Digital Communication: Lesson-learned from Countries which Successfully have Implemented 3G and Digital TV

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Abstract

At present time, digital communication has become a key communication strategy to support a wide range of business activities (Flournoy, 2004, p. 112; 2009): such as e-Business, e-Commerce, e-Public Relations, and e-Marketing. Accordingly, Digital Media can build customer satisfaction by providing the means to increase interaction and personalized messages between customers and businesses. Thailand was moving to digital communication society since the Office of Thai National Broadcasting and Telecommunications Commission (NBTC) approved for 3G licenses and Digital TV licenses in year 2013, (Office of Thai National Broadcasting and Telecommunications Commission, 2014). As communication scholar, I would like to suggest stakeholders: such as government, the NBTC, policy makers, TV broadcasters, and broadcasting and telecommunications services providers: to concern more about digital communication effectiveness through lessons-learned from countries who successfully have implemented 3G and Digital TV. This paper addresses 3G/4G and digital television overview, background/support, interconnectivity, viability and constraints, and successful and unsuccessful applications.

Key word : Digital communication, 3G, Digital Television, Digital TV

Introduction

As digital technologies help facilitate the Thai National Broadcasting and Telecommunications service providers to drive their market, then, digital media can help them compete more competitively (Flournoy, 2004, p. 262). According to the article about digital media usage behavior and attitude, "Networked communities: Strategies for digital collaboration", Albert, Flournoy, & LeBraaser (2009) noted that media consumers tended to communicate through digital media increasingly. As a result, digital devices seem to be popular tool for communication (Albert, Flournoy, & LeBraaser, 2009). Accordingly, Office of Thai National Broadcasting and Telecommunications Commission (NBTC) are responsible for supporting the process of digital transmission. Importantly, NBTC ensured the Thais that National Television Broadcasters, especially free TV, will implement digital broadcasting nationwide before the digital transition deadline in year 2017 (Office of Thai National Broadcasting and Telecommunications Commission, 2014). Currently, the time delay for distributing digital coupon becomes the key challenge for NBTC. As a result, solution for digital transmission is the key concern for stakeholders; especially NTBC and the Thai National Broadcasting and Telecommunications service providers. Therefore, as a communication scholar, I would propose lesson-learned from countries that successfully have implemented 3G and Digital TV as follows:

I. 3G/4G Cellular

1) 3G/4G Cellular Overview:

Mobile phones have become popular tool for communication especially among the youths and young executives. The 3G is a third generation mobile systems which is now used in Thailand and many countries. The International Telecommunications Union (ITU) defined the term 3G as the systems that provide multimedia services at maximum rate of 144 Kbps for moving communication and 2Mbps for fixed communication. This is an always-on mobile internet access which uses two types of technology W-CDMA and CDMA 2000 as a multiple access techniques. Lehr, Sirbu, & Gillett (2004) stated that the 3G being used primarily for voice and text communications. Frequencies licensed for 3G are typically in the 1.7 –2.1 GHz range, varying by country (Broadband City, 2004). In early 2005, the 3G was introduced commercially by Japanese mobile operator; NTT DoCoMo (Flournoy, 2004, p.7). With the introduction of third generation licenses, the DoCoMo operated 3G cellular service iMode to share a 3G connection among several users in order to share existing base station sites (Su,Wang, & Yang, 2008). Therefore, "The greatest advantage of 3G is the simplicity of a single, transparent log-on from anywhere within the sphere of coverage."(Erlanger, 2006).

