

The bumpy road towards network convergence in China: The case of over-the-top streaming services

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Abstract

The decoupling of content and distribution platform has changed television irrevocably. Potential opportunities promised by the integration of telecommunications, broadcast and Internet networks means television has become a strategic highland for relevant stakeholders including industry players and state regulators. In China, network convergence has been on the state agenda since the turn of the century, but has remained stubbornly hard to move forward. This article starts with a brief overview of the state policy development in relation to the three-network convergence. It then zooms in onto the case of over-the-top streaming as a microcosm of the convergence project by examining two critical moments in its development trajectory, highlighting a short-lived early experiment in 2005 and a more recent wave of solutions since 2010. It offers a contextualised analysis of market evolution and state regulatory approaches in this space as power negotiations play out in multiple dimensions including those between the state and market, between the central and local, and between sectorial interests. By doing so, this article reveals contestations, contradictions and challenges in the state-engineered convergence project.

Keywords

China, convergence, cultural policy, M. New Media (Internet mediated), over-the-top, set-top box, streaming

Introduction

As television becomes smarter, the status of living room as the hub of audiovisual entertainment has been cast into doubt. Various forces are at play in recent years, with some diversifying spatial and social contexts of audiovisual consumption, while others are pulling people back to it. New

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players are attempting to redefine viewing experiences with online video sites, IPTV, smart TV, set-top boxes and dongles. Michael Curtin (2009) uses the term 'matrix era' to describe the transformation of television, where one-to-many distribution strategies of broadcast networks has evolved to a moment 'characterised by interactive exchanges, multiple sites of productivity, and diverse modes of interpretation and use'. In the digital landscape of 'connected viewing' (Holt & Sanson, 2014), content is distributed across platforms, in real time or on demand, based on advertising-supported or paid service model. Internationally, Google, Netflix, iTunes, Amazon, Hulu, Yahoo and Facebook are what Cunningham and Silver call the 'King Kongs' of the online distribution world, creating new markets and new forms of content and challenging the dominance of traditional media (Cunningham & Silver, 2013). In the streaming device market, Apple TV, Roku, Google Chromecast and Amazon's Fire TV stick are leading the pack.

The rapid changes in media distribution are situated in the wider context of media convergence. Jenkins (2006) defines media convergence as '[T]he flow of content across multiple media platforms, the cooperation between multiple media industries, and the migratory behavior of media audiences who will go almost anywhere in search of the kinds of entertainment experiences they want' (p. 2). He further emphasises the need to understand convergence beyond the technological dimension and examine it as 'a cultural shift as consumers are encouraged to seek out new information and make connections among dispersed media content' (Jenkins, 2006, p. 3). Indeed, the people who are formerly known as audiences have become producers and distributors of media content in the age of convergent media (Jenkins, 2006). According to Meikle and Young (2012), convergence can be understood in four inter-related dimensions: technological, industrial, social and textual. This is a process where various stakeholders negotiate meaning, voice, influence and boundaries. In analysing 'new' media and the dynamics of change in the media field, Couldry (2009) reminds us the importance of tracing many continuing social, political and economic forces that shape the processes. In the context of media convergence, according to Flew (2012), as the silos of vertical industry sectors are broken and horizontal layers of infrastructure, access devices, applications and content emerge, such changes have rendered much of the existing sector-specific regulatory infrastructure obsolete. The absence of institutional and policy convergence therefore adds to regulatory challenges.

In China, the world's largest Internet market with over 710 million users with a penetration rate over 51% by mid-2016 (China Internet Network Information Center, 2016), the landscape of content distribution and consumption is rapidly evolving. Online video market has grown rapidly, reaching over 510 million users by mid-2016. Digital players in China have come to offer a proliferating range of content often more appealing than programming of state-owned media. Among the 254 million cable subscribers across the country, one-third of them have cut the cord, opting for over-the-top (OTT) services (Ma, 2016). As the evolving viewing behaviour challenges both the traditional notion of television and the oligopolistic playground of the incumbent broadcasters and distributors in developed economies (Strangelove, 2015), China is no exception here. The advent of post-broadcasting in China is accompanied with broadcasters' attempts to win back its youth audience (Keane & Zhao, 2015). In the context of the state-engineered network convergence project, regulatory challenges are acutely felt by authorities in the contested space. Power negotiations play out in multiple dimensions, evident in the dynamics between the state and market, between the central and local, and between sectorial interests.

