

**Imagination of Mobile Media Through Advertising:
Thematic Analysis of 4G and 5G Ads in China and the US**

by

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Abstract

This research project examines the narratives of 4G and 5G network infrastructures in China and the US. As one of the main channels through which people get to know new technologies, advertising is the source being analyzed in this study. The role of advertising is significant because, according to domestication theory, it is the source of the first step in technology adoption, *imagination*. While many infrastructure studies emphasize the fundamentality and functionality, this research project focuses on the portrayals of network infrastructures in media. By conducting a longitudinal comparison between 4G and 5G advertising and a parallel comparison between advertising in China and the US, this study captures some prominent similarities and differences across two generations of networks as well as two countries. The results show commons and inconsistencies in topics, themes, and other implicit messages such as advertising techniques in 4G and 5G from telecommunication companies in China and the US. Some cultural, social, and political contexts are presented in the discussion section to interpret the results.

Introduction

Over the last three decades, mobile technology has entered people's lives and become an essential part of daily activities. Twenty-eight years ago, the first text message, "Merry Christmas", was sent from a computer to a cell phone, which marked the arrival of the second generation (2G) mobile communication technology. In this case, different generations refer to advances in wireless infrastructure, particularly with regard to speed and capacity for handling data. In 2001, with the introduction of 3G networks and devices, we saw the emergence of email and web browsing on mobile phones. About ten years later, we celebrated a faster 4G network, which enabled streaming music and videos, cloud storage, and video calls anywhere. Now, entering a new decade, we begin to hear new information and new promises about the next generation of wireless networks, 5G. Yet, 5G technology is not widespread, meaning individual and public understanding of 5G is still in the "imagination" stage (Silverstone et al., 1992). News articles, advertisements, and discussions about 5G saturate the media environment, which helps form imaginations of 5G, including attitudes, beliefs, perceptions, and expectations of the technology. To be sure, people went through the same process with previous generations of mobile media, although perhaps not exactly in the same way.

This study uses textual and visual analysis to examine and compare portrayals of the 4G and 5G networks in video advertisements -- a major source of imagination and understanding of new technologies -- at the initial stage of the technology adoption process. It is an opportune moment to compare the two generations of networks as the 5G infrastructure is just rolling out and the 4G network remains in place. Similarities and differences in evident topics, themes, and implicit strategies and appeals are at the focus of this advertising study. Also, the scope includes video advertisements from telecommunication companies in China and the US, which offers an

international perspective on how 4G and 5G wireless infrastructures have been, and presently are, imagined through advertising. The US led China in the global 4G race, although they were a little behind Europe and Japan on 2G and 3G (Recon Analytics, 2018). Now, the US is having a heated competition over 5G with China, who is believed to dominate 5G networks since it is the first country to release 5G technology to consumers (McGregor, 2019). It appears the role of network forerunner that the US held in the 4G era is being replaced by China as we enter the 5G era. Meanwhile, China and the US are contesting with each other over the 5G technologies. Hence, the juxtaposition of China and the US is worthwhile and meaningful, particularly at this moment.

Mobile media communication (MMC), infrastructure studies, and domestication theory are traditions offering literature to frame this study. The following section starts by offering highlights from the new and growing field of MMC studies, followed by theoretical framing from infrastructure studies and domestication (Ling, 2004). Following that, the methods next section explains the data collection and analysis, and the results section describes how findings address the study's research questions. The discussion offers implications, conclusions, and next steps.

Literature Review

Mobile media and communication have become an increasingly popular topic in both academia and people's daily lives recently in the last twenty years after the introduction of the third generation of wireless mobile telecommunication technology (3G). Two of the major areas of mobile communication studies are sociality, the connections with other people, and spatiality, the connections with places of social activity (Campbell, 2019). The use of mobile phones and

social media, emerging over the last ten years, has become a major focus in MMC studies and has led to discussions surrounding sociality and spatiality. Some scholars are interested in political implications, such as how mobile media use contributes to political participation (Martin, 2014). Other scholars explore the associations between mobile media use and public social behaviors, including social involvement (Kraut et al., 1998), social networks (Lee et al., 2015), and social cohesion, or the solidarity among groups in society (Ling, 2008).

Entering the 2020s, we are at the point of welcoming a new generation of wireless mobile networks, 5G (Campbell, 2019), in which mobile media is starting to go beyond mobile phones (Frith & Özkul, 2019). Frith and Özkul state that “conceptualization of mobile media is situated at the intersection of mobilities, materialities, and mediation” (p. 295), which enlarges the scope of mobile media, and suggests that mobile and communicative infrastructures should be considered as a type of mobile media. One of the key features of mobile media is hybrid space, referring to the merging of the physical and the digital. To widen the scope of mobile media, Saker and Frith (2019) propose a new term, *dislocated space*, acknowledging mobile virtual reality’s ability to create a hybrid space that “involves concrete space being temporarily superseded by the digital space” (p. 222). While the vast majority of mobile media communication studies focus on mobile phones, many scholars illustrate the new trend and new dimensions of this field, arguing mobile media is everywhere.

4G networks have dramatically changed people’s lives with digital technologies such as video chatting, real-time navigation, and fast data transmission speed. With 4G networks, the critical advance is mobility that allows mobile phones to access the Internet everywhere. With promises of smart homes, smart factories, and smart cities, the arrival of 5G would be another powerful push to the transition from *the mobile* to *the smart*, a new age with wireless

infrastructure connecting objects, factories, homes, and cities. To capture the narratives of 4G and 5G wireless networks in advertising and acknowledge their social significance, infrastructure studies and domestication studies are used as the theoretical framing of this research project.

Infrastructure Studies

The term “infrastructure” means the necessary and fundamental facilities, structures, and systems for the operation of a society, such as a country, city, or an enterprise (Infrastructure, 2020). One of the general features of infrastructures is the lack of visibility. Infrastructures are often not noticed by users and only become visible when they break down or fail (Star, 1999). Infrastructure studies focus on the evolution, operation, structure, and maintenance of infrastructures in local and global communities from a technical, social, and organizational perspective (Bowker et al., 2009). Originally, infrastructure referred to basic physical and organizational systems and services, such as railroads, bridges, ports, and electric power grids. Over the past two decades, the concept of “infrastructure” has spread to many different areas of research (Edwards et al., 2009), including journalism, government, and mobile media. For example, cyberinfrastructure refers to the research environments that support advanced data sharing, data management, data mining, and lead to the development of network-based services. It is believed to resemble a genuine infrastructure for its centrality, robustness, and reliability through the shift of information handling from local networks to cloud services and global network, and digital convergence (Edwards et al., 2009).

Despite the invisibility of infrastructures, many studies have been conducted to highlight the significance of infrastructures, especially regarding socio-cultural and political aspects. A cultural policy study by Wright (2019) concludes that people’s cultural taste and participation are re-shaped by computational technology, considered as an informational infrastructure, as it

mediates the dissemination of cultural life. In an informational infrastructure study, Crabu and Magaudda (2018) build a wireless network community, a bottom-up infrastructure, in Italy to understand the relationship between civic engagement and the built structure itself, emphasizing the important role of technical, political and material instances in the establishment of infrastructures. In the field of mobile media, Plantin and Punathambekar (2019) focus on “the social, material, cultural and political dimensions of infrastructure” (p. 165) embedded in media and communication networks. They suggest that having an infrastructural optic in media studies helps us see “how power relations between stakeholders and users shape how communication networks are imagined, put in place, and mobilized for different ends” (p. 166). Other scholars (Edwards et al., 2019) also believe people’s lives are remarkably transformed by the infrastructures at all social and organizational levels; this transformation should be the main focus for future infrastructure studies.

Wireless networks, such as 4G and 5G, serve as infrastructures in societies, oftentimes without being noticed by users. When using mobile phones, for example, we pay more attention to the content being consumed (social media posts, news articles, streaming videos, etc.) than the Internet connection that supports the data transmission. However, network infrastructures can become visible when they are first introduced and brought into the light. This study focuses on the narratives about wireless infrastructure by looking into 4G and 5G video advertisements since advertising is an essential channel through which the public gets to know about the principles, functions, and applications of new technologies. In other words, advertising is making the 4G and 5G network infrastructures visible. By picturing lives equipped with advanced mobile technologies, advertising can shape people’s views and understandings about network infrastructures in sociocultural, and sociopolitical aspects.

Domestication

Domestication theory, first proposed by Silverstone (1992), is often applied to media studies to demonstrate how people adopt new information and communication technologies (ICTs). It focuses on how technology enters, interacts with, and embeds in people's daily lives. Domestication theory, at first, was developed to study technology adoption into the home but has since been widened to other social contexts, which has paved the way for its application to the mobile media and communication field (Ling, 1997; Shekar, 2009). The process of domestication contains the following stages, *imagination* -- the phase raising people's initial awareness and knowledge of the new technology; *appropriation* -- the phase when the new technology turns into possessions of an individual or a household from commodities; *objectification* -- the phase fitting the new technology into users' material environments based on its aesthetic values and principles; *incorporation* -- the phase involving assimilations of the new technology into users' life routines and time structures, emphasizing its functional aspect, and *conversion* -- the phase when the new technology develops into a part of users' social identities (Ling, 2004; Silverstone, 1992; Silverstone & Haddon, 1996). These steps build a cycle of new technologies from being a distant and strange notion to getting absorbed as part of users' lives and identities.

