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# Looking back to look forward: 5G/COVID-19 conspiracies and the long history of infrastructural fears

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## Abstract

Almost as soon as the COVID-19 pandemic began spreading throughout much of the world, conspiracies arose that blamed the virus on the deployment of fifth-generation cellular networks (5G) infrastructure. These conspiracies had significant consequences, including protests against 5G and the destruction of 5G infrastructure. This article uses a media genealogy approach to place the 5G/COVID-19 conspiracies within the long and recurring cycle of conspiracies focused on mobile infrastructure. Placed within that broader history, this article argues that the 5G/COVID-19 conspiracies should have been unsurprising, and these types of infrastructural conspiracies should be a more significant part of mobile media and communication (MMC) research because infrastructures are an often invisible, yet crucial, part of the mobile practices studied within MMC research. The article concludes by theorizing about why mobile infrastructures are such a frequent target for conspiracy theories and argues that researchers should begin planning now for combatting the conspiracies that will almost inevitably arise when the next generation of mobile infrastructure gets linked to fears about public health.

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**Introduction**

When the COVID-19 pandemic began spreading in early 2020, conspiracy theorists almost immediately began linking the emerging virus to fifth-generation cellular networks (5G) mobile infrastructure (Frith, 2020). Many people assumed that 5G/COVID-19 conspiracies were a joke, but the conspiracies stopped being funny when they began having real-world consequences. In the United Kingdom, people destroyed 5G cell towers because of COVID-19 fears. In the United States, Australia, and Europe, many city meetings featured citizens protesting against local 5G licenses because of concerns about COVID-19 (Meese et al., 2020). In Africa's leading markets, viral posts linked 5G to everything from COVID-19 to vampirism, fueling anxiety and threatening development in the region (Bruns et al., 2020; Wanjau, 2020). If the last decade has taught us anything, it is that bizarre conspiracies that start in niche online communities can quickly spread and have real-world consequences.

The 5G/COVID-19 conspiracies seemed to come out of nowhere and take people by surprise, but this article shows that the roots of those conspiracies trace back more than 50 years. Consequently, we help construct an explanation for why 5G/COVID-19 conspiracies arose almost immediately with the pandemic by placing them within the long history of health controversies surrounding wireless infrastructure. To do so, we use a methodological approach called "media genealogy" (Monea & Packer, 2016). As Foucault (1977, p. 31) argued, a genealogy is a "history of the present" that examines specific past moments of juncture to help explain contemporary events. Monea and Packer (2016) explain that media genealogies apply this approach to communication technologies to examine specific moments that have shaped contemporary structures. Thus, media genealogies are not meant to be complete histories of a phenomenon, and the "analysis must always be in some sense iterative and limited" (Monea & Packer, 2016, p. 3154). This article uses a media genealogy approach to trace health conspiracies through multiple generations of mobile infrastructure. Our argument is not that earlier health conspiracies *caused* the 5G/COVID-19 conspiracy. Rather, we use these crucial moments of juncture to show how they made next-generation 5G infrastructure an easy target for conspiratorial thinking, especially when linked to a global pandemic. The genealogy detailed throughout this article suggests that not only should 5G/COVID-19 conspiracies have been unsurprising, they should have been expected.

While most mobile media and communication (MMC) research focuses more on uses of mobile media than the infrastructures that shape those uses, there is a growing tradition in the field that shows why mobile infrastructure cannot be separated from the practices it supports (Frith & Özkul, 2019; Horst, 2013). As Ling and Donner put it, "It is the networks, not the handset, that allow us to connect" (Ling and Donner, 2008, p. 31). This article builds upon that tradition by uncovering the historical roots of an important moment of juncture and hypervisibility for 5G mobile infrastructure, which has been widely regarded as the future of mobile communication (Gohil et al., 2013). As we

show, although usually invisible (Star & Ruhleder, 1996), communication infrastructures can also pass through moments of hypervisibility (Frith, 2019; Larkin, 2013), a concept we return to later to conceptualize why mobile infrastructures have often been a target of conspiracies.

To establish our “history of the present,” the next section examines research on conspiracy theories. We then explain why infrastructural conspiracies are relevant to mobile communication scholars before exploring the long history of conspiracies about communication infrastructure and disease. We use these historical moments of infrastructural conspiracies to help explain why it should have been expected that 5G/COVID-19 conspiracies would gain a following, and we transition from that longer history to some specificity about the rise of 5G/COVID-19 conspiracies. The article concludes by theorizing about *why* mobile communication infrastructures are often the focus of conspiratorial thinking and discussing the broader implications for the future of mobile communication. The aims of this article reach beyond a genealogical account to help explain 5G conspiracies. That historical context is a primary contribution, but we also set our sights toward the future and argue that we should start preparing now for health-related conspiracies that will likely arise with whatever is deemed as a “next-generation” advancement in mobile infrastructure.