This article begins with a brief overview of state policy developments in network convergence in China. Then it zooms in on the case of OTT set-top boxes that smarten up TV sets in the context of network convergence by examining a short-lived early experiment in the industry in 2005 and

the more recent wave of solutions since 2010. It offers a contextualised analysis of the co-evolution of market development and regulatory approaches in this space as power negotiations play out in multiple dimensions, that is, between the state and market, between the central and local, and between sectorial interests. The article draws on interviews with industry practitioners and observers, and an extensive search of relevant secondary sources including policy documents, news reports and trade press. By doing so, this article reveals contestations, contradictions and challenges in the state-engineered convergence project.

Policy developments of triple-network convergence in China

Triple network convergence, namely, the convergence of telecommunication, broadcasting and Internet networks, has been on the Chinese government's agenda since the 10th Five-Year Plan proposed at the turn of the 21st century. However, it has remained stubbornly hard to move forward for a long time. While technological advances mean various devices can theoretically receive and distribute data and content from any of the three networks, policy development brings considerable complexity to the reality. In China, broadcast industry's earlier experimentation in offering telecom services in the late 1990s raised a red flag for the telecom industry. The experimentation has been brought to an abrupt end, when the State Council issued Document 82 in 1999, preventing both telecom and broadcast industries from entering into each other's business. The initial caution has turned into gradual promotion at the state level. Two years later, the state officially adopted the concept of network convergence, in its 10th Five Year Plan, to promote it as a state project. The progress has however been stagnant.

It was not until 2010 that the state council laid out the *Overall Plan for Promoting Triple Network Convergence* (*tuijin sanwang ronghe zongti fang'an*), which launched initial trial projects in 12 cities followed by further expansion across the country. The difficult birth of the plan resulted from repeated revision of the draft, altogether 13 versions, as sector-specific regulators State Administration of Radio, Film, and Television (SARFT) and Ministry of Industry and Information Technology (MIIT) engaged in drawn-out power negotiation process ('Icebreaking in three-network convergence after 12 years', 2010). Following the 5-year trial, the State Council (2015) issued *Triple Network Convergence Promotion Plan* (*sanwang ronghe tuiguang fang'an*) in September 2015. According to the plan, the scope of two-way entry of broadcasters and telecom industries into each other's business will be gradually expanded across the country.

Apart from sectorial conflicts of interest, fragmentation of cable networks in China adds challenges to three-network convergence. It was not until 2014 that China Broadcasting Network (CBN) was established with a modest registered capital of 4.5 billion yuan (US\$728.48 million) (Shen, 2014). The state-owned new venture was tasked with consolidating China's fragmented cable TV networks, a critical step towards advancing three-network convergence. Under the *Triple Network Convergence Promotion Plan*, CBN secured a telecom licence in 2016, allowing it to provide nationwide Internet data and telecommunication services. Thus, a fourth player has gained an entry ticket to a market long dominated by three operators. Its impact on the telecom market is however too early to tell, before it accomplishes the urgent task of integrating cable networks across the country.

Another significant barrier to network convergence lies in the multiple scales of the media landscape in China. The inter-regional contestations and central-local dynamics were very much implicated with power negotiations between telecom and broadcast sectors. In fact, Chinese media landscape is marked by scalar contestations, conflicts and contradictions, which are critical in

understanding media practices in China (Sun, 2014; Zhao, 2008). Furthermore, as experimental models adopted by local operators during the trial phase of network convergence project carry distinctive local characteristics, to what extent these models can be replicated to a wider scale remains a question.

In the *Triple Network Convergence Promotion Plan*, the state emphasised the need to safeguard cyber security (*wangluo anquan*) and cultural security (*wenhua anquan*). The emphasis on cyber security speaks to the policy discourse on indigenous innovation (*zizhu chuangxin*) for the country to upgrade from the world's factory into a technological leader (Zhao, 2010). China's DVD industry offers a cautionary tale here. Absent from the industry standard setting process, China's DVD manufacturers licence technologies had to pay royalties out of its thin margins to intellectual property owners, which ultimately led to the demise of the industry in China. As China entered World Trade Organization (WTO) in 2001, local manufacturers relying mainly on technology transfer faced increased competition from overseas. In order to be more self-reliant and move up the industry chain in the global economy, the state has invested heavily in research and development of indigenous and proprietary technologies, such as the indigenous 3G standard Time Division–Synchronous Code Division Multiple Access (TD-SCDMA) (Gao & Liu, 2012) and Wi-Fi security standard Wireless Local Area Network (WLAN) Authentication and Privacy Infrastructure (WAPI) (Qiu, 2010). As Qiu (2010) has noted, apart from economic necessity, techno-nationalism also drives the pursuit of technological prowess as China reintegrates itself into the global economy, especially in the information and communications technology sector. The selection of the national standard could however be a contentious process. This is evident in the case of mobile TV standard, where SARFT (which was later merged with the General Administration of Press and Publication in March 2013 into the State Administration of Press, Publication, Radio, Film and Television, or SAPPRFT) and MIIT championed for their own standards and industries under their regulation, and it took a long time before the state selected the MIIT-spearheaded one as the recommended national standard over international standards. This signalled not only the state's intention to promote indigenous technology but also power negotiation between the two sectors (Lin, 2002; Zhao, 2015).