The 4G is a fourth generation mobile systems which is now used in many countries, excluding Thailand. The International Telecommunications Union (ITU) defined the term 4G as the systems that provide multimedia services at maximum rate of 100 Mbps for moving communication and 1 Gbps for fixed communication (Kondra, 2009). This is an IP-based mobile which uses WiMax technology. As a result, the 4G system is going to provide various services and applications with excellent level of flexibility. All services will be user-oriented and will allow the user to access services simultaneously. The 4G is a heterogeneous network which combines several features in it. First of all, the 4G multiple ac-

cess technique supports connectivity access to the application anywhere. Secondly, the 4G technology is a combination of multiple technologies and protocols that provides highest throughput at lower cost. Thirdly, the 4G network is used to access as many users as possible in a provided bandwidth with reliability. Fourthly, the 4G architecture will contain three connectivity areas; one is shot range connectivity, second is WLAN and third is cellular connectivity. The 4G system will support a seamless roaming between different areas of connectivity. The architecture of 4G network is totally Internet based and each cell phone will have a permanent IP address. The main aim of 4G is to provide a mobile network with a single worldwide standard.

Currently, 3G/4G technologies emerging Online Forums, Discussion Groups, and other Online Communities, this is the era of "Social Networking via 3G/4G Cellular". So far, mobile service providers are deploying broadband wireless data services via 3G/4G networks to satisfy the needs of users, who required information in a seamless and transparent manner whenever and wherever needed.

2) Background/Support:

As few decades of the rapid global change, consumers can get wide variety of media from all over the world. Communication technologies not just facilitate people for work and entertainment, communication technologies also change factors of the media consumers' acquisition and determination, and perceived benefits; especially perceived value-added to business (Flournoy, 2004).

Historically, in 1996 the 3G development was initiated by the big companies like Nippon Telephone, Telegraph (NTT), and Ericsson. In 1997, the Telecommunication Industry Association (TIA) of US adopted a three part strategy for migrating existing IS-136 TDMA based networks (2G) to 3G wireless networks. And in 1998, European based Telecommunication industry known as European Telecommunication Standards Institute (ETSI) chose CDMA (Code Division Multiple access) for 3G technology. By the end of 1998 the US decided to use CDMA2000 while Europe decided to use Wideband CDMA (W-CDMA) (Kondra, 2009).

The 4G technology initiated by the 3rd Generation Partnership Project (3GPP) to improve the mobile phone standard to cope with future technology evolutions and needs. Requirements include cost reducing per bit and increased service provisioning. In 2006, the 4G system was introduced commercially by Sprint Nextel Corporation. For 4G evolution, networks are based around the Long Term Evolution (LTE) technology and downlink data speeds can hit 100 megabits per second - about ten times quicker than the fastest 3G networks. The technology has been designed to overlay existing 3G networks and most operators have committed to upgrading to the faster system (BBC News, 2009). Furthermore, US wireless carrier Sprint is expected to roll out its 4G Long Term Evolution (LTE) network in early 2012 (Yahoo News, 2011).

Trend of Internet usage is growing very quickly among the young professionals and youths (generally more highly educated). Consequently, the Third Generation mobile communication systems (3G) and the Fourth Generation mobile communication systems (4G) smart mobiles are becoming the prevalent channels for all multimedia contents (Kondra, 2009). To date, handhelds are becoming the Internet access device of choice for many (Shahid, Shoulian, & Shan, 2008). Researchers predicted that potential for using 3G/4G broadband wireless

network to communicate in the near future is high as it becomes more commonplace (Erlanger, 2006; Fitchard, 2008). Interestingly, ABI Research predicted that, by 2013, multimedia mobile device will be support 3G, 3G+ or 4G communications systems (Bhan, 2010). Furthermore, broadband telephony is one of the cheapest means of marketing communication (Gavrilovska & Atanasovski, 2007). And with 3G/4G performances, digital messages will be enabled enterprises to effectively conduct their businesses (Communication Center on the Internet, 2011). Interestingly, Flournoy (2004) stated that there are numbers of businesses used the Internet to support a wide range of business activities, such as Turner Broadcasting, Lycos Inc., BP Amoco, Chevron, and Napster. Furthermore, Lehr, Sirbu, & Gillett (2004) affirmed that mobile technology expanded opportunities for Internet market, and services, in the wireless broadband space (Broadband City, 2004).

