

Unless otherwise noted, the content of this course material is licensed under a Creative Commons Attribution – Non-commercial – Share Alike 3.0 License.

<http://creativecommons.org/licenses/by-nc-sa/3.0/>.

Copyright © 2005-2007, Jeffrey K. MacKie-Mason.

You assume all responsibility for use and potential liability associated with any use of the material. Material contains copyrighted content, used in accordance with U.S. law. Copyright holders of content included in this material should contact [open.michigan@umich.edu](mailto:open.michigan@umich.edu) with any questions, corrections, or clarifications regarding the use of content. The Regents of the University of Michigan do not license the use of third party content posted to this site unless such a license is specifically granted in connection with particular content. Users of content are responsible for their compliance with applicable law. Mention of specific products in this material solely represents the opinion of the speaker and does not represent an endorsement by the University of Michigan. For more information about how to cite these materials visit <http://michigan.educommons.net/about/terms-of-use>.

Any medical information in this material is intended to inform and educate and is not a tool for self-diagnosis or a replacement for medical evaluation, advice, diagnosis or treatment by a healthcare professional. You should speak to your physician or make an appointment to be seen if you have questions or concerns about this information or your medical condition. Viewer discretion is advised: Material may contain medical images that may be disturbing to some viewers.

# Network Externalities

SI 646

Jeffrey K. MacKie-Mason

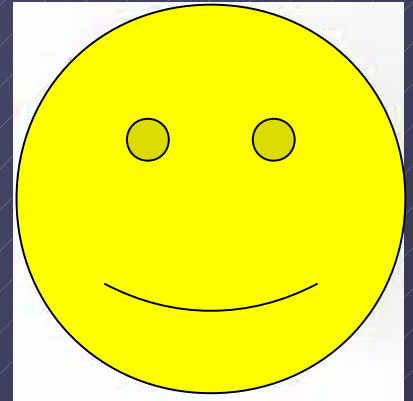
**Competing against, and planning for  
information technology is hard**



+



=

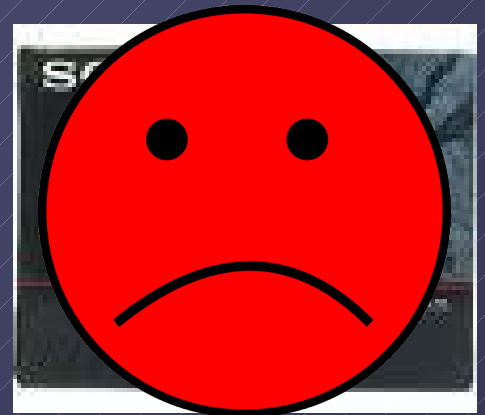




+



=







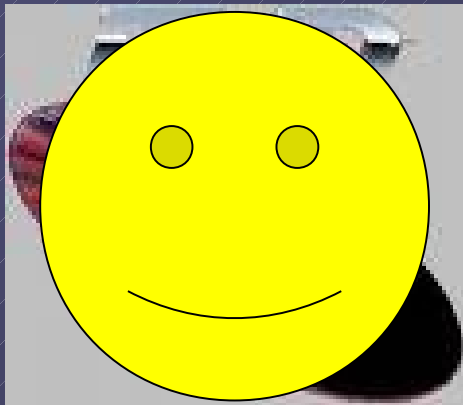
+



+



=



You want to make wise decisions  
about multi-million \$ investments.



How do you anticipate the pitfalls  
*before committing?*

**Anticipate by recognizing features  
common to many challenges**

*Recognizing and understanding*  
network externalities helps you  
plan, compete, evaluate.