The emphasis on cultural security demonstrates the state's intention to continue its grip on cultural production and distribution in the converging media environment. This can be observed from the trajectory of the creative industries discourse in China. As Keane (2007) observes, while the fashionable concept entered China in 2004, the suspicious nature of creativity has met with hesitation from the central government while engendering support by actors looking to evade the ideological control imposed by the state cultural policy and among growth coalitions. The hybrid term 'cultural creative industries' testifies a conciliatory approach as the state intends to nurture new growth opportunities while remaining wary of the sensitive term 'creative'. The connection between cultural development, innovation and creativity remains an unresolved policy issue (Keane, 2009). The inherent conflict between the state's intention to revitalise cultural production and its concern over possibly sensitive or subversive creativity remain a challenge for creativity to come into full bloom. As China's media sectors undergo restructuring and manifest dual nature of public institutions (*shiye*) and commercial enterprises (*qiye*), the state's intention to revitalise cultural production is accompanied by the need to rein in 'inharmonious' creativity and innovation. For innovative media organisations, there is a constant need to balance their entrepreneurial approaches and policy lines. In the context of convergence, both emerging players with potentially disruptive effects and users assuming the role of media producers highlight such inherent conflicts at the crux of policy-making.

While broadcasters and telecom operators have been waging a turf war for a long time, the Internet has become a disruptive force to the established sectors. Meanwhile, the Internet has emerged as a locus of contradictions between economic and political imperatives of the state. China's 'Internet Plus' initiative unveiled by Premier Li Keqiang in 2015 illustrates the state's intention to capture the full potential of the Internet in driving economic growth and development. According to the plan, Internet Plus will become a new economic model and an important driving force for economic and social innovation and development by 2025. While the state aims to employ the Internet as the engine of economic development, it has strengthened Internet governance to maintain its control over the ideological terrain. In 2014, the Cyberspace Administration of China (CAC), also known as the Office of the Central Leading Group for Cyberspace Affairs, was established as a central Internet regulator in the country. This streamlines overlapping Internet control structures where 'nine dragons managing the water' (*jiulong zhishui*), an often-quoted line by industry practitioners and observers during the interviews regarding the fragmented and inefficient nature of governance. Under the direct leadership of President Xi Jinping, CAC has become a powerful Internet governance apparatus aiming to 'make the positions of the Party the strongest voices in the online space' and 'distribute positive energy online' ('The National Internet propaganda work meeting', 2016).

For cultural and creative industries, the Internet carries both hopes of revitalisation and fears of disruption. This also explains the complicated relationship between television broadcasters, telecom operators and Internet service providers. During the long-haul journey towards network convergence, the state-engineered project has witnessed hopes and frustrations, contentions and contradictions. In the set-top box market, cable operators and telcos have been competing fiercely against each other in China. The former mainly dispense broadcasters' content in digital signals, and the latter dominate in deploying IPTV via the dedicated telecom network. While the dust has not settled, OTT solution providers have joined the battle as emerging disruptors. Before I go on to discuss the recent wave of OTT streaming market in China, an early water-testing product is particularly worth discussion, which will be expanded in the next section.

A precedent to the recent wave of OTT streaming in China

An attempt to offer convergent service by connecting Internet to the TV screen emerged in the early times of network convergence as a state project. The experiment however was not a state-led one. In 2005, Shanda Interactive Entertainment Ltd. (Nasdaq: SNDA) launched a TV set-top box called 'EZ Station'. Established in 1999, Shanda built its initial success in multiplayer online role-playing games operation based on prepaid pay-to-play model. In late 2005, the revenue model shifted from subscription to in-game virtual item purchases in an attempt to attract less die-hard players and extend the lifecycle of the games. The further objective was to reach beyond game players and transform Shanda from an online gaming company to an interactive entertainment media company catering to the wider demographics in China. The vision, according to Shanda's CEO Chen Tianqiao, was to become China's Disney (Faris, 2005). Its acquisition of leading online literature websites and adaptation of online literature works into screen products attested to such ambition (Zhao, 2011).