Rich Ling (2004) uses mobile phones as an example to illustrate that the examination of the technology adoption process is a tool to see "the broader machinations of society" (p. 5). Drawing from a group interview, Ling (p. 31) indicates that the stages of domestication do not necessarily happen in sequence. Instead, one can enter the *objectification* stage, thinking about the values and even identities the new mobile phone can bring to them before buying one. Other scholars demonstrate a similar idea with a different angle that emphasizes the dynamics between

technologies and consumers. For example, Silverstone and Haddon (1996) believe that designers need to imagine users' experience at an early stage. The three interrelated activities of design include *creating an artefact* -- working on the functions and sense of aesthetics, *constructing the user* -- picturing actual usage by consumers to refine the design, and *catching the consumer* -- branding and commodifying the technology to cater to the tastes of consumers.

This study takes a closer look at the *imagination* phase in the domestication of 4G and 5G networks. In the stage of *imagination*, advertising of new technologies is an essential source leading to the next step in the adoption, *appropriation* (Ling, 2004). For example, before 5G comes into commercial use, people's visions about how 5G will fit in and alter their lives are determined by the advertising messages. Moreover, advertising remains the same function even after the full adoption of technologies (in this study, the 4G advertising in the late 2010s). As Rich Ling (2004) and Haddon (2003) argue in their books, domestication is not a "one-off" procedure. Instead, it is a non-discrete, non-linear, and non-sequential process. Therefore, this project examines the early domestication process of 4G and 5G networks by analyzing topics, themes, and techniques used in advertising to reveal social and technological narratives that shape how these generations of infrastructure are imagined, both publicly and personally.

Wireless network technologies are the infrastructures of mobile media and communications. The advertising of 4G and 5G wireless networks play an essential role in the adoption process as it determines the public's views and notions formed at the imagination stage. Thus, this current project will trace the trajectory of the evolution of mobile media from 4G, the era of mobile phone, to 5G, the incoming era of the Internet of Things.[1] The following research questions pursue different aspects of the overarching question: How is wireless infrastructure being socially shaped through advertising? More specifically, the study asks:

RQ1: What are the broad topics and refined themes associated with 4G and 5G in video advertisements?

RQ2: What are the implicit messages, such as strategies and appeals, underneath 4G and 5G video advertisements?

RQ3: What are the differences and/or similarities in the topics, themes, and implicit messages between 4G and 5G video advertisements?

RQ4: What are the differences and/or similarities in the topics, themes, and implicit messages between the advertisements in China and the US?

Methods

Procedure

This study uses textual and visual analysis approaches to examine how the 4G and 5G infrastructures are pictured in advertising, and how the imaginations are different in China and the US. First, two lists of network and telecommunication equipment companies were created by the author. One list contains China and US companies who lead the 4G technologies, and another includes big players of 5G technologies selected from the two countries. Then, from October to November 2019, 4G and 5G video advertisements from those companies were collected from the searching results of two video sharing platforms, YouTube.com from the US, and Bilibili.com from China. The keywords used in searching are company names followed by network generations, such as “Verizon 5G”. When searching for the 4G advertisements, the word “LTE” -- which stands for long-term evolution -- was also used besides “4G”.

Data

The list of 4G companies includes six from the US (Verizon, AT&T, T-Mobile, Sprint, U.S. Cellular, and Broadcom) and three from China (China Mobile, China Telecom, and China Unicom). In the 5G list, seven were selected from the US, including four major network companies (Verizon, AT&T, T-Mobile, and Sprint) and three telecommunication equipment companies (Qualcomm, Intel, and Cisco System). To be consistent, three main network companies (China Mobile, China Telecom, and China Unicom) and two telecommunication equipment companies (Huawei and ZTE) of 5G were selected from China. This procedure resulted in 91 4G advertisements (China $n = 23$; US $n = 68$), and 89 5G advertisements (China $n = 32$; US $n = 57$). 4G advertisements on YouTube.com were uploaded by users from April 7, 2009 to October 31, 2017, and 5G advertisements were posted by brand accounts from March 31, 2015 to November 1, 2019. Advertisements on Bilibili.com were uploaded by users, of which 4G advertisements were from December 21, 2013 to November 24, 2019, and 5G advertisements were from February 1, 2019 to October 30, 2019. As regards duration, 4G advertisements have an average of 39 seconds with 40 seconds in the US and 36 seconds in China, and 5G advertisements have an average of 89 seconds with 78 seconds in the US and 108 seconds in China.

Analysis

This study uses textual, visual analysis, and the framework of Hammersley and Atkinson (1995) to analyze qualitative data and identify the main topics, themes, and other implicit messages in 4G and 5G advertising. The whole process has a characteristic “funnel” structure, meaning that the author needs to get familiar with the data first, and then examine and transform the data until its internal structure is explored. The first step was to carefully watch all the collected video advertisements multiple times. During each time of watching, the author paid

close attention to both textual and visual contents and wrote down the identified patterns. Notes of analytic ideas and analytic memos were also written down at this pre-analytical stage because, as Hammersley and Atkinson (1995) argue in their book, it is helpful to write any thoughts or doubts instead of entirely relying on memories. The care and self-awareness put into the first step helped the author to “think aloud”, or to refine the initial thoughts by scrutiny. Then, several categories were created based on the identified patterns to classify and organize the data. The next step was finding the appropriate concepts for each category and refining them by continually reviewing the data. This procedure was repeated regularly in order to keep developing and testing the categories and subcategories until the structure holds stable with another new round of data analysis.

Results

The procedure of analysis resulted in some broad topics, refined themes, as well as advertising techniques used in 4G and 5G video advertisements, which draws upon RQ1 and RQ2. To answer RQ3 and RQ4, this section presents those findings in two sets of comparisons, a longitudinal comparison between 4G and 5G advertising, and a parallel comparison between advertising in China and the US.

RQs1-3: Topics, Themes, and Strategic Appeals in the Contexts of 4G and 5G

1. Topics and Themes

4G advertisements revolve around the topic of fast network speed, which allows many smartphone applications that could be divided into two major categories based on functions, (1) social connections, and (2) entertainment. The category of social connections includes

applications such as social media posting, video chatting, as well as sending pictures and videos to friends and family by text message. The second category, entertainment, contains streaming media, mobile games, online shopping, and fast downloading. Both functions are done through a mobile device such as a smartphone, laptop, and rarely, tablet. For example, as shown in a Sprint commercial (U4-52), one can have a video conference with clients through a laptop in a steak restaurant, stream movies on their phone at the airport, or enjoy high-speed connections for online gaming while camping.

5G advertisements display more diverse applications and situations that advanced network technologies could apply to. In addition to social connections and entertainment, 5G advertising also presents how 5G technologies function in the workplace, industry, transportation, education, as well as the healthcare system. While 5G advertisements have multiple categories containing different topics, they showcase applications on either (1) an individual level, or (2) a societal level. Some technologies enabled by 5G networks are virtual reality (VR) and augmented reality (AR), driverless cars, drones, artificial intelligence (AI), and 4K streaming on mobile devices. On an individual level, those technologies, as presented, bring revolutionary changes to the ways people communicate, work, study, relax and commute. Virtual reality (VR), for instance, can bring a boy and his parents on a raft in green mountains and rivers by virtual traveling (C5-23, 00:49), make the plane figures into three-dimensional building models through VR headsets (U5-14, 00:29), or bring the Iron Man on the screen to the viewers by creating an immersed environment of movies (C5-22, 00:52). On a societal level, the most prominent technology shown in the advertisements is the Internet of Things (IoT), a system that transfers and collects data over a network without the control of devices by humans (Internet of things, 2020). Commonly mentioned IoT applications include smart homes, manufacturing

automation, vehicle-to-everything (V2X) communication, and smart cities. In the 5G era, mobile phones and tablets are not in the spotlight anymore. Instead, it is a revolution of all the digital devices.

Compared with 4G advertisements, 5G advertising focuses on interactions and connections among digital devices instead of network accessibility. In other words, the main message that 4G advertisements convey to the audience is mobility, that is, they can carry their phones anywhere without worrying about dead zones. Scenes of emergency are often used to illustrate the importance of 4G signals. A US Cellular 4G advertisement shows two men being chased by a wild boar in the mountains while one of them was using his phone to search “how to escape a wild boar” online (U4-63). Thanks to the US Cellular network coverage, the two men successfully escaped by pretending to be trees. However, in the 5G advertisements, mobility is not emphasized because there is no need to move anything to anywhere when the world is covered by networks and everything is connected. For example, a China Telecom 5G advertisement features a man’s daily routine with advanced 5G technologies from getting up in the early morning, when a clock wakes him up and signals the curtains, kettle and vacuum cleaner to start working, to his outdoor exercise, when an Augmented Reality (AR) 3D hologram map appears in his glasses to provide the information of directions and safety alerts while he is riding a bike (C5-8). In this advertisement, network coverage is assumed to be everywhere, while the ability of digital devices to work with each other, rather than the ability to be mobile, becomes the principal point to be advertised.