Overall, there are three significant factors that will influent 3G/4G consumption. Firstly, the combination of high Internet penetration, an active tenured population and high-speed connectivity should produce a ripe online social networking environment. Secondly, the increasing numbers of cell phone users using the mobile. Lastly, the increasing number of digital applications which being made available for online internet usage. Due to the high receptivity to such technology, these factors will make 3G/4G Cellular be more widespread.

Challenges Addressed by 3G and 4G:

Public WiFi access and cellular Internet services are growing rapidly, that is "the internet is now the world's largest data communications network" (Flournoy, 2004, p. 62). Not surprisingly, in Korea, Japan, China, and parts of Europe accessing the Internet via cell phones or other handheld devices is common today (The National Master.com, 2011). Currently, Social Networking via 3G/4G Cellular has become a key strategy to fine tune concepts to meet customers' needs and expectations. According to the tremendous growth in Internet market, 3G/4G broadband wireless network is seen to be the new trend to increase "value-added communication services" for many businesses (Flournoy, 2004, p. 25). The 3G and 4G technologies; such as WAP, GPRS, EDGE, WiMAX, FDMA, and MIMO; will fulfill customers' needs by providing faster network speeds (Grant & Meadows, 2010), and real time services. In addition, always-on mobile Internet access (3G) can help businesses compete more competitively in Broadband Millennium Society (Flournoy, 2004, p. 7). Furthermore, evolution of telephony technologies provided means to increase efficiency, by giving users access to latest and updated information in online social networking (Grant & Meadows, 2010). Interestingly, Myhrer (2007) explained that the convergence of mobile technology (4G) can help improve efficiency and increase convenience to users by providing the common platform for communication. The Fourth Generation network will provide 100 Mbps data transmission rates between two users anywhere in the world, and 1 Gbps for fixed communication (Communication Center on the Internet, 2011).

Moreover, Myhrer (2007) also suggested that the 4G wireless systems help build relationships by providing the means to increased interaction and personalized messages between customers and businesses; this is so called "customer centricity" strategy. Beyond 3G/4G network, the user will be able to access the service at anytime and anywhere on the Internet Protocol (IP-Based) (Shahid, Shoulian,

& Shan, 2008). Importantly, Social Networking via 3G/4G Cellular can reduce time consumption and higher cost capital, and ensure their customers because the company can show transparency and precise information. Eventually, users can access specific and real time information through Social Networking via 3G/4G Cellular.

3) Interconnectivity:

Basically, broadband and wireless are the "networks layer" that allow digital devices to talk to each other. Following, Pervasive Computing will embed digital devices into our everyday lives, and these devices will be inter-connected by high-bandwidth wired and wireless networks. As the number of cell phone users using the mobile internet increased, the Third Generation (3G) and the Fourth Generation (4G) mobile communication systems are expected to be communication tools for many industries. Developments in 4G will support next-generation applications, such as high-definition TV to the handset, or heavy-duty corporate data exchange, and span fixed and mobile communications. On the other hand, the developments in WiMax technology would keep us connected, outdoors and in, all the time. According to the evolution to all IP network, Social Networking via 3G/4G Cellular is considered to be the prevalent channel for all online multimedia services. More importantly, 3G/4G technologies integrate seamless interoperability of different types of wireless networks with the wireline backbone. Additionally, 3G/4G will be support the convergence of different traffic types (i.e. voice, multimedia and data) over a single IP-based core network, different technologies (e.g. computers, consumer electronics and communication technology), major different media (e.g. TV, cellular networks, Internet-based applications), and different services (e.g. television and satellite communications) (Gavrilovska & Atanasovski, 2007).