The EZ station was designed based on Microsoft's operating system to bring the Internet to television screens, turning them into entertainment hubs that connect users to a diversified portfolio of content including games, film, and TV shows. According to most interviewees, the idea was ahead of its time. Despite many difficulties in development, Shanda delivered the product. The device came with the capability of recording up to 20 hours of TV on a 80GB hard drive. The box

was priced at 6850 yuan (US\$850), and on top of that, users need to pay a monthly subscription fee between 40 to 68 yuan. The prohibiting price was one reason why the box did not take off. Moreover, broadband adoption, which was necessary for optimal user experiences, was still at its early stage. More importantly, the lacklustre content library failed to attract users. Although Shanda managed to establish a content alliance involving 48 partners, it was not convincing enough for target users (Cao, 2005). TV broadcasters showed little interest, and online video platforms such as LeTV, Tudou and Youku were only beginning to emerge.

What ultimately nipped EZ station in the bud was the policy barrier it bumped into. Back then, telecom operators and broadcasters as well as their sector-specific regulators MIIT and SARFT were deeply embroiled in power negotiation regarding the regulatory power over IPTV. The trump card finally went to SARFT, who became the authority to issue IPTV licence. The first licence went to Shanghai Media Group (SMG) in May 2005. From then on, telecom operators had to seek collaboration with SMG in the field of IPTV, via its wholly owned subsidiary BesTV established to operate IPTV business. Under such collaborations, telecom operators provided set-top boxes, which were often bundled with broadband service at no extra charge to push adoption, and content was largely sourced from broadcasters. As Shanda's CEO Chen explained during a media interview, 'IPTV is about distributing television content over telecom operators' private network, while our EZ station brings the internet to the TV screen' (Dong, 2005). While Chen meant to distinguish EZ station from IPTV and circumvent policy barrier in IPTV, his remarks sounded a poignant alert to SARFT, as broadcasters may face stiff competition from Internet content providers once TV is connected to the Internet. As Shanda tested the boundary, the envisaged convergence of Internet and broadcast network was clouded by regulatory uncertainties. In April 2006, SARFT issued a notice to halt IPTV-like service, where unlicensed service providers distribute content from the Internet to TV. The document singled out Shanda as an example and urged its telecom partners China Telecom and China Netcom to stop providing network support to such services. Soon after the intervention from SARFT, Shanda abandoned its ambitious plan to build an entertainment hub out of the box.

Shanda's failed attempt at bringing the Internet to TV illustrates the power negotiation over the contested terrain of network convergence. This did not come as a surprise to industry observers. As one interviewee recalled, 'Shanda was moving the cheese of the SARFT and it was certainly risky to go ahead before the dust settled between regulatory authorities'. The conflicting interests between broadcast and telecom sectors as well as relevant regulatory authorities, SARFT and MIIT, is in fact a major reason behind the slow, zigzag progress of the state-initiated convergence project (Wu & Leung, 2012; Zhang, 2003). As broadcasting and telecom industries have long been dominated by state-owned or controlled enterprises, industry and regulatory stakeholders have been trying to maintain such dominance in their own spaces while eyeing for new business opportunities. While broadcasters and telecom operators have long been competing against each other, the Internet venture brought an even more audacious plan to the table. The move of connecting TV to the Internet turned out to be overstepping the boundaries. The broadcast regulator's intention to protect its departmental interests and its power in market entrance regulation has led to the demise of the early experiment. While telecom operators were willing collaborators in this experimentation, they cannot circumvent roadblocks set up by broadcast regulators either.

The emerging market of OTT streaming in China

While the broadcast regulator was quick to close the lid on what they perceive as the Pandora's box, the market appeared stagnant for years until the next wave of convergent services has gathered

pace since 2010. As Apple TV, Google Chromecast and the like are disrupting screen distribution, a parallel universe exists in China which allows viewers to smarten up their TVs. China's OTT TV and video market shows strong growth potential, with revenues forecast to rocket from just US\$40 million in 2010 to US\$2815 million in 2020 (Digital TV Research, 2016). Apart from the increasing adoption of broadband Internet and a proliferating range of smart devices, the burgeoning development of online video space has facilitated the rapid growth of screen content online. Online video platforms have evolved into significant players in the screen ecology by various means, including content licensing, original (co-)production and talent nurturing (Zhao, 2016; Zhao & Keane, 2013).

