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The battle of the blue laser DVDs: The significance of corporate strategy in standards battles

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ABSTRACT

Markets and industries that require their products to interconnect or utilize important complements are becoming increasingly common. From communication networks to social web sites, network effects have shown themselves to be powerful forces. However, the same feedback effects that make these industries so interesting also makes them difficult to study as often, without an accepted standard, the industry never germinates and grows. This paper takes and refines an existing model for competition in these types of industries and applies it to the recently concluded contest between Sony's Blu-ray and Toshiba's HD-DVD in blue laser DVDs.

Analysis of this standards battle suggests some interesting findings. First, in this case corporate strategy provided a decisive advantage to the Blu-ray alliance led by Sony. Sony appears to have "won" the battle in the U.S. by exploiting a superior corporate strategy to not only provide complementary products as called for by the traditional model (e.g. Hill, 1997) but also by utilizing its technology as a component in an ancillary product, its Playstation 3. Second, a heuristic is proposed for considering indirect network effects to complement "Metcalf's Law" for direct network effects. Finally, Sony paid a high a price to "win" this standards battle.

1. Introduction

Standards are interface protocols that create a single network of compatible users (Shapiro and Varian, 1999). Standards serve to reduce transaction and switching costs, as well as facilitate the development of complementary products by allowing a division of labor between suppliers of a core product and its complementary products (David and Greenstein, 1990; Kindleberger, 1983; Besen and Farrell, 1994). What makes these markets so interesting is network effects—a product's utility for a consumer today is contingent on what future consumers will do (see Shy, 2011 for review). These network effects, coupled with switching costs, can tip the competition to a single winning standard, e.g. VHS over Beta in video cassette recorders (Cusumano et al., 1992). While very interesting, study of standards battles is difficult because they are relatively rare, either potential battles are resolved via negotiations before market entry or the products simply never get introduced. Furthermore, each battle provides exactly one example for study (e.g. Lint and Pennings, 2003).

This paper examines the recently concluded battle between Sony (Blu-ray) and Toshiba (HD-DVD) for the next generation of DVD players. Section 2 discusses an overview of models for competition in these industries. This is followed by a description of the products and the competitive moves that were made in the U.S. market in Sections 3 and 4. Section 5 applies the actions and competitive maneuvers of the firms against an expanded model of competition in these industries.

2. Theoretical overview: standards and firm strategy

Since they can be controlled by a single firm that may in turn accrue proprietary rents from them standards are strategically important (Hill, 1997; Katz and Shapiro, 1985; Morris and Ferguson, 1993). Microsoft is frequently touted as the ultimate example of this strategy, though other examples, Nintendo and Sony in video games and Dolby in audio technology are also common (Shapiro and Varian, 1999). Similar situations, driven by network effects, have started to surface in the area of services, such as financial payments (Paypal) and personal networking, with Microsoft being willing to invest $240 million for 5% of personal networking site, Facebook, a stake worth an estimated $4.2 billion today (Guth et al., 2007; WSJ, 2011). Of course, these effects are nothing new, the telephone, electric utility, and early railroad industries exhibited similar effects.

Abbreviations: HD, high definition also refers to a specific format of blue laser DVD players; PS3, Playstation 3

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As the network of users increases greater utility for consumers from these effects manifests itself in two ways. First, direct utility – the benefit derived from the interoperability of products between users (e.g. fax machines) – grows. Second, indirect utility arises from a greater array and range of complementary products, such as software, that become more plentiful, see Fig. 1 (Katz and Shapiro, 1985).

Unfortunately, the strength of network effects is hard to measure. The direct effect is frequently modeled using some modification of "Metcalf's Law"—the potential value of a network is proportional to the square of its users, e.g. n^2 or $n(n-1)/2$ where n is the number of nodes (Shapiro and Varian, 1999, p. 184). This of course is not a law, but a heuristic to help practitioners and scholars think about and model these industries. While there has been considerable attention paid to Metcalf's Law, a similar heuristic for indirect effects has not arisen. A suggested heuristic that this paper explores in examining this industry is—*the lower the cost of the core product relative to the cost of each complement, the lower the network effects in that industry*. So an industry where core products cost $1000 and complements are $100 (10:1) would exhibit *lower* network effects than an industry where complements were only $10 (100:1). Therefore, the higher the core to complement cost ratio, the higher the indirect network effects.

