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DTV standards and transition: A comparative policy analysis

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ABSTRACT

China recently has emerged as a serious player in setting ICT standards, as evidenced by its presence in major conferences on standardization with the International Telecommunications Union. While the ATSC standard contributed to the successful completion of the DTV transition in the US, China's home-grown DTV standard bears little, to date, on its relative success in converting one third of its cable households to digital service. In light of these differing outcomes, this paper identifies and compares the strategies behind the quest for national DTV standards by retracing the key policy initiatives in China and the US. Our analysis suggests that protectionist impulses shaping distinct standards for the US (Grand Alliance), China, and other regions dampen prospects for a global standard in DTV. However, the US has been more successful at maintaining the kind of balance between industry and governmental policy that is critical to maintaining technological innovation and a competitive marketplace.

1. Introduction

Setting standards for information and communication technology (ICT) was historically the exclusive territory of developed countries. China recently has emerged as a serious player in setting ICT standards, as evidenced by its presence in major conferences on standardization with the International Telecommunications Union (ITU). From the failed Enhanced Versatile Disk (EVD) to the indigenous 3G mobile communication standard, China has attempted to set its own national standards in the hope of protecting domestic industries. This is because China has already paid a heavy price for not incubating domestic standards in digital technologies. As a case in point, patent fees amount to 40% of the production cost of a domestically produced DVD set (Burger et al., 2008). In the long run, China wishes to benefit from diffusing its standards to other countries, as is already the case with digital television (DTV). For example, there are currently several African and South American countries experimenting with or trialing the Chinese DTV standards.

Setting a technical standard is a complicated endeavor entailing a synergy responsive to consumer and market demands among industry representatives, research teams, and regulatory bodies. Due to the multifaceted nature of this task, a standard-setting strategy may falter when any one of these parties is left out. Although China has been relatively successful in devising indigenous technical standards (e.g., Lu, 1999; Qian, 2002), it faces several vexing issues in coordinating technology switchovers to achieve compatibility with other countries (Starks, 2010).

China's home-grown DTV standard (Digital Terrestrial Multimedia Broadcasting-DTMB) is designed to homogenize terrestrial broadcasting standards, and poses little threat to European standard-based (Digital Video Broadcasting-DVB-C/S) satellite and cable broadcasting standards. Although the indigenous standard is potentially important for taking over the remaining 200 million households which rely solely on terrestrial broadcasting, it could be sidelined when cable TV gains

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substantial penetration in these households. The protracted standardization efforts bear little, to date, on China's relative success in converting one third of the cable households to digital service (Wang, 2010). In other words, the benefits of cultivating a terrestrial-only indigenous standard are yet to be seen. By contrast, the US has successfully completed DTV transition after switching off analog TV signals with a final delay on the deadline to June 12, 2009 (FCC, 2009a; Hart, 2010).

While the three major international DTV standards (i.e., European, American, and Japanese) have spurred numerous scholarly inquiries, research on the Chinese DTV standard – an increasingly important regional standard – is lacking in the literature. A few empirical studies have investigated some aspects of DTV transition (e.g., Feng et al., 2009; Wan et al., 2009). Few comprehensive overviews of the DTV decision-making structure and the Chinese DTV standard, to date, have appeared on English scholarly journals. This paper attempts to fill that gap by providing an historical overview of the key DTV standard-related policy initiatives and the DTV standard in China. Specifically, the present analysis contrasts Chinese DTV policymaking and standards with the more familiar American HDTV policymaking and standards to help inform our understanding of underlying technology diffusion dynamics. Second, by applying established H/DTV policymaking models (e.g., Book, 2004; Dupagne and Seel, 1998; Napoli, 2001), this paper offers a comparative analysis of the key debates and issues in H/DTV diffusion and policymaking.