In this context, electronic device manufacturers and digital giants including online video platforms in China have all aimed to contend for users in the space of OTT streaming. Android TV set-top boxes and dongles abound in the market, mostly priced within the range of 200 yuan (US\$30) to 500 yuan (US\$75). Viewers can install third-party streaming applications such as Togie, fengyun live and 360kan to access a rich repertoire of content including live TV, and project videos on mobile phones and tablets to the TV screen. It is worth noting that live streaming platforms and apps with a diverse range of genres such as showroom, lifestyle, gaming and sports have become increasingly popular in China, especially among the younger generation under the age of 30 (Liu & Li, 2016). Apart from those offering live TV, many live streaming platforms and apps host professionalising amateurs, a group gaining increasing visibility in the online video market in China (Zhao, 2016). These streaming services offer not only alternative entertainment but also social networking opportunities. Thus, they are further drawing audiences away from broadcasters, triggering regulatory responses. Streaming devices including set-top boxes and dongles together with third-party apps therefore assume a critical role in reinvigorating the media experience in the living room. These OTT streaming devices trump other options on the market including those provided by cable operators, which dispense broadcasters' content, and those supplied by telcos who deploy IPTV via dedicated networks.

While the market was flooded with small manufacturers including many *shanzhai* producers who capitalise on the latest fashion, a prominent leader in this wave emerged in late 2012. Xiaomi, a disruptive brand with its initial success in the smartphone market, entered the OTT streaming market in November 2012 by launching Mi Box. Somewhat like Shanda, Xiaomi aims to build its own ecosystem around its smartphones, and Mi Box was a step towards this vision. As Xiaomi's CEO Lei Jun explains, 'Smartphones are going to overtake PC to become the most frequently used devices, and television will become the display for smartphones. Mi Box is turning this picture into reality by connecting the two' (Wang, 2013). The device allows users to wirelessly stream content from Apple's iPhone and iPad, personal computer or Android phones installed with Xiaomi's operating system MIUI. The box features licensed content and supports streaming of videos from partners such as Sohu, PPTV, Tencent, Sina, Funshion, Netease and iFeng. With an affordable price tag of 299 yuan (US\$45) for the box, users can view a wide range of online content on TV. The story sounds familiar. The suspense remains as to whether Xiaomi would become a second Shanda in this contested field.

The strengthened regulation of the OTT streaming market

In just over a week of the launch of Mi Box, Xiaomi issued a public announcement via its micro-blogging account on Sina weibo, citing system maintenance as the reason for service suspension. In fact, as some interviewees revealed, Mi Box raised attention of the broadcast regulator SARFT. The broadcast regulator ordered Xiaomi to suspend the service as it did not have the licence to

provide Internet TV service ('China's Xiaomi delays TV set-top box due to government probe-media', 2012). In the Document 181 ('Requirements of Operation and Management of Agencies Holding Internet TV Licences') released by SARFT in October 2011, the regulator stipulates that Internet TV service providers must collaborate with seven licence holders in service provision and cannot connect with third-party Internet platforms. The licence holders are all state-owned and controlled media, including China Network Television (CNTV), BesTV, Wasu Group, Southern Media Corp., Hunan Television, China Radio International and China National Radio. This is an evident attempt of SARFT to protect the broadcast sector and curtail the competition from OTT service.

Shortly after the suspension of its service, Xiaomi announced in January 2013 the collaboration with Future TV, a subsidiary of the Internet TV service licence holder CNTV, the official online division of the state broadcaster CCTV. The move extended Mi Box's lifeline, yet it returned in a crippled form. As a result of Xiaomi's compliance with the SARFT regulation in seeking survival, Future TV as a gatekeeper has complete control over content. Users can no longer access the online content via third-party streaming apps as previous content partnership had to come to a halt.

The case has since opened the chapter of rent-seeking on the part of licence holders. Following on the heels of Xiaomi in launching the set-top box is China's leading online video platform LeTV. Established in 2004, LeTV is one of the first online streaming site which focuses on licensing premium content and has gradually invested resources in original content production. Building a comprehensive content library turns out to be the first step towards constructing an ecosystem, as evident in the new brand of LeEco introduced in January 2016. The company secured partnership with CNTV and launched its set-top box C1 in December 2012. Other market entrants include PPTV, iQiyi and Alibaba, all launching their boxes in 2013. Both PPTV and Alibaba have partnered with Wasu Media & Network Co Ltd., and iQiyi has secured collaboration with Galaxy Internet Television Co., Ltd. (GITV), a joint venture founded by Internet TV licence holder China National Radio (CNR), JiangSu Television Station (JSTV) and iQiyi in 2012.