# *CHAPTER 1:*

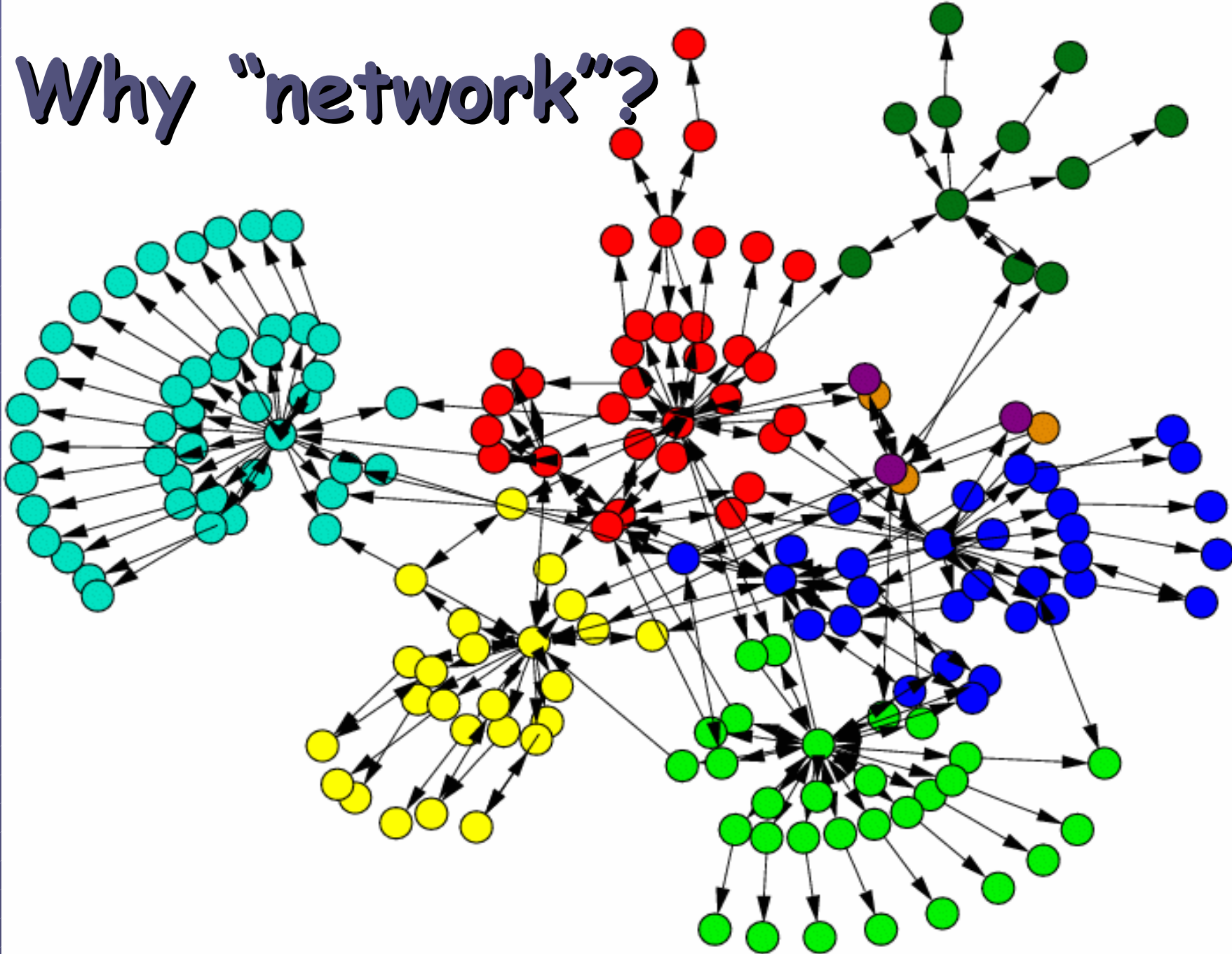
*What are network externalities?*

What are common features of CD (yay!) and DAT (boo!) problems for Sony & Philips?

**Network...**

**Externalities...**

# Why "network"?





Networks offer *substitutes*  
composed of *complements*



What is  
*not* a  
network?