4) Viability and Constraints:

As population becomes increasingly educated and spending power increases, internet will be more widespread. Although 3G/4G services still can't be considered cheap, the market potential is enormous (Erlanger, 2006). Almost everyone will carry some kind of multimedia mobile device that's always on and connected through a patchwork of fixed and wireless IP-based networks, linked to all sorts of applications and services. To date, 3G is becoming a viable wide-area wireless solution (Erlanger, 2006), whereas 4G has greater range and performance. In the case of emerging market, the enterprise expects a real time environment to avoid any delay in information and high latency in voice and data traffic. Then, reducing the time delay in information have becomes the key challenge for 3G/4G service provider (Kondra, 2009). As Shahid, Shoulian, & Shan (2008) mentioned in their work that the 4G network will integrate the all-IP based concept and provide an IP-based common architecture that will satisfy all necessary 4G requirements. Nevertheless, the standard of service level is based on the current wireless equipment, the line-of-sight characteristic, and Orthogonal Frequency Division Multiplex (OFDM) techniques improvement (KhonKaen University, 2011). Meanwhile, many researchers assumed that the power consumption for 3G/4G might be high since 3G/4G add multiple techniques to get high throughput.

5) Successful and Unsuccessful Applications:

In conclusion, 3G/4G technologies present the big opportunity for digital marketing. However,

in some countries; such as Thailand, Philippines and Indonesia; monopoly of telecommunication market and ownership of every Internet Service Provider (ISP) by state has retarded development of commercial Internet services. Additionally, the evolution of technology convergence, consumer culture and customer needs are three key factors that challenge businesses and large enterprises to going forward with mobile broadband. However, due to the great success of smart-phone devices: such as iPhone, Spints, and Blackberry: Social Networking via 3G/4G Cellular is becoming the global trend. The most importantly, users are already expecting 3G/4G service providers to provide such exclusive service to them (Hammon, 2010).

II. Digital Television

1) Digital Television Overview:

For Television Broadcast Industry, digitalization can help improve efficiency and increase convenience to their customers to access to latest and updated information on news, sports, or entertainment (Flournoy, 2004, p. 123). Accordingly, over-the-air broadcasters think about effective digital communication strategy to reach and retain viewers' satisfaction, so called "customer-centric programs and service" strategy (Flournoy, 2004, pp. 265-266). Consequently, TV industries in many countries have digitalized their production technology transmission and reception in digital format: such as digital recording and digital editing (Lin, 2007). In Thailand, many Thai people might have heard of "Digital television transition in the United States" project (HD.engadget.com, 2006; 2008). However, many of Thai people do not know about it in full details (UBMthai.com, 2011). Generally, Digital Television (DTV) is an advanced broadcasting technology that has transformed the television viewing experience. Especially, DTV enables television broadcasters to create, store, and transmit more programming options; including broadcasting over multiple platforms (TVs, PCs, PDAs, and mobile phones), broadcasting of high-definition images (widescreen 16:9 instead of 4:3) and sound (DolbyTM Digital Sound), providing interactive services, and providing enhanced programming. Since June 13, 2009, full-power television stations in the United States have been required to broadcast exclusively in a digital format (DTV.gov.com, 2010; Flournoy, 2004, p. 446; The Federal Communications Commission, 2011). This is proposition that people get "watch television on any device". Specifically, the three modes of broadcasting, namely cable (a cable service), satellite (direct broadcast satellite/DBS) and terrestrial broadcasting (over-the-air television), can be digitized. Currently, there are three transmission standards in the world for the digital TV terrestrial broadcasting, namely, DVB-T (Digital Video Broadcasting-Terrestrial) promoted by Europe, ATSC 8-VSB (Trellis-Coded 8-Level Vestigial Side-Band), promoted by the Advanced Television Systems Committee, USA, and ISDB-T (Terrestrial Integrated Service Digital Broadcasting) BST-OFDM (Band Segmented Transmission - OFDM) promoted by Japan (Sceptre, 2011). Additionally, there are many benefits from the digitization of terrestrial television. Most importantly, the return of radiofrequency spectrum; used for analog broadcast television; from the switchover to digital television can be used in a number of ways: such as easing the spectrum scarcity facing public safety first responders, engendering economic growth and consumer value from spectrum