While many lamented the tie-in with bland content as a result of mandated collaboration with licence holders, resourceful users have their own way of circumventing the gatekeeping. Many purchase the box simply to root it and install third-party apps on it. Rooted Mi Box in fact are top selling products on Alibaba's e-commerce platform Taobao, with a small extra cost of 31 yuan (around US\$5). The regulatory policing has thus given rise to the cultural politics of modification where users battle against the enforced consumption patterns. Intermediaries also emerge to address user needs. Therefore, it has to some extent diminished the effectiveness of the regulation. In fact, unauthorised access to digital entertainment has been deeply imbricated in the fabric of Chinese viewing culture (Pang, 2006; Zhao & Keane, 2013).

Such back doors however have not escaped regulatory glare. In June 2014, SAPPRFT demanded licence holders stop providing the function of app downloading and stop pre-installing unapproved third-party apps including many live streaming ones ('Third-party video apps prohibited on Internet TV box', 2014). In the following month, SAPPRFT ordered all set-top boxes provided by Internet service providers to cancel the time-shifting feature ('Free lunch of Internet TV gone with policed TV boxes', 2015). As a result of stringent enforcement of Document 181 through these measures, service providers started to upgrade operating systems to comply with the regulation. Users were surprised to find previously installed apps missing, viewing history gone and replay feature no longer working. What remained were boxes stripped of diverse content and critical OTT features.

The tightened enforcement has subsequently witnessed joint action of multiple authorities. These include law enforcement authorities and the newly established Internet governance authority

CAC. The aim was to draw a firm line of demarcation between legal and illegal, and to tighten the grip on the latter. In October 2015, SAPPRFT (2015) together with the Ministry of Public Security, the Supreme People's Court and the Supreme People's Procuratorate issued a notice known as Document 229 to crack down on illegal Internet TV devices. The crackdown targeted hardware and software used to provide content that 'harms state security' and 'disturb public order'. Apart from overseas content, micromovies, made-for-Internet series without online publication licences, live streaming was another main target. Furthermore, CAC together with SAPPRFT put 81 apps on the black list, including Fengyun, Himalaya, Panda Audiobooks, and 360. Consequently, many OTT service providers announced service suspension in order to run self-checks and remove blacklisted apps or potentially risky ones. The authorities also demanded all applications be certified by SAPPRFT before they can be pre-installed on set-top boxes. As a result of the Chinese Internet becoming a 'panopticon' under the party-state, self-censorship on the part of platforms and content creators has become internalised (Tsui, 2003).

All these measures reflect the strong intention of the broadcaster regulator to establish its control over the OTT streaming space and protect its sector in the face of competition from Internet service providers. The joint action of multiple authorities further illustrates the state's intention to hold onto its ideological power in the emerging terrain. Regulatory convergence as a key dimension of convergence (Dupagne & Garrison, 2006; Flew, 2012) is however not yet an accomplished task, despite the establishment of the central Internet governance authority. This does not spell the end or ease of sectoral conflicts between broadcasting and Internet industries either. As CAC becomes the top Internet regulator with its major focus on cyber security including content censorship and propaganda, MIIT maintains its authoritative power over the economic operation of Internet industries. Simply put, previous contentions between broadcast and Internet regulators have become more complicated with the establishment of CAC, who may lend support to the broadcast regulator. As CAC is tasked with adapting censorship and propaganda to the digital age under the political will, SAPPRFT gains the upper hand in policy lobbying in the contested field owing to its long-standing role of the state's mouthpiece and gatekeeper in screen content.

As the state police business practices of leading digital players and derive economic benefits from rent-seeking behaviour, users' capability of circumventing regulation and constructing alternative viewing experiences should not be neglected. As Hartley (2007) puts it, creativity of viewers means television is about creating individual or collective experience rather than about consuming products being fed to them. In China, as observed by Keane (2009) and reflected in the above analysis, the implied meaning of uncontrollability of creativity runs counter to the consequence of innovation and the political will of the state. This is noticeable not only among users but also among market players. The compliance of leading digital players in the field however does not mean wholesale submission, which will be analysed in the following section.

The state-backed standard and its compatible other

As SAPPRFT cracked down on Internet service providers in the OTT streaming market, it has a parallel agenda to nurture its own team in this space. In 2014, the broadcast regulator issued a notice to urge all cable companies to purchase or develop set-top boxes running on the home-grown smart TV operating system TVOS 1.0 and prohibited use of other systems in the trial (SAPPRFT, 2014). It also encouraged cable operators to step up the trial operation of the system. TVOS 1.0 was the result of a project led by a research institute under SAPPRFT together with 15 organisations including device manufacturers, cable operators and licensed Internet TV

operators in 2012. According to Wang Xiaojie, director of Department of Science and Technology under SAPPRFT, the purpose of developing TVOS 1.0 and the associated app store mainly resides in making sure that Internet TV devices, content and applications are 'manageable and controllable' (*keguan kekong*) (Lu, 2014). Based on Linux and Android system, TVOS 1.0 is coded to disable rooting and installation of unapproved apps by users. Its compatibility with Android system allows manufacturers and service providers to migrate existing platforms and applications to the state-endorsed operating system. As it curtails the development of Internet service providers in the field, SAPPRFT is pushing the adoption of its own operating system in cable operators' products that could well be placed under its control. Meanwhile, this plays to the tune of promoting both indigenous technology and cultural security as outlined in the state plan to promote network convergence.