## Contours of conspiracy theories

The idea that 5G mobile networks were somehow causing or spreading COVID-19 is a prime example of a conspiracy theory, a term that has been defined frequently in scholarship. Legal scholar Fenster defines conspiracy theories as the “conviction that a secret, omnipotent individual or group covertly controls the political and social order” (Fenster, 2008, p. 1). Similarly, Uscinski defines a conspiracy theory as “an unauthoritative accusatory perception that a small group of powerful individuals acted/are acting/will act in secret for their own benefit” (Uscinski, 2020, p. 41). In his synthesis of various definitions, Fuchs defines conspiracy theories as “an explanation of aspects of society that claims that there is a secret group that executes a conscious, sinister plan for obtaining or exercising (world) domination, pulls the strings of power behind the back of ordinary citizens...and all official interpretations of events must necessarily be manipulated and deceptive” (Fuchs, 2021, p. 67). Those are just three of many definitions of conspiracy theories, which can deviate but typically share two primary contours: (1) conspiracy theories tend to blame powerful forces for unfortunate events; and (2) conspiracy theories often refuse to accept randomness and chance; they “assume everything has been planned and nothing happens by coincidence” (Butter & Knight, 2020, p. 1).

One important point about conspiracy theories is that the term is mostly, but not always, pejorative. Most conspiracy theories are false, and many are damaging. For example, the false QAnon conspiracy has led to violent reactions from many of its adherents, including in the January 6th, 2021, uprising at the U.S. Capitol in Washington, DC. However, just because something is a conspiracy does not necessarily mean it is false. Historically, conspiracies about events such as the Gulf of Tonkin incident or more recently Jeffrey Epstein’s global sex trafficking ring ended up being true. In addition,

there are gradations of unbelievability of conspiracy theories. Some conspiracy theories, whether true or not, are able to marshal more evidence than others that are far more outlandish. Consequently, labeling something as a conspiracy is often pejorative, but it does not automatically mean that the conspiracy is wrong.

Another important point about conspiracy theories is that they are not new. For example, conspiracies have targeted Jewish people for centuries, fueling violence, trauma, and war (Johnson, 2012). Conspiracies may have an increased sense of visibility through social media (e.g., QAnon), which has led some people to regard the current moment as a “golden age” of conspiracies (Stanton, 2020). However, conspiracy theories have a long history, and some studies even suggest that conspiratorial thinking has remained fairly consistent over time. In one study, political scientists Uscinski and Parent (2014) analyzed a sample of more than 100,000 letters to the editor published in the *New York Times* between 1890 and 2010. They found that published letters trumpeting various conspiracies remained significant and consistent (~1% of their total sample) over that 120-year period.

Furthermore, conspiracy theories are rarely isolated. As Brotherton (2015) 2015 4] argues, “Conspiracism is a lens through which the world can be viewed, and it has the potential to distort everything in its field of vision” (location: 1,299). Consequently, people who believe in one conspiracy often believe in multiple conspiracies, which Kay found when he interviewed 9/11 “truthers” and noticed that almost all of them believed in other conspiracies as well: “Scratch the surface of a middle-aged 9/11 Truther, and you are almost guaranteed to find a JFK conspiracist” (Kay, 2011, p. 121). As Brotherton (2015) notes, most studies of people’s beliefs in conspiracy theories find that “belief in one conspiracy theory correlates with belief in others—even when there’s no obvious logical connection between the theories” (location: 1,425). In maybe the most glaring example of this phenomenon, Austrian researchers made up a conspiracy that the Red Bull energy drink causes testicular cancer and then surveyed people’s belief in that fiction. They found that “belief in the entirely fictitious conspiracy theory was significantly associated with stronger belief in other real-world conspiracy theories” (Swami et al., 2011, p. 443). The lesson: believers in conspiracy theories tend to be capacious in their ability to weave events together and accept unrelated conspiratorial narratives.

While a full review of research on conspiracy theories is beyond the scope of this article, this overview has addressed a few keys to conspiratorial thinking that are relevant to our broader project of situating 5G/COVID-19 conspiracies in historical context. To summarize, conspiracy theories:

- typically blame powerful forces for unfortunate events;

- tend to feature complicated explanations for events more easily explained by coincidence or randomness;

- are not necessarily wrong. Most are (like the outlandish 5G/COVID-19 conspiracy), but some conspiracies do have elements of truth;

- have a very long history and, while they may be exacerbated by digital communication, have likely always been a prominent part of human thinking; and

are rarely isolated. Conspiracies lay the ground for other conspiracies, and studies have shown that people who strongly believe in one conspiracy typically believe in multiple conspiracies.