2. Technology Feature: Speed vs. Latency

Speed has always been what people care most about networks until 5G comes. In the 4G era, speed is the main competing element among network companies -- almost all the companies

argue they have the fastest network over others. AT&T has a series of advertisements, “It’s Not Complicated”, where a man has conversations with a group of kids sitting around a table by throwing simple questions. In one advertisement, the kids are asked what thing they wish could be faster, and a boy shouts out “turtle!” (U4-22). But when a girl says being a slow turtle is safer, the man implies the threats a “slow turtle” would face by throwing the girl a question, “what happens when a slow turtle is in the middle of the street?”. In the end, this advertisement says, “It’s not complicated. Faster is better.” What this advertisement tries to say is, obviously, that network speed is one of the most important determinants of 4G networks.

In the 5G advertisements, the existence of fast speed is taken for granted while low latency comes into the spotlight. These two things have different concepts while they are quite similar in user experience. Network speed refers to bandwidth, the transmission capacity over a specific connection, measured in megabits per second (Mbps). Network latency is measured in milliseconds (ms) and it refers to how much time it takes for a package of data to travel between being sent from a computer and getting back from a website. If speed is the thickness of a tube, latency is the flow rate. Low latency enables real-time actions without delay, which realize many 5G applications because of the requirement of accuracy in certain fields, such as VR surgery and manufacturing automation. A visual demonstration of latency is shown in an AT&T 5G advertisement, where a machine is trying to balance an inverted pendulum placed on its by moving left or right, and a screen behind shows an 8-millisecond “current latency” (U5-25, 00:07). A scientist from AT&T lab resembles this phenomenon to holding and balancing a broomstick in one’s hand to explain the importance of low latency and quick reactions. An Intel advertisement describes how the low latency benefits live streaming at the US Open (U5-57). “What we are looking for is the ability to be wherever we want to be when we need to be there”

(00:36), the vice president of field operation & engineering at FOX Sports says. The advertising emphasizes that the almost-zero latency allows 5G to do things that are not just faster 4G things but are revolutionary and beyond people's imaginations.

3. *Appeal: Emotional vs. Rational*

Humor is frequently used in 4G advertising as a technique to present the unexpected fastness of 4G networks, to mock the users of other networks for experiencing lower network speed or poor connections, and to exaggeratedly show people's desire and craving for 4G networks. In a China Unicom advertisement, a college boy holding a tablet is surrounded by a group of friends who shove each other and eagerly stare at the 2018 World Cup game being streamed on the tablet screen (C4-22). "With the stronger signal and faster speed, you will never miss a goal" (00:07), the slogan says. Another classic example is a T-Mobile advertisement, parodying Apple's famous "I'm A Mac" commercials, in which a woman represents myTouch, a smartphone with T-Mobile's 4G network, and a man carrying a middle-aged, bald and overweight man on his back represents an iPhone 4 with AT&T network (U4-48). The woman introduces T-Mobile's 4G network that enables video chat everywhere, while the middle-aged man disdainfully flaunts his FaceTime video chat function from "anywhere there is Wi-Fi like saying airport" (00:14). It is not hard to see that he indeed "slows" the iPhone man down from the tiredness and disappointment on the iPhone man's face. T-Mobile uses humor in the metaphor to show the superiority they have over their competitor.

Another appeal used very often in 4G advertisements is bandwagon, which persuades people to buy a service or a product by making them feel that everyone else is doing it and they will be left behind if they choose to not join the trend. Many network companies apply the bandwagon appeal to persuade users from other networks to switch to their service. China

Mobile has an advertisement interviewing their users from various backgrounds for testimonies, including a female white collar on a subway admiring the stable network, a couple of college students on campus and construction workers appreciating the chance to see their family through video chat, and a company CEO expressing his loyalty to China Mobile for more than ten years (C4-9). Similarly, T-Mobile did an experiment in New York City to randomly choose a person and challenge their carrier to do a speed test with T-Mobile (U4-43). After losing the game, the person held a board on the street admitting T-Mobile is faster, serving as a positive review of T-Mobile to both people on the scene and the audience of this video commercial.

Humor and bandwagon, however, are not commonly used in 5G advertisements. The leading appeal in 5G advertisements is the rational appeal, a strategy of hard sell which persuades the audience by logical reasons instead of emotional feelings. Since detailed introductions and explanations are common and necessary in the rational appeal, 5G advertising is longer in duration (mean = 89 seconds) than 4G advertising (mean = 39 seconds) on average. Some advertisements spend minutes on explaining 5G technologies and applications that make people's lives better. In a 3 minutes and 48 seconds advertisement, China Mobile introduces a variety of 5G applications including virtual education, AI translation, manufacturing automation, self-driving cars, and more (C5-2). AT&T uploaded a video for more than 4 minutes, "What is 5G? - A Breakdown of 5G Technology Explained", in which a technologist from AT&T lab provides a detailed illustration of what 5G network is and how it enables other technologies such as V2X communication (U5-21).

4. Strategy

One of the differences in strategy between 4G and 5G advertising is, as mentioned before, 4G advertisements use testimonies or interviews of users to strengthen arguments, a

strategy not yet seen in the 5G advertisements. Ridiculing other network users is also an advertising strategy only seen in 4G commercials, especially among network companies. Another strategy that shows up in 4G advertisements is competing for the best data plan. Sprint is dedicated to attacking other network companies' unlimited data plans, claiming they slow down or charge extra after a certain threshold of data (U4-53). T-Mobile does the same. In a T-Mobile 4G advertisement, four motorcyclists in pink, blue, red and yellow -- symbolize T-Mobile, AT&T, Verizon, and Sprint, respectively -- are having a race to see whose data plan goes further (U4-51). The Sprint motorcyclist goes off track at a signpost saying "leave 4G zone" due to Sprint's limited 4G LTE coverage, while AT&T and Verizon stop at the toll booth called "data limit" because users need to pay more for overages. The only winner of this data plan race is T-Mobile, who is believed to have the real unlimited nationwide 4G data.

Besides, collaborating with electronics companies is a common strategy used in 4G advertisements. A China Mobile commercial displays 4G phones from Huawei, Samsung, Lenovo, ZTE by combining features of these phones and 4G mobile applications (C4-4). Similarly, T-Mobile promotes the LG G4 smartphone on its 4G network by giving a \$0 down at signing (U4-42).

RQs1-2 & 4: Topics, Themes, and Strategic Appeals in China and the US

1. Topics and Themes

In addition to the thematic differences between 4G and 5G advertising as mentioned in the previous section, China and the US also have diverse topics in both 4G and 5G commercials based on their political and cultural backgrounds. Despite the shared focus on network speed in both China and the US 4G advertisements, the two countries illustrate this point with different

approaches. Advertising in China usually presents 4G applications such as video streaming or video calls, while companies in the US are inclined to symbolize their competencies by using powerful things as metaphors. Verizon, with the slogan of “Rule the Air”, has several advertisements showing men with something sparkling in their hands and throwing it into the thundering sky (U4-1; U4-7). At the end of the commercials, the words, “Verizon 4G LTE” appear on the screen with flashes of lightning behind, creating a sense of intensity and fierceness. Another good example is a motorcycle racing advertisement of T-Mobile, where the speed of four motorcycles is in token of the speed of four major networks in the US (U4-51).

In 5G advertising, one major distinction between China and the US is the reference of the government. There is no mention of the government at all on the US side. However, some advertisements in China talk about their collaborations with the Chinese government to show their adherence to the government’s supportive policy on 5G (C5-5; C5-11; C5-26). For example, a China Mobile 5G advertisement says at the beginning:

Along with the rapid development of the national economy, the 13th FYP development plan for energy and the 19th National Congress of the Communist Party of China have put forward higher requirements for the modern energy system -- let the broad masses of people move from using electricity to making good use of it; continuously reduce blackout time, improve power quality, and create a safe, efficient, and green power grid system. (C5-5, 00:03)

This content quotes the proposition of the Chinese government to indicate the significance of an advanced power grid technology, which this advertisement spends four minutes introducing and explaining. Likewise, China Telecom proudly announces they just initiated the 5G pilot network as a result of the *Internet Plus* strategic cooperation agreement they have signed with the

Changning (a district of Shanghai, China) government (C5-11). The collaborative relationship with the government who highly supports 5G technology is a unique topic in Chinese 5G advertising.

