Plovdiv, guided by the motto Making Space Universally Accessible.<sup>91</sup> EnduroSat's satellites—about the

**View of the broadcast relay tower on Muhchel Peak as seen from the Plana Teleport, 2023. Photograph by Lisa Parks.**

size of a small packing box (10 × 10 × 10 cm)—carry out operations from remote sensing and climate monitoring to internet service provision. Housed in the chic Obsidian building, EnduroSat’s office walls are covered with images of Earth from orbit and imprinted with slogans like “Space is closer than you imagine.” By 2024 the company employed more than two hundred people from Bulgaria and beyond. When we arrived, EnduroSat’s workers were finishing a complementary company breakfast in meeting rooms that overlook Sofia’s tech district, where Vitosha mountain and another TV tower loom in the distance.

CEO and founder, Raycho Rechev, a Bulgarian leader in global space business, described EnduroSat as offering “space as a service” with “software flexible satellites” instead of “one-off missions.”<sup>92</sup> It aims to position itself as an “infrastructure builder in orbit” by producing smaller, adaptable, and disposable buses. EnduroSat markets its satellites as “platforms,” priced between US\$66,000 and US\$1,750,000.<sup>93</sup> By 2023 the company claimed a production capacity of ten satellites per month with a two-week delivery time.<sup>94</sup> Its clients now range from Botswana to Switzerland, and in 2024 EnduroSat opened a new office in Denver, Colorado. The company uses phrases like “Your data is our business” and “Democratization of orbit is our dream.”<sup>95</sup>

Some of EnduroSat’s satellites launch with SpaceX from Vandenberg Space Force Base (VSFB) in Lompoc, California. The cubesats are carefully packed in Sofia, shipped by DHL to VSFB, inspected and tested by SpaceX’s integration analysts, and then bundled with other satellites aboard Falcon 9 rockets. That DHL



EnduroSat’s corporate headquarters and satellite fabrication facilities are housed in the modern Obsidian building in Sofia, Bulgaria, 2023. Photograph by Lisa Parks.

can courier a Bulgarian satellite across the Atlantic for a group launch epitomizes a new era of satellite logistics. Whereas, once, a single state or firm would occasionally send one satellite aloft, SpaceX now sells “rideshares” that launch swarms of satellites together. Within this reorganization of global space economies, Bulgaria’s EnduroSat has become an emergent world player by specializing in small-satellite manufacturing and new orbital platforms.

Satellite futures—globally and in Eastern Europe—involve aging Intersputnik systems and emergent smallsats, state-led socialist legacies and flows of global capitalism. The cubesats traveling from Sofia to California and into orbit remain indelibly linked to the Intersputnik network, its infrastructures, and their retrofitting. Even as EnduroSat brands itself as a “disruptor” and a platform of democratization, its satellites still depend on inherited ground systems and orbital architectures. Our analysis emphasizes the continuities and frictions of legacy and emergent systems, tracing their overlapping materialities and temporalities.<sup>96</sup> The evocative objects at the Plana Teleport reveal how the Soviet-era network’s legacy continues to inflect Vivacom’s strategic position in global satellite and media industries. Not simply a Cold War relic, Plana has been actively repurposed as a gateway for nanosatellite and broadcast futures, where humans and nonhumans converge to sustain and renew its relevance.

The Plana station and EnduroSat together signal a paradigm shift toward infrastructures imagined as flexible, lightweight, and democratic. Yet our analysis insists on grounding these imaginings in the material histories of mountains, towers, dishes, cranks, and fences—objects that allow embodied, sensory encounters as well as critical inquiry. This stance departs from some tendencies of media archaeology, which privilege abstraction, system logics, or disembodied temporalities while overlooking how technologies are felt, handled, and lived with. Our historiographic approach foregrounds the temporal depth and material heterogeneity of everyday components and critiques the tendency to fetishize abstract operations or advance frictionless narratives of service, information, and flow. Attending to the dish, crank, and fence as evocative objects pushes back against the technocratic language that can circulate in both media archaeology and commercial space ventures. By emphasizing an experiential feminist method that is phenomenological as well as political, we offer a counterpoint to discourses—whether in strands of media theory or corporate boardrooms—that risk abstracting away the materialities and plural temporalities that undergird satellite infrastructures.

