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⭐ Interoperability

When consumers, producers, or service providers can make two or more devices, systems, or networks work together, the systems are said to be "interoperable." Interoperability issues often arise when systems offered by different firms are deployed simultaneously, or when both old and new versions of a product from the same firm are deployed. The term is often used in discussing hardware like telephones or medical devices, software, and computer records, but issues relating to interoperability also arise in traditional sectors, such as railroads. Some systems are interoperable by design or even government mandate. These can be built using "open standards" that describe how different products can be made to work together; the standards are "open" in being available for use by any appropriate technology developer. The Internet itself is such a system, supported by the Internet Protocol (IP) and Transmission Control Protocol (TCP) standards, usually shortened to TCP/IP. Other systems become *de facto* interoperable as various economic actors independently decide to use compatible technologies or a single technology, like Microsoft Word. Some products are designed to usually disallow interoperability without permission, like Apple's iPhone.

Overview

These issues arise in discussions of interoperability:

- The role of government in encouraging or mandating interoperability.
- How interoperability or a lack thereof affects competition between firms.
- Problems with competition arising when one firm with substantial market power controls technology needed to support interoperability.
- The time it takes to achieve interoperability, as individual firms often innovate more quickly than standards organizations.
- The costs of interoperability (including increased time to market) as compared to the benefits of interoperability (such as an increase in the ease with which consumers can use a product).
- How technologies for protecting copyrighted works, often called "digital rights management," affect interoperability.
- The role of patented or copyrighted technologies and licensing in achieving interoperability.
- The contribution of interoperability to innovation and economic growth.
- The interoperability of government systems and public safety technologies.
- Problems consumers face if they are "locked in" to a system that is not interoperable.
- Security and privacy problems related to interoperability.

Interoperability Sources

These sources are a good place to start in understanding interoperability issues. Pamela Samuelson and Suzanne Scotchmer's paper "The Law and Economics of Reverse Engineering" looks at the legal issues raised by one firm's efforts to study another firm's product to figure out how it works. Urs Gasser and John Palfrey consider the relationship between innovation and interoperability in "Breaking Down Digital Barriers: When and How ICT Interoperability Drives Innovation."

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Alexei Alexandrov explores some advantages and disadvantages of interoperability in "Interconnecting Differentiated Networks." Ramon Casadesus-Masanell and Francisco Ruiz-Aliseda's paper "Platform Competition, Compatibility, and Social Efficiency" asks why technology products like Microsoft's Windows or Apple's iTunes tend not to be interoperable. Thomas Hazlett looks at the impact on consumers of legal rules that require technology to be interoperable in "Modular Confines of Mobile Networks: Are iPhones iPhony?" Thomas R. Eisenmann, Geoffrey Parker and Marshall Van Alstyne explore why some platforms encourage interoperability and others do not in "Opening Platforms: How, When and Why?" Jonathan Zittrain's blog "The Internet's Fort Knox Problem" discusses security issues related to interoperability.

> "[I]t may be difficult to bring about more interoperability by mandating greater disclosure of interface information or regulating what kinds of changes firms can make to their interfaces." Pamela Samuelson *from her article "*Are Patents on Interfaces Impeding Interoperability?*", Minnesota Law Review, Volume 93, 2009*

> "When a market is young and first-time users are affiliating with platforms in large numbers, a dominant platform is likely to avoid interoperating with smaller rivals. Once platforms are established and user acquisition rates slow, however, it may make sense for rivals to reconsider compatibility policies—especially if their market shares approach parity." Marshall Van Alstyne *from his article with co-authors Thomas Esenmann and Geoffrey Parker, "*Opening Platforms: How, When and Why?*", Platforms, Markets and Innovation, Annabelle Gawer, ed., Edward Elgar: Cheltenham, UK, 2008*

Please note that all links on this fact sheet are accessible from the online version at www.techpolicy.com/Interoperability.aspx.