Both China and the US display applications enabled by network services in 4G and 5G advertisements. The scenes used to present those applications, however, reveal some cultural and social differences between the two countries. Among 23 Chinese 4G advertisements that have been collected, about one-third have scenes of video chatting or messaging with families such as young parents calling their toddlers or adults caring for their elderly parents. For instance, a China Unicom 4G advertisement exhibits a mother moving to tears when hearing her baby calling her “mama” for the first time on the other side of the screen (C4-19, 00:08), and a young man asking for his mother’s help on cooking over video chatting as he wants to cook for his pregnant wife (00:53). To promote the 4G mobile phone trade-in program launched in 2015, China Mobile published a commercial showing a young man calling his mother to tell her about the Chinese New Year gift he has prepared for her, a new 4G phone (C4-7). The same motif continues in the 5G advertisements. China Telecom has a 5G commercial showing an engineer using a VR headset to watch his son’s football game from the perspective of a live audience while working outdoors (C5-2, 00:56). It is also shown in a ZTE commercial that a family of four with three generations sitting on a sofa watching videos through 3D holograms (C5-32). Although displaying similar technologies to China, advertisements in the US do not highlight the role of 4G and 5G applications in the family. Instead, US advertising shows a man playing online games by himself using VR technology (U5-43), or a family sitting together while doing their own things with the 4G network (U4-59). Nevertheless, US advertising contains abundant scenes

of human interactions with digital applications in the workplace, which is also frequently shown in China's commercials.

2. *Strategy: Competition vs. Harmony*

Attack advertisements are only used by US companies, especially among 4G commercials. All four major network companies in the US, Verizon, AT&T, T-Mobile, and Sprint, have published attack advertisements aiming to compete with one another. T-Mobile has the most amount of attack advertisements with the other three companies being targets. Different colors are often used to represent different network companies in T-Mobile commercials. For instance, in an advertisement called "See It Again", a man in blue (AT&T) is riding a motorcycle, while a woman in pink (T-Mobile) passes him with a speed too fast to be seen, which symbolizes T-Mobile's 4G speed is far beyond AT&T's (U4-38). T-Mobile also has a Super Bowl commercial more overtly attacking Verizon, in which a male presenter interrupts a broadcast about network speed and impatiently "corrects" that T-Mobile has doubled their LTE coverage and they "have more LTE towers than Verizon" (U4-40, 00:15). Similarly, Verizon has an advertising campaign in the form of focus groups to claim that they have the fastest speed and the largest coverage (U4-5; U4-11; U4-12). In those commercials, participants are asked to choose the best network after being presented with numbers, bar charts, pie charts, and maps that exaggeratedly show the superiority of Verizon on speed and coverage over the other three networks. Although Verizon uses "random" participants and "scientific" charts, their disdain for other networks is easy to see through the highly contrasting statistics, as well as the campaign name, "Easy Choice".

Instead of attacking other brands, Chinese companies try to build friendly and positive images to attract audiences in 4G commercials. China Mobile has an advertising campaign with

the theme of *he*, which means harmony and being together in Chinese. With a slogan of “be with you”, *he*-themed advertisements bring a sense of warmth to technology by presenting scenes of fathers video chatting with their wives and children while traveling, buddies sharing old memories by playing mobile games online, and lovers expressing their affection to each other before the takeoff parts them (C4-5; C4-6; C4-7; C4-8). Different from China Mobile’s soft and sensitive portrayal, China Union pictures themselves as young and energetic, as the theme *wo* (a homophone for “wow” in English and “me” in Chinese) indicates. Using famous Chinese athletes to endorse their network is a strategy of China Unicom to demonstrate their power and superiority. In a China Unicom 4G advertisement, a male table tennis athlete is playing against a young boy, while two female athletes are doing live streaming and praising the stable network (C4-21). Another advertisement of China Unicom shows four athletes in the spaceship-like vehicle speeding it up by pressing the “*wo* 4G” button next to “*wo* 3G” (C4-18).

3. *Targeting: International vs. Domestic*

Both China and the US do not show the intention of international targeting in 4G advertising. All the Chinese 4G commercials in China are in Mandarin, the only official language in China and not spoken globally. The US targets domestically as well, which can be seen from the extensive use of the US map in 4G advertising by five of the six 4G companies. A Verizon advertisement displays the 4G LTE coverage of four major US network companies by showing the shades on a map of the US, thus demonstrating that Verizon has the best coverage nationwide (U4-3). Also, T-Mobile shows the shape of the US map as well when the commercial mentions their users as “from real people nationwide” (U4-45, 00:12).

A significant difference in advertising targeting between China and the US starts to emerge when 5G comes. While most of the US telecommunication companies claim they are

superior to others in the nation, China's companies are trying to market themselves as the global 5G leaders. Huawei, a company from China, has the strongest penchant for expanding into international markets. Several of Huawei's advertisements have English voice over and display both English and Chinese subtitles (C5-24; C5-25; C5-28; C5-29; C5-31). Since English is not China's official language, using the English language in commercials is a signal of targeting the global market. In addition to voice over language, some companies in China use western people as roles in their advertisements. An advertisement from ZTE has western characters in the scenes of working remotely or multinationally, as well as AI real-time translation (C5-32). More obviously, Huawei and China Telecom use western people in almost all the scenes throughout some of their advertisements (C5-11; C5-24; C5-25). Some textual or visual contents point out this targeting difference between the two countries as well. For example, at the end of a ZTE 5G advertisement, it says, "a reliable global partner in the 5G era", followed by their logo on the screen (C5-32, 02:23).

In contrast to the "global partner" positioning in Chinese 5G advertising, US telecommunication companies are competing domestically. One of Verizon's 5G advertisements states they are "building America's first 5G network" (U5-5, 00:45). When the chief executive officer and former president of T-Mobile, John Legere, talks about *5G for All*, he affirms that "the new T-Mobile is about making sure *all Americans* can benefit from 5G" (U5-32, 00:19). Though the competitions among 5G companies in the US are intense, their advertising lacks the intention of entering the global market compared to China.

Discussion

This study analyzes textual and visual contents of 4G and 5G advertising in China and the US to conduct a two-way comparison between (1) 4G and 5G and (2) China and the US, aiming to examine the imagination stage of network infrastructures driven by advertisements in the domestication process.

The results show that 4G advertising has an emphasis on network speed and mobile phone applications that strengthen social connections or provide entertainment such as video chatting, video streaming, and online shopping. 5G advertising, assuming a realization of fast network speed, brings the low latency to the front and thus presents applications on digital devices, besides mobile phones, that could be applied in healthcare, manufacturing, education, and other industries. Humor, bandwagon effect, and attacking strategies are frequently used in 4G advertising, while 5G advertising employs the rational appeal to persuade the audience. China and the US share similar topics and themes in both 4G and 5G commercials except the reference of government and family, two prominent topics only appear on the Chinese side. The US has a large number of attack advertisements, whereas Chinese companies are trying to build caring and friendly images through advertising. In addition, compared to the domestic targeting of the US, Chinese 5G advertising expresses a desire to enter the global market.

4G vs. 5G

One noteworthy difference between the narratives of 4G and 5G is the subject who benefits from the infrastructures. There is a shifted focus from mobile applications in the 4G era to interactive and intelligent digital devices in the 5G era. In 4G advertising, characters often enjoy the convenience and entertainment brought by the smartphone applications, which sends a straightforward message to the audience -- your life could be just like theirs if you choose us as your carrier. This intent is valid since almost everyone has a smartphone. Nevertheless, 5G

advertising presents remote surgery, smart agriculture, and manufacturing automation, showing how human's life will be transformed with the 5G network. Neither Chinese nor US 5G advertising appeals for personal purchase because the main message of 5G is not only about mobile phone networks. It is about the network empowering other advanced technologies that lead to better lives for all mankind.

Another finding is the distinct appeals used in 4G and 5G advertising. The 5G commercials seldomly use humor and bandwagon effects since the 5G infrastructure is still at the building stage. It is too early to mock 4G users or users from other companies when 5G is not accessible to everyone, let alone apply bandwagon effects. At such time, promoting new technologies to the public is more essential than competing with others for telecommunication companies. Accordingly, the rational appeal is commonly used in 5G advertising. With different appeals, 4G and 5G advertising are convincing the audience in different ways according to the elaboration likelihood model (ELM) of persuasion (Petty & Cacioppo, 1986). The ELM proposes two distinct routes by which people process information, (1) the central route and (2) the peripheral route. The central route, used in many 5G advertisements, works by presenting careful consideration of the arguments in the message, which contributes to a strong persuasion. For example, 5G advertisements contain a large number of detailed explanations that not only demonstrate how technology can benefit people but also serve as introductions that give people the ability to understand and process the message about the technology. In contrast, the peripheral route functions when simple, superficial cues presented in the message trigger people's attitude changes. While this attitude change is unlikely to be meaningful or long-lasting, peripheral routes are frequently used in many 4G advertisements because of the decreasing significance of explaining a technology when it is fully adopted.