Based on these points, we argue against treating the 5G/COVID-19 conspiracy as just a fringe narrative that operates in isolation. Instead, to fully understand the roots of 5G conspiracies and why similar infrastructural conspiracies will likely sprout again, it is important to examine the history of conspiracies about wireless infrastructure and disease. As we address in the next section, some of these conspiracies are not as outlandish as those linking mobile networks to a virus, but they have laid the groundwork for well over 50 years by blaming wireless infrastructure for various forms of health ailments.

## **Infrastructure studies and wireless conspiracy theories**

Mobile communication scholarship is still fairly young, and understandably most research has focused on how people use mobile phones (Campbell, 2019). However, as multiple scholars in the field have pointed out, the device is only one part of mobile media. As the editors of this journal argued in the inaugural issue, “Focusing too much on an existing tradition (namely, ‘mobile phone research’) would hinder the further evolution of academic inquiry” (Jones et al., 2013, p. 4). One MMC tradition that is not phone-centric places focus on infrastructure (Horst, 2013). Mobile infrastructures, after all, are the deeper layer that enables the social practices scholars typically study. Without the infrastructures, there are no apps, no texting, no calling, and so on.

Material infrastructures tend not to be a primary interest in the humanities and social sciences. However, a growing field of transdisciplinary research called “infrastructure studies” conceptualizes the formative role that infrastructures play in shaping the world. As Star and Ruhleder (1996) argue, infrastructures are often portrayed as a neutral layer that simply support higher-level practices, but they are actually active agents that shape those practices, which has been true for mobile communication. The early mobile coordination practices documented by scholars (e.g., de Souza e Silva, 2006 ; Ling, 2004) were enabled by the development of second-generation cellular networks (2G) and various standards for texting capabilities. The growth of smartphones and mobile applications is often linked to the release of the original iPhone, but the third-generation cellular networks (3G) auctions of the early 2000s were key to that development (Frith, 2015; Goggin, 2010). By no means did these infrastructures determine the mobile social practices that then developed, but drawing from infrastructure studies research (Larkin, 2013), they did play a role in enabling and shaping those practices.

One of the core contributions of infrastructure studies has been conceptualizing what it means for something to be infrastructure. While a full discussion of that scholarship is outside the scope of this article, one particularly relevant point is that infrastructures tend to be mostly invisible and unnoticed except in moments of breakdown (Star & Ruhleder, 1996). They are mysterious, often highly technical structures that people rarely think about. In some cases, mobile infrastructures are even built to fade into the environment and become invisible in quite literal ways (Parks, 2010). However, the invisibility of infrastructure can be overstated because, as Larkin (2013) points out,

infrastructures can go through moments of hypervisibility. Mobile infrastructures, for example, can become the focus of marketing, as research has shown on fourth-generation cellular networks (4G) in India and now 5G in China and the United States (Campbell et al., 2021; Mukherjee, 2018). They are not *always* invisible, and the moments of hypervisibility are important junctures when the social imaginaries of infrastructures are shaped before they begin fading into the background.

The 5G/COVID-19 conspiracies were a moment of hypervisibility when a nascent mobile infrastructure intersected with a global pandemic and became the target of conspiracy theories. Drawing from infrastructures studies, we argue that those conspiracies represent a juncture where a “next-generation” infrastructure became highly visible with significant consequences. Importantly, the COVID-19 pandemic was far from the first time that mobile infrastructures went through periods of hypervisibility because of health concerns and conspiracies. The next section demonstrates a notable pattern, with each infrastructural advancement surrounded by conspiracies about secret and serious health hazards brought on by wireless networks and cellular radio towers. We will return to the concept of hypervisibility in our final section to theorize about why mobile infrastructures are such a common target for health conspiracies. After all, 5G may be the new thing, but the lineage of conspiracy it was born into is far from new.

## **0G: The birth of wireless conspiracy theories before mobile phones**

Health fears about wireless communication infrastructures became more prevalent with the advent of 2G cellular telephony infrastructure, but we argue here that they have a much longer history. Rather than progressing linearly from health-focused conspiracies from first-generation cellular networks (1G) to 5G, we step back and report on research that traces these fears back to the pre-cell phone era and arguably helped lay the groundwork for the conspiracies that came later.

Decades before the first generation of cellular towers were built in Japan in 1979, a different type of wireless communication tower spread across the United States: the AT&T Microwave Relay Network (MRN) (a.k.a., the “Skyway”). The microwave network represented the first commercial form of interpersonal (as opposed to broadcast) wireless communication. Between 1950 and the mid-1980s, thousands of these towers were built. By the early 1970s they carried around 80% of all long-distance telephone traffic in the United States (Hench & Strassburg, 1988).

