

## technology and standards in network industries

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The significance of the economics of information is attributed to two key factors: the continuing reduction in cost of information technology hardware products and the scale effect of global standards. Gordon Moore, founder of Intel Corporation, created a corporate empire on his eponymous Moore's Law that states that every year and a half processing power doubles while costs hold constant. Moore's foresight proved prophetic and his Law is expected to remain valid for the foreseeable future. Computer memory, storage capacity, and telecommunications bandwidth are all going through a similar pattern of cost reduction. This makes it very affordable for individuals and small businesses to be equipped with the electronic means to conduct commerce and transfer information as fast and freely as large corporations can. Hence, the demand for the products of the information, computing, and telecommunications (ICT) industries continues to grow (in spite of the feast and famine evident in the telecommunications industry reminiscent of the fragility of corporate structures during the railway boom of the 1840s).

However, the rapid growth of products from the ICT economy depends on operating technology standards as well as on production costs. For example, automated teller machines across the world must work on an agreed standard to ensure customers can use one card in different countries. A technology standard is the important enabler to create wide reach and to capture a wide network of subscribers. With the globalization of commerce, national and regional boundaries blur and the need for international standards is more urgent and critical.

A new standard can be registered with organizations such as the British Standards Institute, the American National Standards Institute, or the International Standards Organization. But, the process to determine the prevailing standard does not stop there. The path to achieving a de facto standard stems from three

modes of selection process: market-based selection, negotiated selection, and a hybrid selection process where both market competition and negotiation operate jointly.

*Market-based selection* is reflected in standards wars such as that between VHS and Betamax, where consumers decided on the dominance of the VHS standard. The marketing strategies of firms are key to which firm and standard is most likely to win. VHS gained a decisive advantage from a strategy of wider distribution channels and a range of complementary products (Hollywood films) as well as longer recording time than Betamax in spite of other more advanced features available only on Betamax.

*Negotiated standardization* is becoming more widespread. Organizations that determine prevailing standards are emerging to reduce the cost and the uncertainty associated with adopting new standards. Negotiated standard setting guarantees the smooth interchange of information, technical components, and services along different networks. The telecommunications industry was able to keep up with the speed of technological development by opening up the negotiation process to market players. Groupe Speciale Mobile (GSM), the current mobile technology in Europe is an association of 600 network operators and suppliers of the mobile phone industry. The universal mobile telecommunications system (UMTS) Forum is a similar association, developed to speed convergence between telecommunications, IT, media, and content suppliers for the 3G industry. As with GSM, the name of the UMTS association is synonymous with the name for the industry technology standard.

The Internet has a different history of standardization to telecommunications. Standards were completely open and established within the research communities of universities. As the Internet has become a commodity for the domestic and the commercial communities, other players are increasingly influencing its evolution.

*Hybrid standard setting* emerges as private firms adopt strategies to undercut collaborative decisions taken in negotiated standardization. They introduce new products, which initiate unprecedented developments but also create

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incompatibilities, lock-in effects, and pockets of market power. Internet telephony is a typical example, where companies, standards organizations, and governments create a hybrid standard setting environment.

Standards organizations are playing an increasingly important role in the process of *upgrading standards* (called “versioning”). The GSM association is guiding the evolution of the mobile industry through a family of wireless technology standards from today’s standard through to general packet radio service (GPRS), enhanced data for global evolution (EDGE), and 3GSM. Each subsequent standard offers a higher level of service. GPRS provides open Internet. EDGE facilitates faster data streaming, and 3GSM provides video streaming. The network of companies supporting the technologies will go through grades of service levels, in order to phase out older standards and introduce newer ones. At the end of the life span of a standard, the technology platform is decommissioned with the exception of equipment and software that is forward compatible with the next generation of standards.

Software standards follow a similar versioning strategy. Microsoft publishes the “Windows Desktop Product Lifecycle Guidelines” to provide advanced notice of changes in product availability and support. Microsoft makes Windows licenses available for purchase for a minimum of 5 years and provides assisted support for a further 4 years. The guidelines are important so that companies can plan their investment through software upgrades of Windows 98, NT, 2000, ME, XP, Vista, and Windows 7.

Switching costs are minimized when standards are designed to evolve from one another.

The introduction of revolutionary standards, however, is costly. The pay-off is superior performance against the high-cost of switching standards. The telling example is the price paid by mobile telephone operators to switch to third generation technology. Mobile spectrum auctions earned European Governments £200 billion with Britain and Germany raising £22.5 and £60 billion, respectively. The mobile operators had to bid to renounce third generation spectrum was to opt out of the future. The bidding process of the auctions inflated the cost of the licenses, leaving the mobile operators with increased debt, depleted cash flow, and delay in third generation launches, all of which became the more significant as the stock market faltered and declined.

See also *critical mass; networks; network externalities; network industry strategies*

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