By engaging with objects and infrastructure sites phenomenologically and materially, we offer a historiographic method attuned to the lived and multitemporal

dimensions of media systems, particularly in regions too often framed through lenses of belatedness or deficiency. This approach reworks media archaeology into a situated, feminist, and materialist practice, one that recognizes the potential of infrastructures to shape the present—not through obsolescence, but through their capacities to mediate new relations, generate emergent uses, and produce alternative epistemologies. Infrastructures like the Plana Teleport are neither decaying remnants of socialism nor fully subsumed into the logics of digital capitalism. Instead, they persist in temporal and material multiplicities, where Cold War geopolitics, commercial ventures, and speculative futures intersect, producing emergent regional media and ways of imagining the histories and possibilities of satellite technologies.

## Notes

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18. Wolfgang Ernst, *Technológos in Being: Radical Media Archaeology & the Computational Machine* (Bloomsbury Academic, 2021), 6; also see Elodie A. Roy, “For a Radical Media Archaeology: A Conversation with Wolfgang Ernst, NECSUS, 28 May 2017, <https://necsus-ejms.org/for-a-radical-media-archaeology-a-conversation-with-wolfgang-ernst/>.

19. Ernst, *Digital Memory and the Archive*, (University of Minnesota Press, 2012), 55. Ernst explains, “Media archaeology, which is concerned with techno-cultural processes, is both a self-reflexive method and an archival object of research” (41).

20. We greatly thank a reviewer of the article for helping us to articulate this point.

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27. Barad, 2007, 91.

28. Jack Halberstam, *Female Masculinity* (Durham: Duke University Press, 2019), 13. As Halberstam suggests, “queer methodology attempts to combine methods that are often cast as being at odds with each other, and it refuses the academic compulsion toward disciplinary coherence.”

29. Petrov, *Balkan Cyberia*.

30. D. Todorov, “Press and Broadcasting,” 213.

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35. Petrov, *Balkan Cyberia*, 5.

36. Petrov, 4.

37. Petrov, *Balkan Cyberia*, 5. Also see Gabriel Varaljay, "The Pioneering Spirit of Socialist Bulgaria: A Retrospective on the Nation's Flourishing Computer Manufacturing Industry," *Medium*, 18 April 2023, <https://medium.com/@gabrielvaraljay/the-pioneering-spirit-of-socialist-bulgaria-a-retrospective-on-the-nations-flourishing-computer-dae947240677>.

38. Boyan Aspruhov, "Technology in Bulgaria in the Second Half of XX Century," *International Scientific Journal "Science, Business, Society,"* 7, no. 2 (2022): 79–81, <https://stumejournals.com/journals/sbs/2022/2/79.full.pdf>; Alexander Andreev and Alexey Pomigolov, eds., *Zeroes and Ones Go Olympic* (DataArt IT Museum, n.d.), accessed 21 November 2025 at <https://oi.dataart.com/>; Svetoslav Todorov, "A New Electronic Generation," *Vij and DataArt*, n.d., <https://bulgarianit.vijmag.bg/article-en-1.html>; Petrov, *Balkan Cyberia*, 6.

39. Petrov, *Balkan Cyberia*, 8.

40. P.S. Getsov, "Bulgarian Space Studies: Past, Present and Future," in *Proceedings of the International Conference on Recent Advances in Space Technologies, 2003. RAST '03* (IEEE, 2024), 542–546.

41. Svetoslav Alexandrov, "Bulgarians Still Dream of Space Four Decades after Their First Crewed Mission," *Space Review*, 14 January 2026, <https://www.thespacereview.com/article/3638/1>.

42. "Soviet RYAD Computer Program ER-RP-73-15," CIA, August 1973 (released in 1998), 11, accessed 21 November 2025 at [https://www.cia.gov/readingroom/docs/DOC\\_0000309585.pdf](https://www.cia.gov/readingroom/docs/DOC_0000309585.pdf).