Strategies such as using testimonies, ridiculing slow network carriers, competing for the best data plans, and collaborating with other companies only appear in 4G advertisements. One reason could be the timing or the stage of technology adoption. Since the data collection was conducted in November 2019, the 4G advertisements in this study are probably from the mid to late period of the 4G era when 4G networks are widely in use. Yet, it was the beginning of the 5G era since 5G networks had not launched then. Therefore, there are no actual 5G network users to interview for testimonies. Although the data were collected at different stages of 4G and 5G, the assumption of advertising's role as a major source of imagination stays valid because of the following reason. As many scholars (Ling, 2004; Haddon, 2003) point out, the adoption of new technologies is not a step-by-step process, which means that the steps of domestication, including *imagination*, are still in the process even though new technologies have been adopted for a while. Even for a product that people are extremely familiar with – iPhone, for example – advertising still serves as a source of imagination in people's minds because of the updates in functions, appearance, or the added value such as fashion and creativity. That is to say, advertising remains its function of shaping imaginations even in the late 4G era. Nevertheless, each stage does have distinct strategies in commercial promotion according to the development stage of technologies. It seems to be a reasonable prediction that in a couple of years, 5G technologies will be advertised with the similar strategies mentioned above in the 4G commercials.

China vs. United States

Network companies in the US use lightning at night and high-speed motorcycles not merely to portray their networks as superior and powerful. Those images embody the fierce competition among the four major network companies as well. However, advertising in China

applies a gentle way to declare their superiority. The lack of attack advertisements in Chinese advertising is caused by two reasons. First, the Advertising Law of the People's Republic of China (2015) does not allow an advertisement to "belittle commodities of other producers and dealers or services of other providers". It is also prohibited by China's advertising law to use "national", "highest", "best", or "similar comparative" words in advertisements, which strictly limits competition among brands in the same industry. The second reason is that the three major network companies in China, China Mobile, China Unicom, and China Telecom are all state-owned, meaning they are directly controlled by the Chinese government. In this case, Chinese network companies have no reason to attack each other since they are in the same group.

Cultural differences between China and the US also explain some of the results. There are plenty of scenes of family or friends gathering in Chinese advertising, while the US focuses on the individual usage of technologies. Collectivism in China is about bonding with other people, especially families and close friends. With the functions of maintaining and strengthening connections among people, mobile networks are portrayed, in Chinese advertising, as tools for human bonding, which is reasonable since it fits well in China's value system. Filial piety, or *xiao*, is one of China's most important moral tenets, referring to the virtue of respecting and caring for one's parents and elder family members. That is the reason why some Chinese advertisements present adults video chatting with their parents, or kids enjoying the VR home cinema with big families. On the other side, the American Dream believes everyone has an equal opportunity to achieve success regardless of their socioeconomic status. Having an emphasis on freedom and equality, the American Dream encourages everyone to follow their personal calling and to become a better version of self, which promotes individualism (Abrams, 2019). Thus, advertising in the US pays more attention to how network technologies can be used to benefit

oneself than community relationships. Just like the T-Mobile advertisement says, the main message of US network advertising is to benefit and help everyone in the nation (U5-32).

The 5G advertising in China shows an interest in entering the global market, which is not seen either in the 4G commercials or on the US side. As the global leader of 5G, Huawei has the most obvious international appeal among all Chinese telecommunication companies. Though banned in the US, Huawei continues to have a rapid annual revenue growth with the majority of business conducted in the Greater China region, Europe, the Middle East, and Africa. Huawei represents China's ambitions to take the lead in the world in technology as it became the biggest Chinese private company in 2018. Huawei's unassailable position in China and the determination to be a multinational giant explains its intention of attracting more global partners in advertising. The US has already been dominating the global technology industry since seven of the world's top 10 tech companies are from the US (Parietti, 2019). Therefore, telecommunication companies in the US are busy competing with each other and do not have spare time and extra energy to join the global contest.

This research project explores the role of advertising in the adoption process of 4G and 5G networks. The trajectory from 4G, the era of mobile phones, to 5G, the era of the Internet of Things, reflects a number of changes and developments in mobile media communications that ICTs have brought to people's lives. The above analyses demonstrate how advertising makes network infrastructures visible through the portrayals of new technologies enabled by the 4G and 5G networks. With various scenes of everyday life furnished by new technologies, the advertising guides the public to realize the import of networks in their lives, leading to the shaping of their views about the 4G and 5G networks as infrastructures.

This study has potential limitations. First, this project might not display a full view of 4G advertising as expected. The data of 4G advertisements were found on online video sharing platforms from October to November in 2019, when many of the 4G advertisements were not available anymore as the telecommunication industry started promoting 5G networks. Since YouTube and Bilibili do not support archiving previous videos, this study might experience an incompleteness of the 4G data. Second, this project is not able to capture all the 5G advertisements since new 5G commercials have been released continuously over the past few months. In spite of the incessant promotions of 5G, the snapshot of 5G advertising this study captures is still meaningful due to the unique timing in the early technology adoption stage. Besides, since videos on Bilibili.com are user-uploaded, biases and subjectivity might be unavoidable. It is also possible that this study leaves out some commercials that are less popular or less accessible among the public as few people are able to see them, let alone upload to a video platform. Finally, advertising sends out perspectives of the industry since it is a marketing tool employed by brands to promote their products and services. Aside from the positive publicity from companies, dissenting voices from other places could also influence a person's imagination of new technology.

Future work should analyze other sources of imagination such as news articles or public discourse shaped by opinion leaders since combining multiple sources could provide a more comprehensive understanding of the early adoption process. Collecting various sources is also critical to adopt a historical view and look back to the 3G era or even earlier when video advertising was not a popular way to get information. Additionally, future directions include investigating the next steps after the imagination stage, for instance, people's perceptions of

technologies after the exposure of promotion sources, their behaviors of purchase, and the assimilation of technologies into their lives.

In sum, this study examines how the infrastructure technologies, 4G and 5G networks, are portrayed in advertising in China and the US as well as how the imaginations, in turn, influence people's views and understandings about the infrastructures. According to the domestication theory, the imagination stage is crucial in the technology adoption process as people might reflect their predilections and attitudes towards the technology (Haddon, 1996), and consequently decide further stages leading to full adoption. By analyzing the advertising in two leading nations in the 4G and 5G eras, this study lays out an overview of the source of imagination and captures the commons in China and the US, while comparing the inconsistencies between the two countries from different development levels and cultures. The findings also make a step forward to break the invisibility of infrastructure and to bring it to the foreground.

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Appendix

| Ad ID | Company | Title | Link |
|-------|---------------|-------------------------------------|---|
| C4-1 | China Mobile | China Mobile 4G Upgrade your SIM | https://www.bilibili.com/video/av76881615?from=search&seid=17687216881816201657 |
| C4-2 | China Mobile | China Mobile 4G "He" Game | https://www.bilibili.com/video/av76883142?from=search&seid=17687216881816201657 |
| C4-3 | China Mobile | China Mobile "He 4G" Sharing | https://www.bilibili.com/video/av76882351?from=search&seid=17687216881816201657 |
| C4-4 | China Mobile | China Mobile 4G Phone Ad | https://www.bilibili.com/video/av76885499?from=search&seid=17687216881816201657 |
| C4-5 | China Mobile | China Mobile "He 4G" Heart to Heart | https://www.bilibili.com/video/av76887097?from=search&seid=17687216881816201657 |
| C4-6 | China Mobile | China Mobile "He 4G" Be with You | https://www.bilibili.com/video/av75522313?from=search&seid=17687216881816201657 |
| C4-7 | China Mobile | China Mobile 4G Chinese New Year | https://www.bilibili.com/video/av76888317?from=search&seid=17687216881816201657 |
| C4-8 | China Mobile | China Mobile 4G A New Era | https://www.bilibili.com/video/av881080?from=search&seid=17687216881816201657 |
| C4-9 | China Mobile | China Mobile "He 4G" Your Choice | https://www.bilibili.com/video/av68831273?from=search&seid=4676579550842966251 |
| C4-10 | China Mobile | China Mobile 4G Waling the Dog | https://www.bilibili.com/video/av971531?from=search&seid=4676579550842966251 |
| C4-11 | China Mobile | China Mobile 4G Technologies | https://www.bilibili.com/video/av61301291?from=search&seid=4676579550842966251 |
| C4-12 | China Mobile | China Mobile 4G Fast Speed_1 | https://www.bilibili.com/video/av69748711?from=search&seid=8032620046270371333 |
| C4-13 | China Mobile | China Mobile 4G Fast Speed_2 | https://www.bilibili.com/video/av69748711?p=2 |
| C4-14 | China Telecom | China Telecom 4G+ Data Plan | https://www.bilibili.com/video/av16755197?from=search&seid=782471933382616739 |
| C4-15 | China Telecom | China Telecom 4G Better and Faster | https://www.bilibili.com/video/av76890731?from=search&seid=782471933382616739 |
| C4-16 | China Telecom | China Telecom 4G A Better Life | https://www.bilibili.com/video/av30276554?from=search&seid=782471933382616739 |
| C4-17 | China Telecom | China Telecom 4G+ Get Lost | https://www.bilibili.com/video/av24147132?from=search&seid=6007220250556119675 |