The state-backed operating system has seen its second version released jointly by SAPPRFT and MIIT in December 2015, soon after the ban of 81 apps. TVOS 2.0 is developed on the basis of Huawei's MediaOS and Alibaba's YunOS, and the development process involved over 60 partners, including Huawei, Alibaba, LeTV and ZTE. Participation in the development process has been referred to as a political task by some interviewees. The engagement of more partners including leading digital enterprises in the development process can be perceived as a move to capitalise on the strength of these partners and, perhaps more importantly, to facilitate adoption of the system among a wider scope of stakeholder in future. The launch of TVOS2.0 is accompanied by the plan to expand the scope of trial operation, which is rolled out in Shanghai, Jiangsu, Hunan and Shaanxi (Wang, 2015).

However, YunOS developed by Alibaba complicates the system-level competition. Developed in-house, YunOS carries the hope of building an ecology for Alibaba by powering smart devices. The digital giant's intensified efforts to break into screen content market has been evidenced by the establishment of its film division Alibaba Pictures Group in 2014 and its acquisition of the leading online video platform Youku Tudou in 2016. The Tmall Box launched in collaboration with the Internet TV licence holder Wasu, the second largest cable operator in the country, runs on its own system. SAPPRFT's tightening grip on the OTT box in 2014 and 2015 has seen the box losing critical features.

This has not dampened Alibaba's ambition. A significant milestone in building the ecosystem around YunOS is Alibaba's collaboration with Hunan TV & Broadcast Intermediary Co Ltd. in launching a set-top box branded as Family Box running on the system in September 2015. The collaboration provides Alibaba access to users of the provincial cable network, reaching six million households covered by the latter's wholly owned subsidiary Hunan Cable TV Network (Group) Co., Ltd. (Hunan CATV). Meanwhile, the cable operator receives operational support from the Internet service provider including its e-commerce platform for revenue expansion. Both parties contribute to building an appealing content library. Another content collaborator in this deal is the entertainment and media company DMG Yinji. Operating across market boundaries, DMG Yinji is known for assisting Hollywood in capitalising on the Chinese market in film production and distribution, as in the case of *Iron Man 3*, as well as its attempt to expand overseas market for Chinese content. Subscribers can access content via live streaming or in a time-shifted fashion. In announcing the deal, Hunan CATV emphasised the compatibility of YunOS with TVOS 2.0 and its complete control over the service to meet the broadcast regulator's intention to hold onto its control. As chairman of Hunan CATV Deng Qiulin emphasises, it is a bottomline for all collaborations in this field to comply with SAPPRFT's regulation and to make sure platform, devices and content are manageable and controllable (Liu, 2015). Similar to self-censorship discussed above, the emphasis

on complying with the state's intention to maintain its power in the emerging field reveals a growing public-private alliance in developing a sanitised and pacified online environment (Lagerkvist, 2011). However, such compliance should not be read as a complete submission to the regulator, given the development of an alternative standard.

The three-way collaboration also sees the joint forces between 'new' and legacy media. This is similar to the scenario where YouTube is becoming Hollywood's valued ally in convergence, from tracking and profiting from intellectual property to collecting user intelligence (Miller, 2009). YouTube and Hollywood both have near-global reach yet claim distinctive cultures, as the former focuses on 'scale, automation, and iterative, pivoting permanent beta' while the latter exemplify premium content and mass entertainment appeal (Cunningham & Craig, 2016). The alliance between the two represents the interconnection and interdependence between 'new' and 'old' media. The Alibaba-Hunan CATV-DMG Yinji deal mirrors such dynamics. The deal also highlights the particularities of media convergence in China, where such alliance occurs in the context of a strong state, the local-central dynamics and the participation of transnational capital eyeing on the Chinese market.