Tightly coupled

**Key: Strong complementarities.**

Multilateral dependencies

**Externalities are...?**

Why "externalities"?

What are examples of  
network externalities in...

information technologies?



What are examples  
of network  
externalities in...

information goods?





What are examples of network externalities in...  
information distribution?



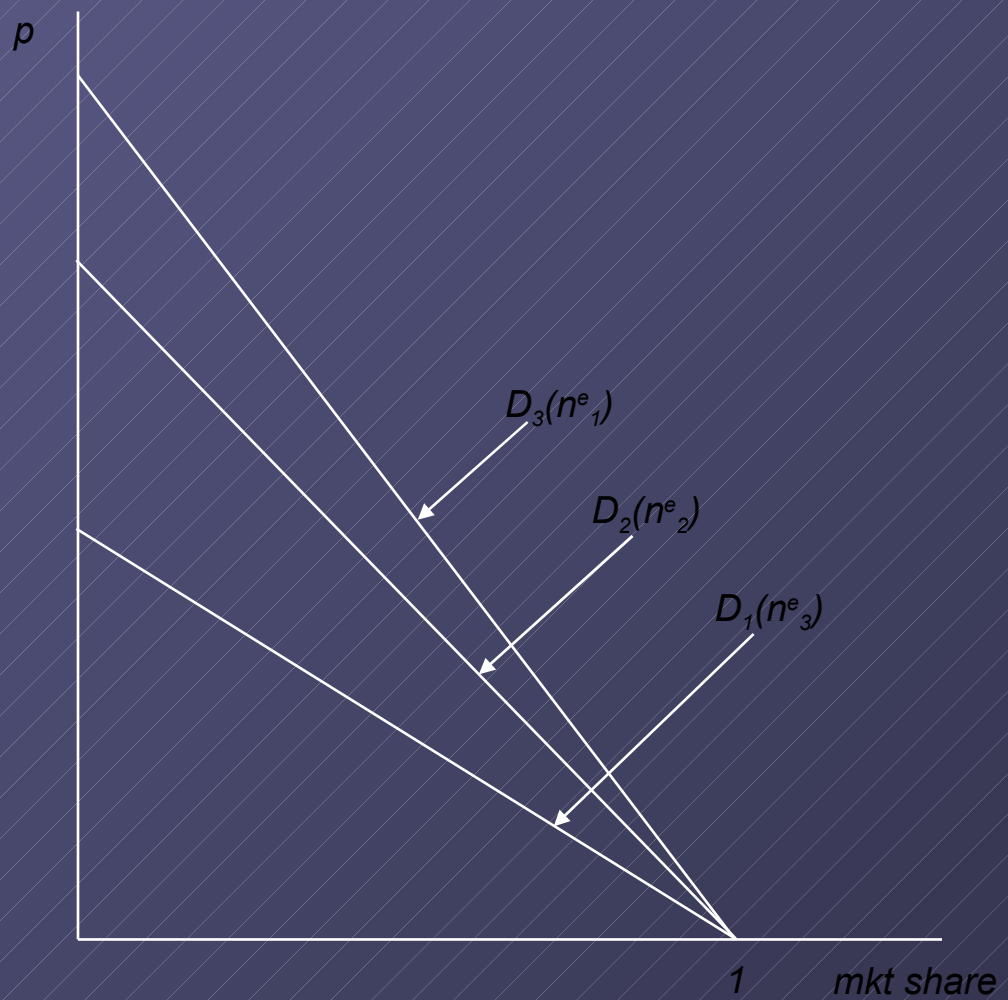
## *CHAPTER 2:*

*How do network externalities work?*

- Let  $p(i, n_e)$  be the amount the  $i$ th user is *willing to pay* when she expects  $n_e$  other users
- $p(i, n_e)$  is *increasing* in  $n_e$ :