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|-------|--------------|--|---|
| C4-18 | China Unicom | China Unicom 4G Spaceship | https://www.bilibili.com/video/av76874550?from=search&seid=217040457334823848 |
| C4-19 | China Unicom | China Unicom 4G Not Only Faster | https://www.bilibili.com/video/av3989669?from=search&seid=217040457334823848 |
| C4-20 | China Unicom | China Unicom 4G Ice-cream | https://www.bilibili.com/video/av22479243?from=search&seid=6007220250556119675 |
| C4-21 | China Unicom | China Unicom 4G Ping Pong | https://www.bilibili.com/video/av21783565?from=search&seid=752104643970986318 |
| C4-22 | China Unicom | China Unicom 4G Soccer Game | https://www.bilibili.com/video/av29827889/?spm_id_from=333.788.videocard.2 |
| C4-23 | China Unicom | China Unicom 4G Your Best Choice | https://www.bilibili.com/video/av64790170?from=search&seid=752104643970986318 |
| U4-1 | Verizon | Verizon 4G LTE Commercial | https://www.youtube.com/watch?v=hJc_KDkpIU8 |
| U4-2 | Verizon | Verizon LTE Advanced Commercial | https://www.youtube.com/watch?v=oKn1_H4dQvA |
| U4-3 | Verizon | Verizon XLTE 4G Coverage - Layers | https://www.youtube.com/watch?v=enwa_9A5rVA |
| U4-4 | Verizon | Verizon Wireless 4G LTE Commercial | https://www.youtube.com/watch?v=U9uH7fsBKdE |
| U4-5 | Verizon | Verizon 4G LTE Coverage Reality Check That's Powerful | https://www.youtube.com/watch?v=04FcXq4vx7I |
| U4-6 | Verizon | Verizon 4G LTE Hiking Commercial | https://www.youtube.com/watch?v=_158hOhtNL0 |
| U4-7 | Verizon | Verizon TV Commercial with Star Legends Cameo | https://www.youtube.com/watch?v=3HfB-kdP54E&list=PL-DSg9FzFVDh_OWL2xKkKcjmAIWfx5WNj&index=6 |
| U4-8 | Verizon | Verizon Wireless. America's Fastest 4G Network. Rule the Air. | https://www.youtube.com/watch?v=rtf8BwUrOf8&list=PL-DSg9FzFVDh_OWL2xKkKcjmAIWfx5WNj&index=5 |
| U4-9 | Verizon | Verizon 4G LTE Commercial November 23, 2013 | https://www.youtube.com/watch?v=9J84R-tPQT0 |
| U4-10 | Verizon | Verizon Wireless Weight Lifter Commercial- TK McKamy Director Reel | https://www.youtube.com/watch?v=CrqrvzHLxdA |
| U4-11 | Verizon | Verizon 4G LTE Easy Choice | https://www.youtube.com/watch?v=zy_E84 |

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|-------|---------|---|---|
| | | Commercial | XzIFE |
| U4-12 | Verizon | Verizon 4G LTE Easy Choice 2 0 Commercial | https://www.youtube.com/watch?v=rN-HTBO5BDY |
| U4-13 | Verizon | VERIZON WIRELESS Commercial signal matters | https://www.youtube.com/watch?v=jAU9D7ppvY8 |
| U4-14 | Verizon | Verizon 4G LTE Coverage Commercial | https://www.youtube.com/watch?v=TBWsh38XFXs&list=PL-DSg9FzFVDh_OWL2xKkKcjmAlWfx5WNj&index=2 |
| U4-15 | AT&T | AT&T Thanksgiving Commercial -It's Not Complicated by Pet Turkey | https://www.youtube.com/watch?v=Bh2-3_JQTnA |
| U4-16 | AT&T | AT&T - 4G Network - It's Not Complicated - Werewolf - Commercial - 2013 | https://www.youtube.com/watch?v=8Op6UXYJvXk |
| U4-17 | AT&T | AT&T - 4G Network - It's Not Complicated - Nicky Flash - Commercial - 2013 | https://www.youtube.com/watch?v=k23Z-bWPCg |
| U4-18 | AT&T | Two Things at Once - AT&T TV Commercial 2013 - It's Not Complicated | https://www.youtube.com/watch?v=usfGA6l1HOs |
| U4-19 | AT&T | AT&T - 4G Network - It's Not Complicated - Candy Island - Commercial - 2013 | https://www.youtube.com/watch?v=feyW2mPR2U8 |
| U4-20 | AT&T | AT&T TV Commercial It's Not Complicated Cutest Grape | https://www.youtube.com/watch?v=-1dYE7WyXaE |
| U4-21 | AT&T | AT&T - 4G Network - It's Not Complicated - Robot - Commercial - 2013 | https://www.youtube.com/watch?v=17U_GwGBDuM |
| U4-22 | AT&T | AT&T - 4G Network - It's Not Complicated - Slow Turtle - Commercial - 2013 | https://www.youtube.com/watch?v=sw5o9SADbUQ |
| U4-23 | AT&T | AT&T - 4G Network - It's Not Complicated - Video Games - Commercial - 2013 | https://www.youtube.com/watch?v=6KJxPhlNoSA |
| U4-24 | AT&T | AT&T TV Commercial Its Not Complicated Couch Warmer | https://www.youtube.com/watch?v=D7Sa-Y7T07o |
| U4-25 | AT&T | AT&T Better Commercial - 2013 | https://www.youtube.com/watch?v=nfECEQ_jJ18 |

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| U4-26 | AT&T | AT&T TV Commercial - New Year's Revolution, Kids in Classroom | https://www.youtube.com/watch?v=oxB_F7WkHUo |
| U4-27 | AT&T | AT&T - 4G Network - It's Not Complicated - Pickle Roll - Commercial - 2013 | https://www.youtube.com/watch?v=TR9Shet2C74 |
| U4-28 | AT&T | It's not complicated - ATT commercial "high five" -bigger is better | https://www.youtube.com/watch?v=chgsxK1rSRo |
| U4-29 | AT&T | AT&T - 4G Network - It's Not Complicated - Tree House - Commercial - 2013 | https://www.youtube.com/watch?v=WRHjgfBoQ2A |
| U4-30 | AT&T | AT&T - 4G Network - It's Not Complicated - ∞ x ∞ - Infinity - Commercial - 2013 | https://www.youtube.com/watch?v=fcZEW0z9nVA |
| U4-31 | AT&T | AT&T Halloween TV Commercial - 'Whiz Bang' Largest 4G Network | https://www.youtube.com/watch?v=9LCYE9odBGU |
| U4-32 | AT&T | AT&T Commercial Afternoon Run Largest 4G Network YouTube | https://www.youtube.com/watch?v=aeRgWKaub5w |
| U4-33 | AT&T | Before Driving to Cabin - AT&T Digital Life TV Commercial | https://www.youtube.com/watch?v=x-gzi2GS6h0 |
| U4-34 | AT&T | LTE 101 AT&T | https://www.youtube.com/watch?v=bjCvY4utV-o |
| U4-35 | AT&T | AT&T Tailgate Commercial | https://www.youtube.com/watch?v=VZv_duABYDI |
| U4-36 | AT&T | AT&T LTE Broadcast AT&T | https://www.youtube.com/watch?v=0weDVmYEOtc |
| U4-37 | T-Mobile | T-Mobile's Unlimited Nationwide 4G Data with No Annual Contract | https://www.youtube.com/watch?v=4rRjJGAlldI |
| U4-38 | T-Mobile | T Mobile See It Again TV Commercial YouTube | https://www.youtube.com/watch?v=kN3nhaMWItY |
| U4-39 | T-Mobile | T-Mobile Commercial 2015 Ready Set Switch | https://www.youtube.com/watch?v=MxIBfrvKEss (no longer available) https://www.ispot.tv/ad/7e25/t-mobile-ready-set-switch (alternative link) |
| U4-40 | T-Mobile | T Mobile "Drop The Balls" Super Bowl Ad 30:s TV Commercial | https://www.youtube.com/watch?v=P1GkmbE3Mos |