43. See Petrov, *Balkan Cyberia*.

44. K. Serafimov et al. "First Results of the Bulgaria-1300 Satellite Experiment," *Acta Astronautica* 10, nos. 5–6 (1983): 263–268. This satellite was also known as Intercosmos 22. Also see, "The prototype of the first Bulgarian satellite in orbit around the Earth will soon be exhibited in Stara Zagora," *Bulgarian National Radio*, 6 June 2022, <https://bnr.bg/en/post/101667054/the-prototype-of-the-first-bulgarian-satellite-in-orbit-around-the-earth-will-soon-be-exhibited-in-stara-zagora>.

45. Petrov, *Balkan Cyberia*, 5.

46. Victor Zakharov and Yuri Lavrenjuk. "Conception of New Generation Computer Systems: The Last Large-Scale Initiative in Computers of the COMECON Countries: A Glance after Twenty Years" (Paper presentation, First Soviet and Russian Computing (SoRuCom), Petrozavodsk, Russia, July 2006 (no page numbers), accessed 10 December 2025 at <https://inria.hal.science/hal-01568395/document>.

47. David Binder, "Bulgaria's Ambitious High-Tech Goals," *New York Times*, 4 July 1985, <http://www.nytimes.com/1985/07/04/business/bulgaria-s-ambitious-high-tech-goals.html>. Also see Petrov, *Balkan Cyberia*, 98–106.

48. For relevant research on satellite earth stations and launch facilities see: Pedro Ignacio Alonso and Hugo Palmarola, "NASA in Chile: Technology and Branding of a Satellite-Tracking Station," *Design Issues* 33, no. 2 (2017), 31–42; Siddiqi, "Another Space"; and Parks, "Global Networking and

the Contrapuntal Node: The Project Mercury Earth Station in Zanzibar, 1959–64,” *ZMK* 11 (2020): 40–57.

49. Evans and Lundgren, *No Heavenly Bodies*.

50. See, for instance, press clipping in the Bulgarian daily *Trud*, 25 December 1976 (issue 303), 9332. A second television channel was added in 1980 in connection to the broadcast of the Olympic games in Moscow.

51. For further discussion of Intersputnik station architecture see Evans and Lundgren, *No Heavenly Bodies*, 91–125.

52. Evtim Zlatkov and Spas Velev, *Selo Plana: Istorija, legendi i dejstvitelnost* (Sofia: Svjat 2001, 2004).

53. Zlatkov and Velev, 145.

54. Zlatkov and Velev, 147.

55. Zlatkov and Velev, 150.

56. Shaun Moores, *Satellite Television and Everyday Life: Articulating Technology* (Luton: University of Luton Press, 1996).

57. U.S. Congress, Office of Technology Assessment, *U.S. Telecommunications Services in European Markets, OTA-TCT-548* (Washington, DC: U.S. Government Printing Office, August 1993).

58. Rangelov, interview by Parks and Velkova, 23 April 2023.

59. “Geodesic Observatory ‘Plana,’” National Institute in Geophysics, Geodesy, and Geography, accessed 21 November 2025, <http://www.niggg.bas.bg/en/observatories/geodesic-observatory-in-plana/>.

60. For further details on the design of Intersputnik stations see Evans and Lundgren, *No Heavenly Bodies*, 105–108.

61. Antonia Kakalova-Gray, “Vivacom leads globally in B2B satellite services revenue growth,” *SeeNews*, 20 January 2023, <https://seenews.com/news/bulgarias-vivacom-leads-globally-in-b2b-satellite-services-revenue-growth-1223225>; Vivacom/United Group, “Vivacom Is Again in Top 10 Fastest Growing Satellite Companies Globally,” press release, 23 January, 2024, available at: <https://united.group/vivacom-is-again-in-top-10-fastest-growing-satellite-companies-globally/>. In recognition of these developments, the company’s owner, United Group committed to allocate US\$2.6 billion for further investments to Vivacom for all its operations.