$$\frac{\partial p(i, n^e)}{\partial n^e} > 0$$

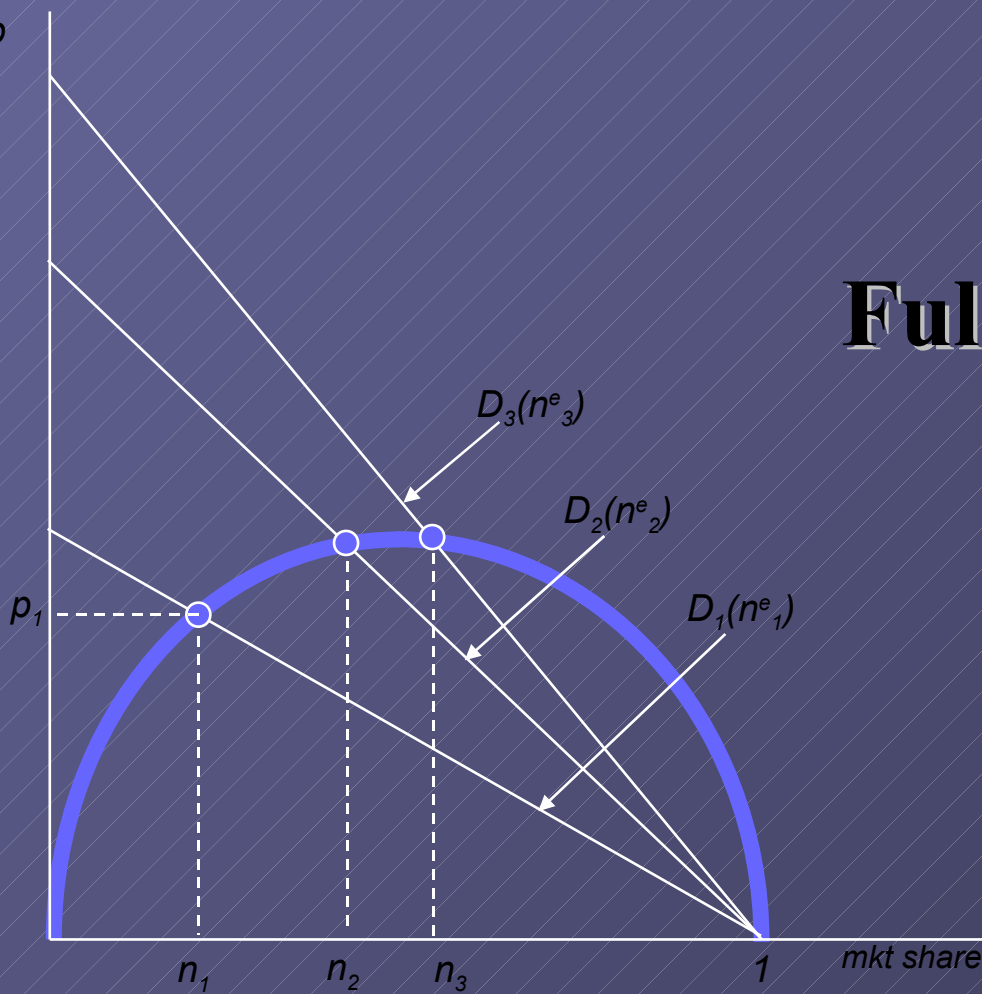
Defn: Value to a user increases in the number of other users



