

Lecture 10

Network Economics II: *Standards*



15.011/0111 Economic Analysis for Business Decisions
Oz Shy

Standards: Sept. 3, 1967: Sweden switched to driving on the right side



Compatibility & Standardization: Important concepts and definitions

Compatibility: Competing brands are said to be **compatible** if they can “work together.” For example:

- Android apps are *incompatible* with iOS (Apple) apps
 - NTSC television sets were *incompatible* with PAL TV sets
 - Javascript and HTML are *compatible* with most Web browsers
 - FedWire’s transfer protocol is *incompatible* with the ACH protocol
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Standards: Competing brands are said to be using the same **standard** if they are compatible. For example:

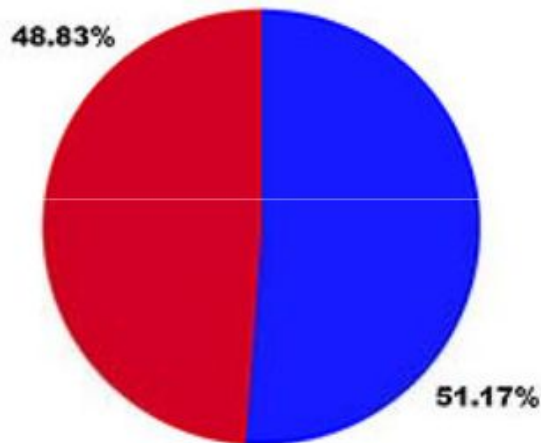
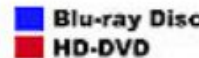
- U.S. Voltage is 110V 60MHz; most of the world uses 220V 50MHz
- FTP (file-transfer-protocol) standard is widely accepted
- CompactCassette (1966) and CD-ROM (1989) are standards

Compatibility & Standardization: Blue-ray wins the HD standard war

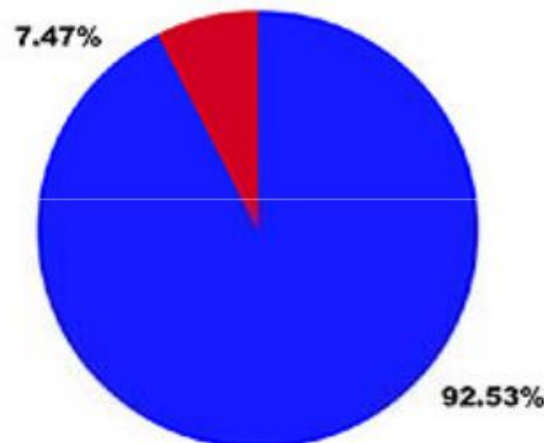


Note: We view movie titles as *software*, that is written for a specific hardware format (standard): Blue-ray vs. HD-DVD

High-Def Market Share (Hardware) - NPD Group



January 2008 - Week 1
(Week Ending 1/5)



January 2008 - Week 2
(Week Ending 1/12)

Earlier formats: Sony's Beta versus VHS

Amazon will stop selling hardware for viewing competing video standards

TECHNOLOGY

The New York Times

Amazon to Stop Selling Apple TV and Chromecast

By DAVID STREITFELD and KATIE BENNER OCT. 1, 2015

SEATTLE — Amazon said on Thursday that it would stop selling devices from Apple and Google that compete with its own streaming media players, escalating the entertainment battle between the major tech companies.

Apple TV and Google's Chromecast are popular items in Amazon's electronics store. But the devices are in a brawl for market share with Amazon's Fire TV and Fire TV Stick, which were introduced in 2014. The Fire Stick delivers Amazon's rapidly expanding video offerings to its customers.



amazon.com



× Unavailable



× Unavailable

Frequent mileage as a “standard”



MileagePlus # XXXXX109

Oz, your miles can take you places.

Keep your award miles. Act now.

Your 14,618 MileagePlus® award miles¹ are due to expire on April 30, 2016

You can keep your account active for another 18 months² when you earn or use award miles. Earn award miles³ when you fly, stay at hotels or rent a car.