2. Background

2.1. Historical overview

China. China initiated its tracking research on DTV standards in the early 1990s (RFTBG, 2007). In 1992, the State Commission of Science and Technology (SCST) proposed a research project on HDTV technologies as part of the Eighth Five-Year Plan. The Academy of Broadcasting Science (ABS) under the State Administration of Radio, Film and Television (SARFT) was assigned to carry out the research project (ABS, 2008). Under the leadership of SCST, a coordination group on HDTV research and development composed of eleven ministries and commissions was established in 1994. As China embarked on the Ninth Five-Year Plan, the coordination group was replaced by the HDTV Technical Executive Expert Group (TEEG) in 1996. Headed by Zhang Wenjun from Shanghai Jiaotong University (SJTU), TEEG consisted of several universities including SJTU and leading companies with cutting-edge research on consumer electronics. After two years of extensive research on the American and European systems, TEEG submitted a sample HDTV terrestrial broadcasting system for testing in Beijing, Shanghai, and Shenzhen in 1998 (RFTBG, 2007).[1]

With the initial stage of preparatory research completed, the Chinese government wanted to establish an indigenous DTV standard by merging several parallel DTV systems proposed by competing research teams, including TEEG. Five systems were submitted for testing by 2002.[2] In 2002, results of initial testing revealed that neither one of the systems met the demands of the desired standard on several key parameters (RFTBG, 2007). The temporary testing committee thereby recommended that further improvements on all five systems were needed before the second testing could be conducted. In September 2002, the State Intellectual Property Office (SIPO) issued a report after further evaluation on the five systems. Based on SIPO's report, NDRC entrusted the Chinese Academy of Engineering (CAE) with evaluating the remaining two competing systems: the DMB-T system from Tsinghua University and ADTB-T from TEEG. In 2003, the second testing by CAE confirmed that the two systems could satisfy the basic requirements of DTV standards but the DMB-T system was overall superior to ADTB-T due to its innovative modulation scheme.

In an effort to converge these systems, a special working group on national DTV terrestrial broadcasting standards was established by NDRC in October 2003. The special working group was dedicated to putting forward a national standard by merging the DMB-T and ADTB-T systems (RFTBG, 2007). In June of 2006, the radio and television committee under the Standardization Administration of China (SAC-TC239) conducted standard testing on the system – supplied by the special working group – and the test results were satisfactory. The system, based on two somewhat incompatible standards, was a fusion of European and American systems and capable of handling single and multicarriers. SAC officially promulgated the national DTV terrestrial standard as GB20600-2006 in August of 2006; it was entitled "framing structure, channel coding and modulation for digital television terrestrial broadcasting system" (Burger et al., 2008; SAC, 2006). The Chinese standard, later known as DTMB, became effective August 1, 2007.

The US Policymaking has been focused more on HDTV than the generic DTV standards in the US. To avoid confusion, HDTV is used to denote any HDTV or DTV related policy initiatives except when specified otherwise. Although this history has been well-chronicled elsewhere (e.g., Dupagne, 2002) and need not be retold here, a brief summary is in order. The US was a latecomer in HDTV research and development, having been initially surpassed by the Japanese (e.g., Dupagne and Seel, 1998;

[1] In 1999, the National Development and Reform Commission (NDRC) – a government institution in charge of strategic planning – established a program on DTV research and industrialization, allocating additional funding to TEEG for HDTV pilot testing. China Central Television (CCTV) successfully conducted a trial with the domestic HDTV system when China celebrated its 50th national day in 1999 (Feng et al., 2009).

[2] Tsinghua University proposed its Digital Multimedia Broadcasting-Terrestrial (DMB-T) system – featuring Time Domain Synchronous-Orthogonal Frequency Division Multiplexing (TDS-OFDM) – as the modulation scheme using multicarriers like European DVB-T and NHK's Integrated Services Digital Broadcasting-Terrestrial (ISDB-T). TEEG submitted two systems. The first one, the Advanced Digital Television Broadcast-Terrestrial (ADTB-T) system, was a single carrier vestigial sideband system (VSB) based on the US 8-VSB standard (Burger et al., 2008). The second system utilizes Coded Orthogonal Frequency Division Multiplexing (COFDM) as the modulation scheme with multicarriers. ABS proposed a system based on Quadrature Amplitude Modulation (QAM). The fifth system was an OFDM system devised by Xidian University (RFTBG, 2007).