As the SAPPRFT hopes to accelerate the adoption of its standard as well as to utilise Internet service providers' development and operational experiences by involving multiple stakeholders in the development process, a system-level competition seems to emerge between the state-backed system and YunOS. In the context of the increasing role of users as data providers (Van Dijck, 2009), data ownership and control becomes a new form of power. While the broadcast regulator is tightening its grips on the Internet TV service and strongly pushing the adoption of its operating system among cable networks, the collaboration between provincial cable players and Internet service providers has moved forward. This can be explained by the scalar contradictions of Chinese media (Sun, 2010; Zhao, 2008). Meanwhile, both Alibaba and Hunan Cable Network's involvement in the development of the state-backed standard should not be neglected. The foot-in-both-camps approach lessens regulatory risks for the digital giant and the provincial cable operator. The fact that YunOS is compatible with the state-backed system also raises the question of whether there is going to be a true convergence between broadcasters and Internet service providers or the state will incorporate the compatible standard to push the consolidation of the market under its control. Overall, it remains to be seen how the competition as well as collaboration play out, how the central-local dynamics evolve, and how that impact on the progress of network convergence project.

Conclusion

Internet TV as a microcosm of network convergence project in China has seen the impact of state dominance and relevant regulatory measures over its development trajectory. The field has co-evolved with power negotiations between entrenched interest groups, bureaucratic institutions and emerging disruptors over the terms of technological and institutional convergence. While early experimentation stalled as a result of market entry restrictions following the clarification of regulatory power over the emerging field, the proliferation of smart devices, increasing connectivity and the expanding range of online video content has motivated industry players to test regulatory boundaries again. Consequent contestations manifest themselves in multiple dimensions.

As market readiness evolves, regulatory measures have developed from wholesale crackdown to a mixed approach of containment and collaboration. Specifically, the broadcast regulator maintains market entry restrictions and demarcates the line between legal and illegal at

hardware, software and content levels to limit features and content. The joint forces of central Internet governance authority as well as other law enforcement authorities lend support to the broadcast regulator here owing to its long-standing role of mouthpiece and gatekeeper in screen content, which contributes to the mission of central cyberspace authority. This approach helps fence off competition from Internet service providers, and allows time for the broadcast sector to catch up. It also allows rent-seeking on the part of the state and relevant authorities and state-owned enterprises. Meanwhile, the broadcast regulator has developed its own technological standard of operating system by involving multiple stakeholders along the industry chain. The multiple-stakeholder approach here illustrates its need to utilise technological and operational expertise of relevant parties, and more importantly, to hopefully pave the way for gradual adoption of the state-backed standard. This allows the broadcast regulator to consolidate the set-top box market starting with the cable network and extend the state regulator's control to the emerging field. The pattern of exclusion and inclusion here speaks to the contradiction in policy approaches as the authorities need Internet service providers for their expertise yet at the same time intend to constrain their development to protect entrenched interests in the broadcast sector. Furthermore, while broadcasting and telecom industries have long been dominated by state-owned enterprises, Internet service providers are mainly supported by private and international capital. The contradiction therefore also speaks to the dilemma in the state's attempt to tame the Internet in the context of transnational capitalist accumulation and state corporatism.

As the broadcast regulator pushes the trial programme for the state-endorsed standard among cable operators in different areas, the central-local dynamics within the broadcast sector and the co-opetition between Internet service providers and broadcasters further complicate the scenario. Key challenges for the broadcast regulator lie in the fragmentation of cable networks and the reluctance of Internet service providers, who are not necessarily willing collaborators as most of them have in-house developed systems. Provincial broadcasters and Internet service providers adopt the foot-in-both-camps approach by engaging in the development and trial of both the state-backed standard and the alternative yet compatible standard. Compatibility with the state standard can be seen as a major reason why the collaboration has so far encountered little intervention from the state. While provincial cable networks and Internet service providers are collaborating on local levels, the former's ability to negotiate with the latter over the terms of collaboration should not be underestimated. As cable networks are seeking to improve its market performance through collaborations, they still have to answer to the state regulator and experiment within boundaries.

As television continues to evolve in the context of convergence, it is crucial to critically examine horizontal dynamics between different sectors and vertical dynamics between the state and the market as well as the central and the local. Would standard compatibility satisfy the state regulator in terms of controllability over the long term? Is it a temporary compromise for the state regulator to allow the development of alternative yet compatible standard? To what extent would provincial broadcasters contribute to the state's cause via regional integration? How does the power negotiation play out over the terms of technological and regulatory convergence? What is the nature and character of convergence? To answer these questions requires multi-dimensional and multi-scale analysis in the context of the state's mission to balance economic pursuits and political imperatives, and the experimentation of provincial and local cable networks and Internet service providers as they collaborate and compete. The curtain has only begun to rise.

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