Unlike cell towers that broadcast a wide signal, the AT&T MRN worked as a wireless relay, transmitting a concentrated data stream from tower to tower until reaching the final destination. The line-of-sight transmission meant that there was far less electro-magnetic exposure for the surroundings compared to a contemporary tower. However, many of the health conspiracies that went mainstream with the spread of 2G cell towers (1G was never particularly widespread) can initially be found in discourses about this earlier wireless communication network. For more than 30 years, newspapers reported on health protests

that can be viewed as a pretext to the 2G (and now even 5G) conspiracies about cellular technology. Here are just a few examples:

as early as 1953, residents in Chattanooga, Tennessee, protested against a local tower, in part because of concerns about how they would affect children's' health ("Second Tower Is under Fire," 1953);

residents in Hackensack, New Jersey, started a sustained protest against a 343-foot tower because of health fears ("Tower Protest Is Due Tonight," 1967);

in 1972, residents in Hanover, Pennsylvania, protested against the building of a tower in part because "It would establish a potential danger to our children" (Milhoen, 1972, p. 34);

a 1974 protest once again invoked children with arguments that "We don't know enough about the long-term effects of microwaves, even very low power ones" (Muldoon, 1974, p. 6); and

the Mayor of Mahwah, New Jersey, urged citizens to protest against a microwave tower because "he thinks microwave beams directed into Mahwah can cause birth defects and cancer" (Kamen & Lundstrom, 1985, p. 10).

These are just a few examples from many primary sources that covered different tower protests. The most important takeaway from this handful of examples is the similarities. Returning to research on conspiracy theories, these examples targeted a powerful force (AT&T) and blamed it for likely unrelated events (e.g., a sick child) with little evidence. Most importantly, these primary sources trace this history back further than the more typical starting point of 2G protests and conspiracies about health fears. Instead, these records show that 30 years before the construction of 2G towers, some individuals had already linked wireless communication with disease.

To be clear, we are not referring to these earlier health controversies as conspiracies in a simple pejorative sense. As mentioned earlier, "conspiracy" does not have to mean false, and there is no clear dividing line between an unproven health concern and a conspiracy theory. People were not necessarily acting irrationally when expressing concerns over a large new infrastructure, especially considering that their reassurances primarily came from what was, at the time, the largest corporation in the world. However, these concerns did not have evidence based on scientific consensus, and they did blame a powerful actor for diseases that were likely unrelated to the towers, so they do fall within the scope of conspiracy.

## **Generations of wireless infrastructure, generations of conspiracy theory**

Because 1G never became widely commercially available, conspiracy theories about dangers of cellular infrastructure mostly began with the second generation of mobile telephony, which largely supported voice calling, Short Message Service (texting), and



Multimedia Messaging (images). When 2G cell towers became widespread, conspiracies about health risks were a major part of public and academic discourses. People feared actual devices (e.g., talking on a cell phone too long could cause brain cancer), but many of the conspiracies focused on towers and their electromagnetic field (EMF) radiation. Throughout the 1990s, groups protested against the placement of towers, sometimes causing delays and sometimes forcing them to relocate. The section above shows how this movement is rooted in conspiratorial thinking established long before the 2G protests, but it still seemingly took people by surprise.

The media also played a role in constructing the fear narratives around 2G wireless infrastructure. For example, Chapman and Wutzke (1997) analyzed how media framing aided the success of one protest by bringing focus on the community's concerns for children. Research shows that these concerns can translate into lower property values (McDonough, 2003), and several scholars have characterized protestors as irrational actors driven by media-constructed fear narratives (Law and Mcneese, 2007). While the scientific community had significant consensus that EMF exposure levels set by government agencies were safe, media narratives often portrayed the scientific community as being fractured on the issue (Elvers et al., 2009).

Considering this history, it is unsurprising that controversy about wireless infrastructures continued throughout the 2000s. Groups protested the emergence of 3G towers in the 2000s followed by 4G towers when they became available (Mukherjee, 2020; Wearden, 2002). Similar protests broke out against Wi-Fi, which has been restricted in some schools around the world over health fears. For example, a 2015 French law banned Wi-Fi in nurseries and limited it in primary schools by ruling that Wi-Fi could only be turned on during "digital educational activities" (Hir, 2015, n.p.).

Cities around the world have also enacted laws banning 3G and 4G towers from proximity to schools (Mukherjee, 2020; Sheyner, 2019), echoing the findings in the MRN section that health conspiracies about wireless infrastructure often used rhetorics of child safety. Additionally, these fears are certainly not exclusive to the West. As Mukherjee's (2020) book *Radiant Infrastructures* documents, India has had major protests about cellular infrastructure, and "Owing to radiation's ability to evade the human senses, popular news programs in India characterized cell tower signals as *khamosh khatra*, or silent danger" (location: 141). Mukherjee also introduced the term "environmental publics" as a framework to understand stakeholders in controversies about mobile communication infrastructures.