62. See, for example Joseph Dumit, “Writing the Implosion: Teaching the World One Thing at a Time,” *Cultural Anthropology* 29, no. 2 (2014): 344–362; Haraway, *Staying with the Trouble: Making Kin in the Chthulucene* (Durham: Duke University Press, 2016); Bruno Latour, “The Berlin Key or How to Do Words with Things,” in *Matter, Materiality and Modern Culture*, ed. Paul Graves-Brown (London: Routledge, 1991), 10–21; Arjun Appadurai, ed. *The Social Life of Things* (Cambridge, UK: Cambridge University Press, 1986); and Igor Kopytoff, “The Cultural Biography of Things: Commoditization as a Process” in *Social Life of Things*, 64–91.

63. Turkle, *Evocative Objects*, 16.

64. Martha Lampland, “The Illusion of Abstraction,” *Comparative Studies in Society and History* 65, no. 1 (2023): 4–26. This point resonates with Lampland’s analysis of “formalizing practices” in Hungary, by which she means “a series of actions or operations that make quantification, rationalization, and standardization possible” (1). Her work on time and motion studies in this context draws attention “to the activities entailed in realizing formal structures, procedures that tend to be overlooked

as incidental rather than constitutive” (7). As she explains, “Entailed in all these procedures is an attempt to select and isolate features and exemplify a specific phenomenon or social process (6). According to Lampland, “Where something happens, and when, is significant, not some colorful irrelevant background story” (23–24).

65. Turkle, *Evocative Objects*, 17, 226.

66. Dumit, “Writing the Implosion,” 351.

67. Raymond Williams, *Television: Technology and Cultural Form* (London: Routledge, 1974); also see Parks, Velkova, and Sander de Ridder, eds. *Media Backends: Digital Infrastructures and Sociotechnical Relations* (Champaign: University of Illinois Press, 2023).

68. Barad, *Meeting the Universe Halfway*, 245.

69. Charlotte Brunson, “Satellite Dishes and the Landscapes of Taste,” in *The Audience and Its Landscape*, eds. James Hay, Lawrence Grossberg, and Ellen Wartella (New York: Routledge, 1996), 343–357.

70. Moores, *Satellite Television*; Brunson, “Satellite Dishes”; and Parks, “Technostruggles and the Satellite Dish: A Populist Approach to Infrastructure,” in *Cultural Technologies: The Shaping of Culture in Media and Society*, ed. Göran Bolin (London: Routledge, 2012), 64–85

71. “An Eye Turned towards the Cosmos,” [Космическото „око“ на Плана] *Otechestven* [*Front Daily*], issue 10826, 5 May 1980.

72. *Rabotnicheskio Delo*, issue 13213, 12 July 1989.

73. Lynn White Jr., “Of Cranks and Crankshafts: The Curious Question of Mechanical Power Transmission,” in *Fifty Years of Medieval Technology and Social Change*, ed. George Brooks (London: Routledge, 2019).

74. Isabelle Stengers, “The Insistence of Possibles: Towards a Speculative Pragmatism,” *Parse*, no. 7 (Autumn 2017), <https://doi.org/10.70733/w8eviu210>.

75. Elizabeth Grosz, “The Untimeliness of Feminist Theory,” *NORA—Nordic Journal of Feminist and Gender Research* 18, no. 1 (2010): 48–51. For further discussion of the untimely, see Friedrich Nietzsche, *Untimely Meditations*, trans. R.J. Hollingdale (Cambridge, UK: Cambridge University Press, 1997); and Gilles Deleuze, “Nietzsche,” in *Pure Immanence: Essays on a Life*, trans. Anne Boyman (New York: Zone Books, 2005).

76. See also David L. Edgerton, *The Shock of the Old: Technology and Global History since 1900* (London: Profile Books, 2006).

77. Mark Andrejevic, “Surveillance in the Digital Enclosure,” in *The New Media of Surveillance* (London: Routledge, 2009); Nick Seaver, “Captivating Algorithms: Recommender Systems as Traps,” *Journal of Material Culture* 24, no. 4 (2019): 421–436; Natasha Dow Schüll, “Digital Containment and Its Discontents,” *History and Anthropology* 29, no. 1 (2018): 42–48.