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| U4-41 | T-Mobile | T-Mobile Towers TV Commercial | https://www.youtube.com/watch?v=uTwtKRwlAzW |
| U4-42 | T-Mobile | T-Mobile's Two Line Family Plan Offers Unlimited 4G LTE Data Commercial 2015 HD | https://www.youtube.com/watch?v=wX9OiVKgS58 |
| U4-43 | T-Mobile | T-Mobile #WidebandLTE NYC Challenge - Short #2 T-Mobile commercial | https://www.youtube.com/watch?v=WnZKEwqVjvQ |
| U4-44 | T-Mobile | MyTouch 4G- New Ride Commercial | https://www.youtube.com/watch?v=GDc1I01wxME |
| U4-45 | T-Mobile | T Mobile 4G LTE Network New Leader in Speed Commercial | https://www.youtube.com/watch?v=ExXmosY00Eo |
| U4-46 | T-Mobile | T-Mobile 4G PayDay Commercial | https://www.youtube.com/watch?v=8Qom7MTnck8 |
| U4-47 | T-Mobile | T-Mobile "No More Mr. Nice Girl" 4G Commercial 2012 | https://www.youtube.com/watch?v=jN_zAqzbXkc |
| U4-48 | T-Mobile | T-Mobile myTouch 4G Commercial | https://www.youtube.com/watch?v=JABV8Sez45s |
| U4-49 | T-Mobile | TV Commercial - T-Mobile - 4G LTE Data - Unleash! | https://www.youtube.com/watch?v=jTL3xhBK8Vw |
| U4-50 | T-Mobile | T-Mobile 4G Network commercial (2011) | https://www.youtube.com/watch?v=i-cjEocsPho |
| U4-51 | T-Mobile | T-Mobile 4G Data Showdown Commercial | https://www.youtube.com/watch?v=Po25PZrw8kM |
| U4-52 | Sprint | Sprint 4g commercial | https://www.youtube.com/watch?v=NPdkvg9Kw-M |
| U4-53 | Sprint | Sprint - Charts Commercial | https://www.youtube.com/watch?v=iaZjiUA1Uco |
| U4-54 | Sprint | NEW Sprint Palm Pre 4G Commercial "Breakup" W/ Pandora (Watch In HQ) | https://www.youtube.com/watch?v=zOMjjiCJcY |
| U4-55 | Sprint | Sprint's Now 4G Network Featuring Palm Pre & The Most AMAZING Sprint Commercial EVER! | https://www.youtube.com/watch?v=NlwBO36OeUQ |
| U4-56 | Sprint | NEW Sprint Commercial - What's happening 4G | https://www.youtube.com/watch?v=ZCTL6rlCPmU |
| U4-57 | Sprint | Sprint - What Can You Do with | https://www.youtube.com/watch?v=MS8- |

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| | | 4G? | vtvM6Qs |
| U4-58 | Sprint | Sprint Break Up Commercial | https://www.youtube.com/watch?v=3vFhBqu50bM |
| U4-59 | Sprint | Sprint 4G - Overdrive | https://www.youtube.com/watch?v=GmDsLlt5HM4 |
| U4-60 | Sprint | Wireless Network News Sprint 4G LTE Launch! | https://www.youtube.com/watch?v=HEm_q5wqGtM |
| U4-61 | Sprint | Sprint Commercial 2015 Don't Be Too Rich to Care Layover Ads | https://www.youtube.com/watch?v=QHsPgUJIsHQ (no longer available) https://www.ispot.tv/ad/7iIE/sprint-dont-be-too-rich-to-care-layover (alternative link) |
| U4-62 | U.S. Cellular | U.S. Cellular "4G Experience" | https://www.youtube.com/watch?v=4FhhpkcBdDI |
| U4-63 | U.S. Cellular | US Cellular commercial "Running" | https://www.youtube.com/watch?v=29vaN2yK8OE |
| U4-64 | U.S. Cellular | NETGEAR 4G LTE Router Now Available at U.S. Cellular | https://www.youtube.com/watch?v=d1CyG5ymUwQ |
| U4-65 | U.S. Cellular | D-Link 4G LTE Router from U.S. Cellular | https://www.youtube.com/watch?v=DGVxZHnqodk |
| U4-66 | U.S. Cellular | ZTE 4G LTE Router with Voice from U.S. Cellular | https://www.youtube.com/watch?v=0YNNjUvpSUA |
| U4-67 | U.S. Cellular | US Cellular commercial "Unbelievable" | https://www.youtube.com/watch?v=Q8op994riXs |
| U4-68 | Broadcom | Broadcom Delivers 1000x Bandwidth to 4G Mobile Networks | https://www.youtube.com/watch?v=m_X6l4toRXE |
| C5-1 | China Mobile | China Mobile 5G Come for You | https://www.bilibili.com/video/av54879045/?p=1 |
| C5-2 | China Mobile | 5G Changes Society | https://www.bilibili.com/video/av46867456/?spm_id_from=333.788.videocard.0 |
| C5-3 | China Mobile | 5G Intelligence Connects Dreams | https://www.bilibili.com/video/av54879045/?p=3 |
| C5-4 | China Mobile | 5G Empowers Smart Production | https://www.bilibili.com/video/av54879045/?p=4 |
| C5-5 | China Mobile | 5G Empowers Smart Power Grid | https://www.bilibili.com/video/av54879045/?p=5 |

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| C5-6 | China Mobile | 5G Technology for Criminal Detection And Catching | https://www.bilibili.com/video/av54544280/?spm_id_from=333.788.videocard.0 |
| C5-7 | China Mobile | The Future of Possibilities | https://www.bilibili.com/video/av67354640?from=search&seid=4990909441364839002 |
| C5-8 | China Telecom | 5G Empowers the Future: One Day With 5G | https://www.bilibili.com/video/av56831628?from=search&seid=12645618413024176888 |
| C5-9 | China Telecom | 5G Empowers the Future | https://www.bilibili.com/video/av63652449/?spm_id_from=333.788.videocard.6 |
| C5-10 | China Telecom | Hello 5G | https://www.bilibili.com/video/av74007130?from=search&seid=13931587561739168526 |
| C5-11 | China Telecom | 5G Is on the Way | https://www.bilibili.com/video/av63673760/ |
| C5-12 | China Unicom | Enjoy 5G with China Unicom | https://www.bilibili.com/video/av63199033?from=search&seid=2622678922156175336 |
| C5-13 | China Unicom | Let the Future Grow_1 | https://www.bilibili.com/video/av55349296?from=search&seid=4990909441364839002 |
| C5-14 | China Unicom | Let the Future Grow_2 | https://www.bilibili.com/video/av53940436?from=search&seid=4990909441364839002 |
| C5-15 | China Unicom | Smart Winter Olympics Connects the Future | https://www.bilibili.com/video/av48799688?from=search&seid=4990909441364839002 |
| C5-16 | China Unicom | 5G Driverless Delivery | https://www.bilibili.com/video/av68680530?from=search&seid=14535035751899689445 |
| C5-17 | China Unicom | 5G Low Latency Communication | https://www.bilibili.com/video/av68680530?from=search&seid=14535035751899689445 |
| C5-18 | China Unicom | 5G Fast Live Broadcasting | https://www.bilibili.com/video/av68680530?from=search&seid=14535035751899689445 |
| C5-19 | China Unicom | 5G Smart Home | https://www.bilibili.com/video/av68680530?from=search&seid=14535035751899689445 |
| C5-20 | China Unicom | 5G Fast Speed | https://www.bilibili.com/video/av68680530?from=search&seid=14535035751899689445 |
| C5-21 | China Unicom | 5G Intelligent Healthcare | https://www.bilibili.com/video/av68680530?from=search&seid=14535035751899689445 |
| C5-22 | China Unicom | 5G^n, Let the Future Grow | https://www.bilibili.com/video/av64881982?from=search&seid=2025217601812688219 |
| C5-23 | China Unicom | Me and My Country | https://www.bilibili.com/video/av67946708?from=search&seid=17061409479786477739 |
| C5-24 | Huawei | Bring Digital to Everyone | https://www.bilibili.com/video/av54941906? |

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| | | | from=search&seid=6205766730438798227 |
| C5-25 | Huawei | The Super Connected and Super Intelligent World | https://www.bilibili.com/video/av53479817/?spm_id_from=333.788.videocard.0 |
| C5-26 | Huawei | The Proud of the Country | https://www.bilibili.com/video/av53458699?from=search&seid=6205766730438798227 |
| C5-27 | Huawei | Huawei Leads a New Era of 5G | https://www.bilibili.com/video/av44224956?from=search&seid=6205766730438798227 |
| C5-28 | Huawei | Huawei Mobile World Congress 2019_1 | https://www.bilibili.com/video/av42320611?from=search&seid=6205766730438798227 |
| C5-29 | Huawei | Huawei Mobile World Congress 2019_2 | https://www.bilibili.com/video/av42320746/?spm_id_from=333.788.videocard.0 |
| C5-30 | Huawei | Huawei Mobile World Congress 2019_3 | https://www.bilibili.com/video/av42330952/?spm_id_from=333.788.videocard.2 |
| C5-31 | Huawei | Across Time and Space | https://www.bilibili.com/video/av68009720/?spm_id_from=333.788.videocard.10 |
| C5-32 | ZTE | 5G Is Coming | https://www.bilibili.com/video/av47735763?from=search&seid=8384410101980919079 |
| U5-1 | Verizon | 5G Built Right Corning Verizon | https://www.youtube.com/watch?v=FjZ8Bd_KUtM |
| U5-2 | Verizon | 5G Built Right NFL Verizon :30 | https://www.youtube.com/watch?v=sqnl7Ng9KfQ |
| U5-3 | Verizon | 5G Built Right I Madison Square Garden I Verizon | https://www.youtube.com/watch?v=GlyUb6bWY2s |
| U5-4 | Verizon | First Call First to Tomorrow. First to 5G. | https://www.youtube.com/watch?v=6Mppg32to_g (no longer available) https://www.ispot.tv/ad/dNVT/verizon-first-call (alternative link) |
| U5-5 | Verizon | First to 5G First to Tomorrow. First to 5G. | https://www.youtube.com/watch?v=ni58XY3TbeU |
| U5-6 | Verizon | Be First to Real Time 5G Ultra-Wideband | https://www.youtube.com/watch?v=ZkgKyIRDJPK |
| U5-7 | Verizon | Can Randy Moss beat Verizon 5G? Verizon | https://www.youtube.com/watch?v=2DleBMYeSQU |
| U5-8 | Verizon | Can Rob Gronkowski beat Verizon 5G? Verizon | https://www.youtube.com/watch?v=e7LGeKPLeRk |
| U5-9 | Verizon | Putting Better Outcomes at | https://www.youtube.com/watch?v=DjT- |