The environmental publics that fear EMF radiation have continued to grow, occasionally winning victories for restricting cell towers or Wi-Fi in certain places. Like almost any public, their stakeholders' views are far from uniform. On the more extreme side, there are books published by influential conspiracy theorists like Mercola (2020) that are obviously ridiculous in their claims. Mercola, who was already famous for pushing dangerous anti-vaccine conspiracies, claims "Cell phones are the cigarettes of the twenty-first century" (location: 1,061). His book—*EMF\*D*—blames increased EMF exposure from cell towers for everything from autism to obesity to Alzheimer's disease to declining fertility rates to cancer. According to Mercola, cell towers are even the reason that bees are dying out. For infrastructural conspiracies pushed by people such as Mercola—and his book is just one of the more polished examples—EMF exposure from cell towers

and Wi-Fi is the bogeyman to explain most of contemporary society's health ills. Mercola concludes with "tips" on how to limit exposure, some of which include shielding rooms with special EMF-protective paint and sleeping in what is essentially a Faraday Cage: the "Silver Shield EMF Sleeping Tent." Unsurprisingly, Mercola sells the tent on his website.

Not all people concerned about EMF exposure are as extreme as Mercola. Some members of this broader environmental public, including some Indian activists detailed by Mukherjee (2020), make more tempered arguments that the scientific consensus on EMF exposure is not absolute. After all, there have been peer-reviewed scientific studies suggesting that current levels of EMF exposure *could* (and the "could" is important) have negative health effects. For example, a peer-reviewed meta-analysis of research published between 1997 and 2013 found that "magnetic fields were associated with childhood leukemia" (Zhao et al., 2014, p. 273), though another systematic review argues that the situation is more complicated (Ahlbom et al., 2001). Additionally, as we mentioned earlier, some governments have placed restrictions on EMF exposure. To be clear, studies showing negative health effects from EMF exposure are a small minority, but they do exist and have fueled infrastructural conspiracies by providing "official" sources when protesting against new towers.

These environmental publics only became more vocal with the early development of 5G networks; even prior to the COVID-19 pandemic, conspiracies about health risks had intensified. The newness of 5G led to an explosion of books and articles warning about the next-generation infrastructure, ranging from the more obviously outlandish—books with titles such as *Death by 5G: An advanced guide to population reduction techniques* (Steele, 2019)—to more measured concerns. For example, in 2017 over 180 doctors and scientists representing 35 countries wrote an open letter calling for a moratorium on 5G development, and their first point was that "5G leads to massive increase of mandatory exposure to wireless radiation" (*Scientists Warn of Potential Serious Health Effects of 5G*, 2017, p. 1). The scientists called for a European Union taskforce to investigate the potential health effects of 5G. The European Commission responded by saying that a task force is not their responsibility, and the "primary responsibility for protecting the public from potential harmful effects of electromagnetic fields remains with the Member States" (Andriukaitis, 2017, n.p.). Some European nations and cities did enact a 5G moratorium. Brussels, for example, blocked the rollout of 5G, stating that there was "wider debate needed before 5G rollout" (Dorpe & Cerulus, 2020, n.p.). In the United States, some cities moved to ban 5G while calling for further research on health effects (Mims, 2019). As we argue, these examples, especially when considered in the longer history detailed earlier, had already laid the groundwork for fears about 5G networks well before COVID-19 began spreading.

## **The birth of 5G/COVID-19 conspiracies**

The global spread of COVID-19 has been a massive boon to conspiratorial thinking. As Fuchs (2021) documents in his book on the topic, the many conspiracies cover a great deal of ground. Some argued that the virus is a myth used by the powerful to take away freedoms. Relatedly, some claim that China created COVID-19 as a bioweapon to weaken the West. Other conspiracies Fuchs analyzed argued that pharmaceutical

companies engineered the virus to boost their stock prices. Right-wing commentators spread conspiracies that COVID-19 death numbers were inflated for political reasons. Others claimed that there were simple COVID-19 cures being withheld. Conspiracies then only grew with the release of the COVID-19 vaccines, with people spreading rumors—often focused on Bill Gates and the Gates Foundation—about the vaccine doing everything from implanting microchips to making people infertile as a form of population control.

Importantly for our argument, these conspiracies did not happen in isolation. There have long been conspiracies about governments using “false flags” (in this case COVID-19) to manufacture crises to take away freedoms, just as there were many pre-COVID-19 conspiracies about corporations manufacturing problems so that they could make money solving them. Additionally, the Bill Gates conspiracies Fuchs’ documents built upon a much longer history of anti-vaccination and anti-leftist elite conspiracies. As Fuchs points out, given that history, “it is no surprise that Bill Gates became a major figure in COVID-19 conspiracy theories” (Fuchs, 2021, p. 94). We are making a similar argument here, positing that the 5G/COVID-19 conspiracies should have been no surprise considering the long history of mobile infrastructural conspiracies.