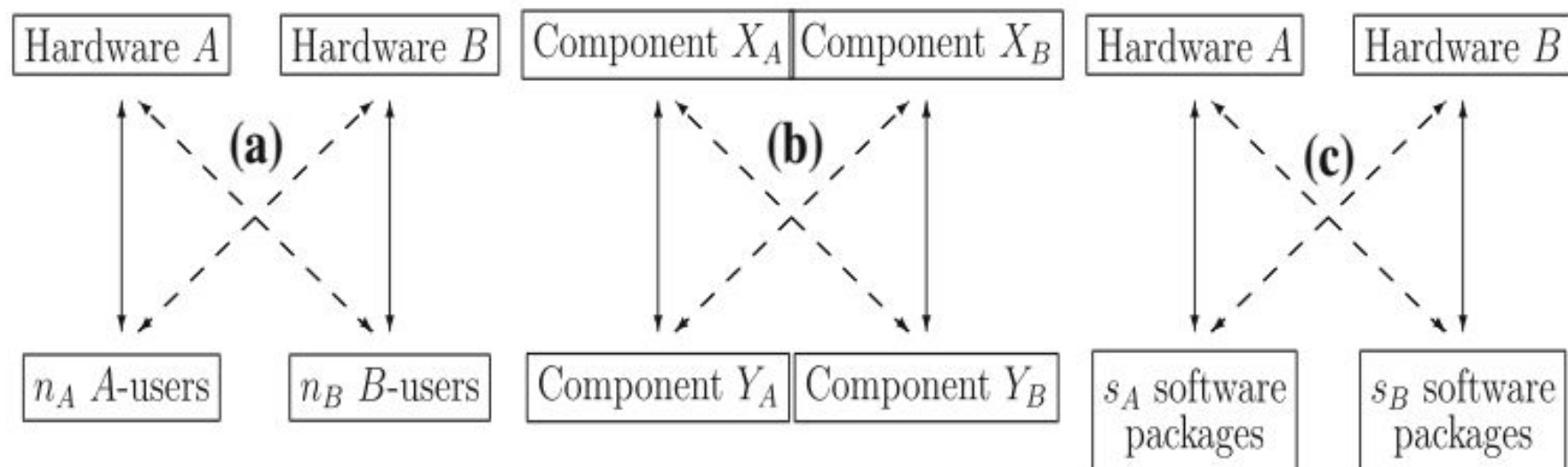
Airlines try to prevent you from searching for lower-cost flights by locking you in their own FF programs

Compatibility & Standardization: Managers' Decision Problems

Network effects: Producers: Production technologies are said to exhibit **network effects** if a firm's profit is enhanced when more firms adopt the same or compatible technologies.

- Examples for industries where firms choose uniform standards Shared ATMs (common in Europe), shared frequent-flier program (joint reservation systems), code sharing, compact disks, USB, ISO-9000, floppy diskette 1.44MB
- Examples for industries where firms choose incompatible standards Apple vs. Windows OS, Apple iTunes vs. MP3, SONY's Beta vs. VHS, GSM vs. CDMA
- The **key** question for producers: Can competing firms enhance their profit by choosing compatible technologies?

Compatibility & Standardization: Three Theoretical Approaches:



- (a) Network externalities: A user's utility is enhanced with the total number of users who buy identical or compatibility hardware (e-mail, social networks)
- (b) The components approach: Assembling systems from different manufacturers (Can Apple printers be connected to Dell machines?)
- (c) The software-hardware approach: Will the software industry support 2 incompatible standards? (Mac software & Windows software; SONY's Blue Ray vs. HD; Android & iOS)



Standardization game: DVD standards (Hardware producers choice of standards)

Movie producers (software writers)	Two DVD formats (Blue-ray & HD-DVD)	Single DVD format
Columbia pictures	Available titles =150	Available titles = 150
Disney	Available titles = 50	Available titles = 50
Total # titles available to consumers	150 or 50	200

- The above model assumes: (a) Software is costly to develop on 2 formats (compared to single format), and
- Consumers willingness to pay (WTP) for a DVD player (hardware) increases with the number of movie titles (software) available at stores and public libraries

(To be continued next slide...)



Standardization game: DVD standards

(Hardware producers' choice of standards game)

		Sony's standard choice			
		Blue-ray		HD-DVD	
Samsung's choice	Blue-ray	\$X	\$X	\$100	\$100
	HD-DVD	\$100	\$100	\$Y	\$Y

- Suppose $X > \$100$ and $Y > \$100$. Then there are 2 Nash equilibria : (Blue-ray, Blue-ray) and (HD-DVD, HD-DVD)
- Suppose $X > \$100$ and $Y > \$100$ and $X > Y$. Then, the (HD-DVD, HD-DVD) is profit-dominated by (Blue, Blue)
- The above equilibrium is often referred to as a “market failure”
- The opposite failure occurs if:
 $X > \$100$ and $Y > \$100$ and $X > Y$



(Non) standardization game: iOS vs. Android

(Hardware producers' choice of standards game)

		Apple's standard choice			
		iOS		Android	
Samsung's & Google's choice	iOS	\$30	\$80	\$100	\$100
	Android	\$100	\$100	\$90	\$90

- There are 2 Nash equilibria (iOS, Android) and (Android, iOS)
- Intuition: Product differentiation (different standards) reduces competition among hardware providers
- The market is segmented according to consumers' tastes

New technology adoption game



		Firm A			
		New technology		Old technology	
Firm B	New	\$80	\$90	\$10	\$10
	Old	\$10	\$10	\$30	\$40

- There are 2 Nash equilibria (New, New) and (Old, Old)
- Intuition: Network effects from industry standardization are very strong!
- The Nash equilibrium (Old, Old) constitutes a “market failure”