redeployed to wireless services, and affording the federal government revenues from the proceeds of a spectrum auction. To facilitate the transition, the Congress and the Federal Communications Commission (FCC) temporarily provided television stations nationwide with additional spectrum so that stations could simultaneously broadcast both an analog and a digital signal (Wikipedia, 2011a). Moreover, there are many quality levels of digital television programming. The most common are Standard Definition TV (SDTV), Enhanced Definition TV (EDTV), and High Definition TV (HDTV) (Wikipedia, 2011b).

2) Background/Support:

Digital television (DTV) is a telecommunication system for broadcasting and receiving moving pictures and sound by means of digital signals which was first developed by a TV Broadcaster. Historically, around 1970s, the NHK (Nippon Housou Kyouka or Japan Broadcasting Corporation) started research on Hi-Vision Television. At the beginning of 1980s, Japanese TV Broadcaster "NHK" announced it was leading to develop a HDTV technology (NHK, 2011). By 1993, the US Congress and the Federal Communications Commission (FCC) decided to implement digital technology in over-the-air TV Broadcast Broadcasting. In May 1993, FCC's Grand Alliance formed a digital television broadcasting system with a significantly higher resolution than traditional formats (NTSC, SECAM, PAL). Later, the FCC's grand alliance HDTV standard was adopted in 1996. In 1997, American Broadcasters and FCC agree on digital switchover plan. In 1996, the U.S. Congress authorized the distribution of an additional broadcast channel to every full-power TV station so that each station could launch a digital broadcast channel while simultaneously continuing analog broadcasting. Eventually, the U.S. Congress set June 12, 2009 as the deadline for full power television stations to stop broadcasting analog signals (Wikipedia, 2011a). Currently, two digital standards are used in DTV; those are SDTV (Standard Definition Television) and HDTV (High Definition Television). Basically, SDTV is the basic level of quality display and resolution for both analog and digital. Transmission of SDTV may be in either the traditional (4:3) or widescreen (16:9) format. HDTV in widescreen format provides the highest resolution and picture quality HDTV in the 16:9 aspect ratio with either 720p or 1080i picture rates. Combined with digitally enhanced sound technology, HDTV sets new standards for sound and picture quality in single world TV standard (Flournoy, 2004, p. 282). The digital system was introduced commercially in October 1997 by NHK, and it was the first digital system in which was introduced in HDTV program.

3) Interconnectivity:

Due to government policies and market competition, broadcasters and equipment manufacturers began to realize that over-the-air broadcast television would soon see competition from new players who wanted to reach an ever-growing audience of on-the-go viewers. As a result, Digital TV broadcast by cable transmission, terrestrial transmission, or direct-to-home transmission enable many forms of digital communications: such as multi channeling, High Definition Television (HDTV), Electronic Program Guide (EPG), interactive service, HD-radio, DVRs or Mobile TV (Flournoy, 2004, pp. 312-316). Interestingly, many scholars reaffirmed that DTV transmissions are robust, and can help viewers access to television signals in as many or more places than analog TV (Adrick & Bretl, 2008; Albert, Flournoy, & LeBraaser, 2009; Brown, 2009; Flournoy, 2004; Fuller, 2006; Goldstein,