The COVID-19 pandemic began spreading in China in late December 2019, followed by an outbreak in Italy and Spain not long after. In the United States, likely the most momentous date in the early pandemic was on March 11, 2020. Within a span of about two hours, Tom Hanks announced he had COVID-19, the National Basketball Association suspended their season because a player tested positive, and former President Donald Trump gave a national address announcing the closing of the borders. And while it is impossible to identify a definitive starting point for 5G/COVID-19 conspiracies, an influential early source was recorded only a day later. That source was a video filmed on March 12, 2020 that featured a 10-min lecture by Dr. Thomas Cowan, MD. The main thesis of Cowan’s lecture was that “Before every pandemic of the last 150 years, there was a quantum leap in the electrification of the Earth” (the video has been taken down, but see Frith, 2020 for more detail). His argument comes from a book by Firstenberg (2017) titled *Invisible Rainbow: A history of electricity and life*, which is essentially a 550-page magnum opus of infrastructural conspiracies linking various diseases over the last 150 years to various communication infrastructures. For example, Firstenberg claims that the Spanish flu was caused by the growth of radio and the 1957–1958 influenza A (H2N2) virus pandemic was caused by radar and television towers. It is doubtful whether many people who started spreading the 5G/COVID-19 conspiracies read Firstenberg’s book, but Cowan’s brief description of it that extended the conspiracy to 5G and COVID-19 quickly went viral with tens of thousands of shares and hundreds of thousands of views within a week. The celebrity Keri Hilson, who had 2.3 million followers at the time, shared the video on her Instagram account, furthering the spread. The video was eventually taken down from YouTube, but by then the damage was done.

Cowan’s viral argument is a classic example of conspiracy thinking. He targeted a powerful force (government and the telecommunications sector) to trace a pattern between two events that were unrelated. He also linked this conspiracy to previous, similar conspiracies about communication infrastructures and disease, including the

health conspiracies about EMF exposure we examined earlier, the exact type of linkage between different conspiracies found again and again in research (Brotherton, 2015; Uscinski, 2020). Other examples that went viral followed a similar pattern, including a pair of tweets that stretched correlational conspiratorial thinking about as far as it could go. The first is a tweet that was shared thousands of times across social media platforms that connected previous mobile generations to viral outbreaks (see Wynne, 2020 for a screenshot of one of these tweets; they were shared in similar forms by countless Twitter users):

“2003 – 3G introduced to the world

2003 – SARS [severe acute respiratory syndrome] outbreak

2009 – 4G introduced to the world

2009 – Swine flu outbreak

2020 – 5G introduced to the world

2020 – Coronavirus outbreak

Make your own mind up....”

A March 15, 2020 tweet shared across platforms made similarly spurious connections (goat\_in\_a\_moat1, 2020). The text of the tweet read “The roll out of 5G and the #coronavirus map.... Almost identical. 😊” The text was followed by a world map of 5G rollouts and a map of COVID-19 outbreaks, which basically just showed that both happened in big cities in China, the United States, and Europe. Other users then made more granular maps that compared COVID-19 deaths in major cities in the United States (and other tweets showed similar maps for other countries) to maps of where 5G had been deployed (Apocalypsycho, 2020). The correlations on the maps were strong, but in reality they just showed that both 5G and COVID-19 were unsurprisingly present in areas with high population density.

Within a few weeks, the #5GCoronavirus hashtag was trending in the United States and United Kingdom, and the conspiracy had been shared by multiple celebrities with huge followings, including Wiz Khalifa and Woody Harrelson (Cockerell, 2020). Importantly, the spread of the conspiracy seemed to take people by surprise. For example, Ahmed et al.’s social network analysis of the #5GCoronavirus hashtag between 27 March, 2020 and 4 April, 2020 “revealed that there was a lack of an authority figure who was actively combating such misinformation” (Ahmed et al., 2020, p. 1), which might have slowed the spread. Bahja and Safdar’s (2020) social network analysis of tweets between January and April, 2020 found that some of the most commonly occurring words focused on radiation, China, and Huawei, which is unsurprising considering the earlier genealogical account and the tendency for conspiracies to blame powerful forces for unrelated events.

In addition, conspiracies from the West rapidly spread elsewhere through social media. In Africa, for example, 5G conspiracies took root in places that were first to deploy the infrastructure, including Kenya, Nigeria, and South Africa. As with the West, the usual concerns about radio waves and cancer were present as well as claims that 5G technology causes and/or spreads COVID-19 (Ahmed et al., 2020; Bruns et al., 2020). These claims were translated into localized beliefs as they spread through megachurches (Kalu, 2021), particularly in Nigeria and Kenya where pastors propagated conspiracies that 5G causes COVID-19 and radiation damage, which is a reminder of how conspiracies can be warped to fit within various cultural contexts. In some of the more prominent cases, pastors warned that 5G tracks people through implanted nanotech and turns people into vampires through COVID-19 infections (Wanjau, 2020). According to Wanjau, these conspiracies in Africa attracted a significant amount of public attention, resulting in consumer anxiety about a technology that is “billed to positively transform all aspects of life” (Wanjau, 2020, n.p). Wanjau also pointed out that, “Conspiracy theories on wireless technology are not new. Virtually all previous mobile communications technologies from 1 to 4G have had their fair share of detractors and critics. Experience has, without exception, served to prove the doomsayers wrong” (Wanjau, 2020, n.p.).