Because of network effects, if switching costs are present, it is possible that the "best" technology on a traditional price/performance metric does not gain broad market acceptance, e.g. the QWERTY keyboard prevailed over "better" rivals (David, 1985). This has become especially important for considering the effects of technological change on markets and industries. Hill (1997) modeled market demand and installed base in these markets as a function of availability of complements and their product utility, which are further reinforced through feedback effects (see Fig. 1 for feedback effects, Fig. 2 in Section 5 takes Hill's model as its foundation). As more customers adopt a product, that product's value increases to past, present, and future customers. This feedback effect is what causes some markets to "tip" to only one version being available, e.g. VHS format VCRs. Needless to say, much attention has been given on how firms can exploit these industries via tactics such as penetration pricing, subsidies to complement producers, product preannouncements, and the direct provision of complements (Besen and Farrell, 1994).

Of course, not all, or even most, standards battles result in a "tipped" market. Some industries remain split, e.g. video game players (Subramanian et al., 2011). Occasionally, this split is along regional lines, such as with different television formats in USA (NSTC) and Europe (PAL). Sometimes, industries manage to reconcile multiple standards, such as DVD recording formats, or 33, 45, or 78 RPM prerecorded vinyl disks (i.e. records) via adapters or versatile core products. Finally, some industries fail to gain broad consumer acceptance, such as quadraphonic sound (Postrel, 1990) or Mini-Disk.

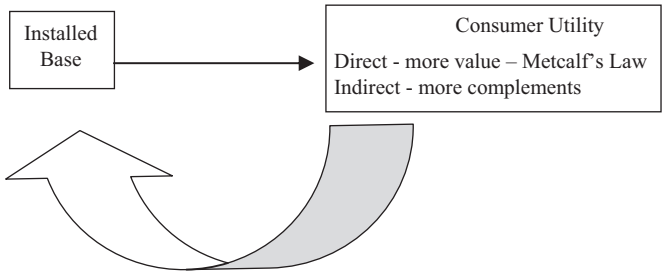

Fig. 1. Basic feedback model.

3. Setting the stage: the Innovation of the blue laser DVD

Since blue light has a shorter wavelength, a blue laser beam (405 nm) is narrower than a red one (650 nm). This enables the creation of higher capacity Digital Video Disks (DVD)—hereafter referred to as blue laser DVDs (blue DVD). Consortiums formed around two rival blue DVD standards. One was led by Toshiba, the primary sponsor of the earlier Super Density DVD standard, which pushed for an evolutionary format called HD-DVD (HD). The other, broader, consortium was led by Sony and supported Blu-ray. Table 1 presents some summary information about the dueling formats.

As can be seen from Table 1, the new technology offered many advantages over the existing DVD format. Capacity was expanded from DVD's 4.4 GB to 15 or 25 GB per side. This capacity increase was key because it allowed for video resolution of 1920×1080 – the resolution of high definition television sets – for a full length motion picture. Initially, only blue DVD *players* were introduced to the market. This was similar to DVD's trajectory where players appeared first while recordable DVD systems followed.

4. The battle of the blue laser DVDs in the United States

While Sony introduced an early version of Blu-ray in the Japanese market as a $4000 player/recorder in March of 2004, demand was weak and there was little support for content other than Sony Pictures, which owned Columbia Pictures as well as Metro-Goldwyn-Mayer. The real battle would start when the players were released in the large United States market. This section reviews the battle of the blue DVDs to its conclusion in March of 2008 broken out by common tactics that are used when competing in these industries (e.g. Besen and Farrell, 1994).

4.1. Tactic: product preannouncements

Since customer perceptions of what future customers will do is so important, both sides engaged in significant preannouncements in an effort to garner movie studio support and encourage consumers to purchase their version of the player, or at least, discourage customers from purchasing a rival player. Toshiba struck first in November 2004 announcing non-exclusive agreements with three major studios, Paramount, Universal, and Warner Bros., to release HD movies for Christmas 2005 (McBride and Dvorak, 2004). However, Sony quickly struck back, allying with Disney and Fox to support Blu-ray (McBride, 2005). When coupled with Sony's in house support, this evened the count to three movie studios for each standard. However, in October of 2005, spurred by Sony's announcement that it would use a Blu-ray DVD in its forthcoming PlayStation 3 (PS3), Paramount announced that it would support Blu-ray as well as HD-DVD (McBride, 2005).

This shift by Paramount was partially prompted by Toshiba acknowledging that its players would be delayed until March of 2006. In the U.S., the fourth calendar quarter, due to Christmas, accounts for a disproportionate amount of consumer sales. Therefore, this delay cost HD most of its chance to build its installed base before Blu-ray arrived.

Despite a last ditch effort to unify the standards between April and August of 2005 a full-blown consumer standards battle broke out on 17 April 2006 when Toshiba shipped 10,000 to 15,000 of its HD-A1 HD DVD players priced at $499 (Garrett, 2006). However, HD's head start was short as Samsung introduced the first Blu-ray DVD player, the BD-1000, on 25 June 2006, priced at $999. Sony's player appeared later that year in December. Ironically, Blu-ray disks were available as early as 23 May 2006.