2006; Grant & Meadows, 2010; Lin, 2007). Moreover, the switch from analog to digital technologies is offering new business opportunities for the TV industry; especially perceived value added to business; both in the television broadcasting business and consumer electronics industries. For instance, Flournoy (2004, p. 272) stated that "NBC preferred to put energy into helping affiliates generate additional revenues from their new digital spectrum...". TV digitalization will eventually reshape the TV industry worldwide. Therefore, to ensure their future success, other programmers: such as the sports programmer (ESPN), the news programmer (CNN, FOX): are also seeking additional revenue from the industry's drive toward TV Everywhere; this is the future of television (Adrick & Bretl, 2008; Fuller, 2006). Interestingly, by reviewing digitization experiences in Taiwan, Lin(2007) found that the digitization process would allow digital TV (DTV) stations to broadcast to any digital devices: such as PCTV, IPTV, or Mobile TV). He also posited that Digital TV systems allow Taiwan TV News stations to combine digital text (video, audio and data), non-linear editing, digital broadcasting, and digital storage. Furthermore, he also stated that TV digitalization enables the TV broadcast signals to be viewed on many forms of wireless communications: especially digital interactive application.

4) Viability and Constraints:

The main reason for the FCC to promote DTV project is its potential for improving digital communication. Especially, the key objective of this project is to form a single universal standard (Flournoy, 2004, p. 312). Based on free market principles, TV stations in many countries try to implement digital technology in order to maintain viewers' satisfaction. The sooner a television provider understands this, the greater the stake they'll have in the future, because they'll be able to stay on top of this evolution. However, a number of TV Broadcasters practitioners also recognize that there are several factors that impact development and effectiveness of digital transmission campaigns: such as

1. The new competitors coming in to the market (Grant & Meadows, 2010, p. 28).

2. Need to change applications and modify according to customer requirements (Flournoy, 2004, p. 274).

3. The same kind of product performance between competitors (Grant & Meadows, 2010, p. 25).

4. Slowdown of economy might have significant impact on profitability of a service provider: such as iBlast network case study (Flournoy, 2004, p. 275).

By focusing these key factors, TV Broadcasters in some countries are hesitant to adopt digital technologies, due to unsettled standards, market uncertainty, and policy vagueness (Lin, 2007). On the other hand, while development of a new technical standard allow digital TV (DTV) stations to broadcast in many form of digital contents, digital technologies also increase the pressure on workers, who perform multiple tasks (Lin, 2007). Correspondently, the DTV transition project needs to be carefully planned to prevent disruption in viewing. More importantly, TV stations should adopt a pro-competitive approach to the switchover process.

5) Successful and Unsuccessful Applications:

Based on Lin (2007)'s findings, perceptions of relative advantage, compatibility, cost, and sustainability were factors that affect the organizations' decision-making to adopt digital technology. Significantly, the growth of digital media usage in the

next 5 years will reshape customer expectations regarding digital TV Broadcast services. Moreover, Flournoy (2004, pp. 277-282) stated that digital conversion costs for the implementation stage, technical complexities, economic issue, and the adoption process of digital systems are affected the DTV transition. Similarly, Grant & Meadows (2010, p. 62) also stated "HDTV has had a difficult time penetrating organizational functions to be served before consumers can adopt the technology". Furthermore, Lin (2007) also posited that implementation does not mean that TV station is innovative but lack of implementation could be seen as a mismatch to TV station's brand image. He also emphasized that high cost of deployment and operation, and production equipment and digital receivers in the homes (the current HDTV equipment is not compatible to receive or transmit signals) appears to have a greater impact on the production process, worker roles and tasks, and collaboration.

In conclusion, digital TV technology is a complex network. Moreover, digital strategy still faces challenges in building understanding of how digital transmission impact business life cycle, especially in Thailand. Therefore, in order to making money from new technologies and to increase the effectiveness of digital communication with customers, broadcasters should conduct a digitization feasibility study to determine the optimal switchover timing and method. This may encourage stakeholders: such as government, the Office of Thai National Broadcasting and Telecommunications Commission (NBTC), policy makers, TV broadcasters: to concern more about digital communication effectiveness. This is because while digital television may bring about multi-channel broadcasting, greater competition and more program varieties, there is still a need to ensure that the broadcasters would be to provide good service without effecting users.

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