While some strands of 5G/COVID-19 conspiracies have managed to survive a pandemic that has now lasted years, many of the 5G conspiracies died out over time, likely because they were partially drowned out by other conspiracy theories about COVID-19 that downplayed the virus’ severity and discouraged people from getting vaccines. Nonetheless, these 5G conspiracies were consequential. In multiple countries, people destroyed 5G infrastructures over COVID-19 fears, and protestors targeted city meetings to try to stop the deployment of 5G. A study from the *New York Times* even suggested that Russia played a role in spreading the conspiracy, likely with the goal of slowing the United States’ advancement in 5G technology (Broad, 2020). In addition, 5G conspiracies in Africa sowed consumer distrust at a time when 5G was being framed as a major piece of next-generation development for the continent. Just like with the protests and banning of 2G towers and Wi-Fi, 5G/COVID-19 conspiracies had real-world consequences that fit within more than half a century of conspiratorial thinking focused on infrastructure and disease.

## **Discussion and conclusion: Theorizing infrastructural conspiracies**

Mobile communication practices cannot be separated from the networks that enable and support them. Consequently, conspiracy theories about mobile infrastructure are an important part of scholarship on the social implications of mobile media. This article has provided a genealogical account to help explain the present situation and to help anticipate future situations. We are not arguing that 50-year-old protests against AT&T’s microwave towers directly *caused* 5G/COVID-19 conspiracies. Rather, we assemble specific moments of juncture to show that 5G/COVID-19 conspiracies are part of a much larger pattern. By way of conclusion, we return to the literature to theorize about what it is about mobile infrastructures that make them such fertile ground for conspiratorial thinking.

As we noted earlier, a defining feature of infrastructure is pseudo-invisibility. Infrastructures are designed not to be thought about too deeply, and they often only “become visible upon breakdown” (Star, 1999, p. 380). As Star and colleagues have detailed throughout their work (Bowker & Star, 1999; Star, 1999; Star & Ruhleder, 1996), there are many contributing factors to this invisibility, including that infrastructures tend to be highly technical and operate on massive scales that are difficult to comprehend. Someone might understand how a pothole is filled or that their signal comes from a nearby cell tower, but it would be difficult to understand the larger system or how it works. Consequently, infrastructures often remain shrouded in mystery, which is arguably even more pronounced with the sophisticated engineering and digital nature of wireless communication infrastructure.

The proposition that infrastructures remain invisible except in moments of breakdown has often been a core tenet of how people conceptualize infrastructure (Anand et al., 2018). However, the concept of invisibility has been critiqued for ignoring complexity involved in social understandings of infrastructure. For example, Seberger and Bowker argue that infrastructures sometimes become visible not because of malfunction but because of “hyper-functionality” (Seberger and Bowker, 2021, p. 1712). Larkin further cautions, “Invisibility is certainly one aspect of infrastructure, but it is only one and at the extreme edge of a range of visibilities” (Larkin, 2013, p. 10). Consequently, researchers should “examine how (in)visibility is mobilized and why” (Larkin, 2013, p. 336). Haleboua and Lingel (2018) help to animate this range of visibilities in their analysis that compared buried fiberoptic cable to the LinkNYC project that became hypervisible and highly controversial. Their research demonstrates infrastructural (in)visibility is something achieved rather than something inherent to infrastructure, and they posit that researchers should use “shifting constructions of (in)visibility as a framework for analyzing power” (Haleboua and Lingel, 2018, p. 4649).

We theorize that the complex range of visibilities are likely an important part of the explanation for the recurring cycle of health conspiracies with each new generation of mobile infrastructure. Instead of accepting invisibility as the “natural” state of infrastructure, seeing it as site of contestation offers better understanding of the repeating cycles detailed above (Haleboua & Lingel, 2018; Larkin, 2013). On the one hand, the telecommunications sector want infrastructure to remain invisible. They do not want people thinking about the towers and wires and EMF exposure. Even their commercials touting 5G tend to hide the material infrastructure (Campbell et al., 2021). On the other hand, with each new generation there are environmental publics who consciously work to make wireless infrastructures hypervisible, particularly by foregrounding health concerns. The dynamics are familiar, and the pattern repeats. However, these tensions play out in unique social, cultural, and historical contexts and can vary based on whatever health crisis is looming at the time. Obviously, linking 5G to a viral pandemic is not exactly the same as more broad concerns about cancer, but as conspiracy research has shown, conspiracies are rarely isolated (Brotherton, 2015). They are often linked to earlier conspiracies and adapt to new situations.