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| | | Doctors' Fingertips | VZ210pc |
| U5-10 | Verizon | Helping Doctors Fight Cancer – Extended | https://www.youtube.com/watch?v=5xsg15c8sfM |
| U5-11 | Verizon | The Age of Humans | https://www.youtube.com/watch?v=KARvI5vcNSw |
| U5-12 | Verizon | VERIZON “READY TO KEEP YOU READY” 5G :15 | https://www.youtube.com/watch?v=qtLU3yobGNA (no longer available) https://www.ispot.tv/ad/ocsl/verizon-more-than-a-phone-company (alternative link) |
| U5-13 | Verizon | Verizon's 5G Incubator: Building the 5G ecosystem Technology Demonstration Verizon | https://www.youtube.com/watch?v=471NuszPnI |
| U5-14 | AT&T | 5G for Business from AT&T | https://www.youtube.com/watch?v=wgqEhALXIAc |
| U5-15 | AT&T | Connecting Our Lives Through 5G AT&T | https://www.youtube.com/watch?v=SqGn2LYnNq4 |
| U5-16 | AT&T | AT&T 5G Network TV Commercial, Kid iSpot tv | https://www.youtube.com/watch?v=meAN0-3ZwtY |
| U5-17 | AT&T | OK Carnival AT&T | https://www.youtube.com/watch?v=PJ-4tRbmX7Q |
| U5-18 | AT&T | OK Surgeon | https://www.youtube.com/watch?v=1YT3erQZoq4 |
| U5-19 | AT&T | OK Tattoo | https://www.youtube.com/watch?v=CIXfWgKAIEI |
| U5-20 | AT&T | OK Sushi | https://www.youtube.com/watch?v=o9ERrXnmKt4 |
| U5-21 | AT&T | What is 5G? - A Breakdown of 5G Technology Explained AT&T | https://www.youtube.com/watch?v=PAqEjQjxgdY |
| U5-22 | AT&T | AT&T Fixed Wireless 5G Trials Delivering Ultra-Fast Connections AT&T | https://www.youtube.com/watch?v=MtceXqgks1M |
| U5-23 | AT&T | Future of 5G Technology AT&T | https://www.youtube.com/watch?v=C3YUwhZ7M2g |
| U5-24 | AT&T | AT&T 5G for Businesses Allows Customers to Create Experience | https://www.youtube.com/watch?v=OJbazGHFog8 |
| U5-25 | AT&T | We're Bringing 5G to Life AT&T | https://www.youtube.com/watch?v=54a4VQbqxmU |

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| U5-26 | T-Mobile | T-Mobile T-Mobile Plans Nationwide 5G | https://www.youtube.com/watch?v=cD_u00hxoHk&t=34s |
| U5-27 | T-Mobile | Natalie Sifferman T-Mobile 5G commercial | https://www.youtube.com/watch?v=a7ZG_YyYliY |
| U5-28 | T-Mobile | Built 5G Ready T-Mobile 600 MHz Network | https://www.youtube.com/watch?v=l8CaLSfLpqQ |
| U5-29 | Two | T-Mobile & Sprint: 5G For All | https://www.youtube.com/watch?v=iRpJ02oWU9s |
| U5-30 | T-Mobile | Our 5G Future T-Mobile | https://www.youtube.com/watch?v=cSK2VRAbho4 |
| U5-31 | T-Mobile | How 5G Technology Will Benefit the Future of Education T-Mobile | https://www.youtube.com/watch?v=UhfH-tmwprg |
| U5-32 | T-Mobile | How 5G Will Benefit Your Everyday Life T-Mobile | https://www.youtube.com/watch?v=WM0Di5b7OK4 |
| U5-33 | T-Mobile | How Future 5G Networks will Benefit the World T-Mobile | https://www.youtube.com/watch?v=wpBTGqz2owE |
| U5-34 | T-Mobile | How Will 5G Technology Change Everything? T-Mobile | https://www.youtube.com/watch?v=IW1_kM3RhOw |
| U5-35 | T-Mobile | Benefits of 5G: Future Smart Cities - Los Angeles T-Mobile | https://www.youtube.com/watch?v=9gxJ7EVD26s |
| U5-36 | Sprint | Sprint 5G Episode 1: Transformation | https://www.youtube.com/watch?v=hFTgXrEOf-g |
| U5-37 | Sprint | Sprint 5G Episode 2: Technology | https://www.youtube.com/watch?v=hVFG1xalXoY |
| U5-38 | Sprint | Sprint 5G Episode 3: The Future | https://www.youtube.com/watch?v=6xF3Z2VloyY |
| U5-39 | Sprint | Sprint 5G Episode 4– Spectrum | https://www.youtube.com/watch?v=ub8-5etWceA |
| U5-40 | Sprint | Sprint 5G Episode 5: Massive MIMO Part 1 | https://www.youtube.com/watch?v=KHsv-2IS39M |
| U5-41 | Sprint | Sprint 5G Episode 5: Massive MIMO Part 2 | https://www.youtube.com/watch?v=ihWXYqstyIQ |
| U5-42 | Sprint | Sprint True Mobile 5G is in Phoenix | https://www.youtube.com/watch?v=yRRG-yQdpPI |
| U5-43 | Qualcom m | Welcome to the Invention Age | https://www.youtube.com/watch?v=2I0TEX-BN14 |
| U5-44 | Qualcom | Now with 5G, you can | https://www.youtube.com/watch?v=FwrdM |

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| U5-45 | Qualcomm | First 5G data connection with the Snapdragon X50 5G modem | https://www.youtube.com/watch?v=MTXQOez3mcg |
| U5-46 | Qualcomm | The Qualcomm Snapdragon 855 Mobile Platform is ushering in the 5G era | https://www.youtube.com/watch?v=LmnTgnJez24 |
| U5-47 | Qualcomm | Meet Snapdragon X55 – the world’s most advanced commercial 5G modem | https://www.youtube.com/watch?v=gjQFLjQsqAY |
| U5-48 | Qualcomm | Meet Snapdragon X50 – Qualcomm Technologies' First 5G Modem | https://www.youtube.com/watch?v=OqSGyhFxQIs |
| U5-49 | Qualcomm | Qualcomm’s 5G Vision | https://www.youtube.com/watch?v=xRav7yVqRYc&t=2s |
| U5-50 | Cisco System | Cisco Ultra Services Platform - 5G Ready, Today | https://www.youtube.com/watch?v=CEADobEmG0 |
| U5-51 | Cisco System | 5G? Yes. Wi-Fi 6? Yes. And only from Cisco? Yes. | https://www.youtube.com/watch?v=NH4iaVyURgk |
| U5-52 | Cisco System | Rakuten and Cisco: Building the Bridge to 5G | https://www.youtube.com/watch?v=likKx_L1YkQ |
| U5-53 | Intel | Network Transformation 5G Video Intel Business | https://www.youtube.com/watch?v=qZD2BmyETeM&list=PLj-81kG3zG5Ypq3kDwZNaLJIJZHrlVQqN&index=1 |
| U5-54 | Intel | 5G Wireless Networks Intel | https://www.youtube.com/watch?v=0KOMGb_L1zM |
| U5-55 | Intel | Transforming the Network For 5G Intel Business | https://www.youtube.com/watch?v=UuIOi_fIvWc&list=PLj-81kG3zG5Ypq3kDwZNaLJIJZHrlVQqN&index=2 |
| U5-56 | Intel | What is 5G? Intel Business | https://www.youtube.com/watch?v=kwqkbWFNIhU&list=PLj-81kG3zG5Ypq3kDwZNaLJIJZHrlVQqN&index=11 |
| U5-57 | Intel | Intel 5G Technology at the US Open | https://www.youtube.com/watch?v=1XtQvLZVGK8 |