78. A.R.E. Taylor, “Concrete Clouds: Bunkers, Data, Preparedness,” *New Media & Society* 25, no. 2 (2023): 405–430; Velkova, “Retrofitting and Ruining.”

79. Cornelia Vismann, “Starting from Scratch: Concepts of Order in No Man’s Land,” in *War, Violence, and the Modern Condition*, ed. Bernd Hüppauf (Berlin: Walter De Gruyter, 1997).

80. There are resonances between the fence and the door that could be further discussed. See Bernhard Siegert’s important analysis of the door and the ordering of inside and outside in *Cultural*

*Techniques: Grids, Filters, Doors, and Other Articulations of the Real*, trans. Geoffrey Winthrop-Young (New York: Fordham University Press, 2015).

81. Benjamin Bratton, *The Stack: On Software and Sovereignty* (Cambridge, MA: MIT Press, 2015).

82. Alonso and Palmarola, "NASA in Chile."

83. For further discussion see Darin Barney and Patrick Brodie, eds., *Media Ruralities* (Durham: Duke University Press, 2026).

84. See, for example, the forum thread "The Plan: vr. Muhcel" on the hiking website *Mountain Forum*, 17–18 March 2025, <https://forum.bg-turist.com/viewtopic.php?p=168302&sid=f5edd19a5b68feaaaabd3d4fd97e4b24>; the Facebook page for the one-day hike to the peak in 2021: [https://www.facebook.com/events/плана-планина/еднодневен-поход-изкачване-на-връх-мухчел-1326-м-нв-в-плана-планина/155010276335393/?locale=bg\\_BG](https://www.facebook.com/events/плана-планина/еднодневен-поход-изкачване-на-връх-мухчел-1326-м-нв-в-плана-планина/155010276335393/?locale=bg_BG); and the 26 May 2020 blog account of a fitness trainer who went in to the peak (in Bulgarian), <https://nikolabull.blogspot.com/2020/05/24-39-1337-2.html>. All accessed 29 September 2025.

85. Zlatkov and Velev, *Selo Plana*, 89.

86. Zlatkov and Velev, 88.

87. Zlatkov and Velev, *Selo Plana*.

88. Rangelov, interview.

89. By materialities, we are referring to both the physicality of objects that make "media," and the material conditions—economic and social relations, experiences, and forces—that are mobilized in their production. See Anna Munster, "Materiality," in *John Hopkins Guide to Digital Media*, ed. Marie-Laure Ryan, Lori Emerson, and Benjamin Robertson (Baltimore: John Hopkins University Press, 2014), 327–330. Feminist philosopher Elizabeth Grosz claims materialism requires an interest in both material objects and material forces that exert effects on objects. Also see Grosz, "Untimeliness of Feminist Theory."

90. Haraway, *Modest\_Witness@Second\_Millennium.FemaleMan\_Meets\_OncoMouse: Feminism and Technoscience* (New York: Routledge, 1997).

91. "Making Space Universally Accessible," EnduroSat, 2025, <https://www.endurosat.com/>.

92. Raycho Rechev and Viktor Danchev, interview by Parks and Velkova, 27 April 2023.

93. "Buy Satellites and Modules," EnduroSat, 2025, <https://www.endurosat.com/products/>.

94. "Fastest Ever," EnduroSat, 17 November 2023, <https://www.endurosat.com/news/fastest-ever/>.

95. Jason Rainbow, "EnduroSat Gets Order for Botswana's Debut Satellite," *SpaceNews*, 3 July 2024, <https://spacenews.com/endurosat-to-build-botswanas-debut-satellite/>. See also Raychev and Danchev, interview.

96. For a critique of the new satellite economy and corporate claims of democratization and universal service, see Matthew Graydon and Parks, "Connecting the Unconnected: A Critical Assessment of US Satellite Internet Services," *Media, Culture & Society* 42, no. 2 (2019): 260–276.