These battles over the (in)visibility of mobile infrastructure clearly happen again and again, and we argue that each prominent example likely makes the protests of the next generation of mobile infrastructure more likely. We want to go one step further than

just explaining, however, to argue that the complex dynamics of (in)visibility play an important role in *why* each new generation is targeted by new health conspiracies. As we mentioned earlier, invisibility is often assumed with infrastructure, even if it must be earned. Part of the dynamic of invisibility is that infrastructures are both highly technical and built on a scale that they necessitate involvement from powerful forces such as government or major corporations. We theorize that the complexity that feeds into invisibility is also arguably what makes mobile infrastructure such a fertile ground for conspiracy theories. Their technical nature means that the actual workings of mobile infrastructure remain a “black box” for most people, and boxes can be filled with all kinds of things. Consequently, the same invisibility is embraced by the telecommunications sector so people do not have to think about their mobile connections being a double-edged sword when conspiracy theories step in to fill that knowledge gap.

Equally important, part of the supposed invisibility of infrastructure is because of their ubiquity. Communication infrastructures operate on massive scales, which can contribute to invisibility because they become so mundane and commonplace that they fade into the background. However, we posit that that same ubiquity can also make them easy targets for conspiracy theories. After all, a core tenet of conspiratorial thinking involves the linking of likely unrelated events. Mobile infrastructures are ubiquitous in many parts of the world, so they can be an easy target for just about anything, especially anything health related. The majority of people in many countries live within range of EMF radiation from mobile infrastructure, so towers can then easily be blamed for population-driven spikes in disease, illustrated in the 5G/COVID-19 maps mentioned earlier. 5G was in many major cities by early 2020, so it became any easy target for people who wanted to link it to the COVID-19 pandemic. That linking and those maps then work as interventions to make a mobile infrastructure hypervisible for at least some groups of people.

A final point is that mobile infrastructures themselves also work along the invisibility–visibility spectrum. Some parts are literally visible: cell towers; 5G transmitters; and so on. Others are not visible: the switching stations; buried fiber; etc. We argue maybe the most important invisibility for the moments of juncture detailed above is the EMF radiation itself. All mobile infrastructure puts off EMF radiation; that is how they work. That EMF radiation is invisible to humans, so unless someone purchases specialized hardware, they will have no idea what they are being exposed to. As Mukherjee (2020) notes, environmental publics in India call this exposure the “silent danger” (location: 141).

We argue that the complex dynamics of invisibility/visibility is key to understanding the long history of mobile infrastructural conspiracy theories. It is true that mobile infrastructures are often ignored and fade into the background. But it is also true that invisibility is a site of contestation where some groups work to make these infrastructures hypervisible through protests, often via familiar but unfounded health conspiracies and organized digital media campaigns. In addition, the same factors that often contribute to people ignoring mobile infrastructures—for example, their technical complexity and their ubiquity—almost paradoxically are weaponized through health conspiracies. Most people will never know how each generation of mobile infrastructure works on a technical level, and the fact that these infrastructures are ubiquitous means their presence

will correlate with almost any negative health event. Furthermore, the invisibility of EMF waves is weaponized to make these infrastructures hypervisible for certain environmental publics. The same aspects of mobile infrastructure that contribute to their invisibility also make them targets for the groups that work to make them hypervisible through unsupported health conspiracies.

This (in)visibility dynamic and the remaining mystery of just how mobile infrastructures work means they can be targeted for a wide range of conspiracies. Most of the history we detailed focused on concerns about cancer from cell towers, but wireless infrastructure has been blamed for everything from autism to Alzheimer's disease to declining bee populations. The COVID-19 pandemic offered the conspiracies a new avenue by linking EMF exposure to the spread of a virus. The key point is that the lack of attention people typically pay to mobile infrastructure—for very understandable reasons because that lack of attention is basically a prerequisite for something becoming infrastructural—can be weaponized. Within this overarching trend, conspiracies can be adapted into local contexts, which we saw in the case of African churches. Each successive iteration is linked (by fear), and the groundwork is laid for health conspiracies to confront the next generation of mobile infrastructure.

Ultimately, we argue that the history detailed in this article suggests that mobile infrastructural conspiracies should become a more visible part of MMC research. After all, 3G was linked to SARS, 4G to Swine flu, and now 5G to COVID-19. That list does not even mention the more prevalent conspiracies about mobile infrastructure causing cancer, fertility problems, and autism. These conspiracies are an important part of mobile communication research because they impact the infrastructures that make mobile communication practices possible. A key part of our argument is showing this repeating cycle and theorizing its persistence, and we use that argument to call for planning for the future and the next generation of mobile infrastructure. By no means do we suggest that research and preparation will be able to fully stop the conspiracy cycle detailed above. However, as communication scholars, we are well suited to both analyze these conspiracies and begin planning for what is likely to come. In other words, we need to start planning now for the intersection of the *next* health concern with whatever new mobile infrastructure arises in that future moment.


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