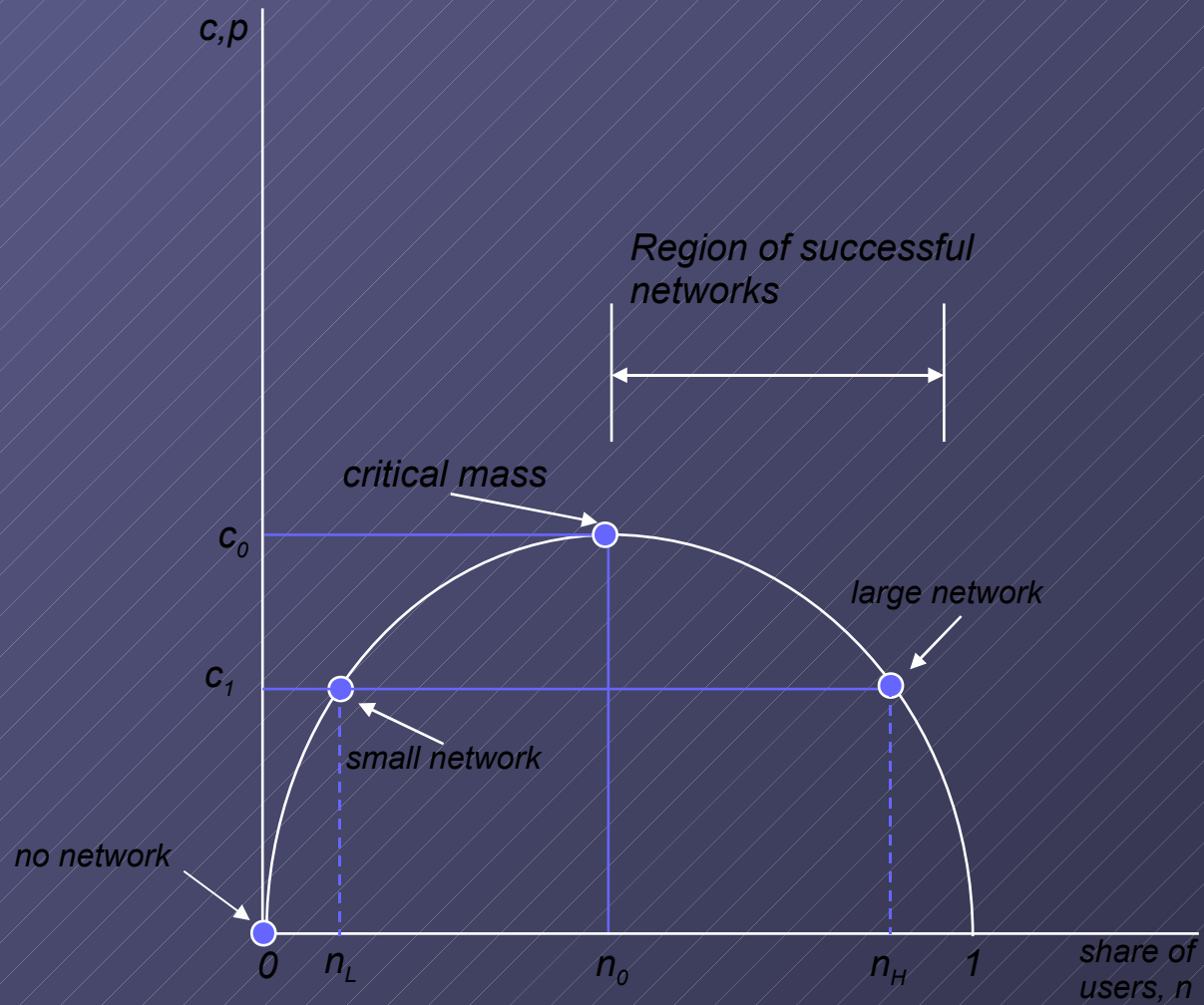
So, there's a different demand curve for each level of expected usage

**Fulfilled expectations:**

$$n = n^e$$



Market is in equilibrium when demand is based on expected usage equal to actual usage



**Key feature in such markets is  
critical mass**

	Network effects		
Dem and for Variety		Low	High
Low		unlikely	high
High		very low	depends

Tipping likely?

*Tipping*: When successful, product penetration can be very fast

*Excess inertia:* Successful networks  
tend to be large, entry is tough

Give an example of a standard that tends to promote excess inertia





*Natural monopoly:* Network externalities push toward one supplier

# Supply-side natural monopoly:

When cost of building an alternative is economically prohibitive

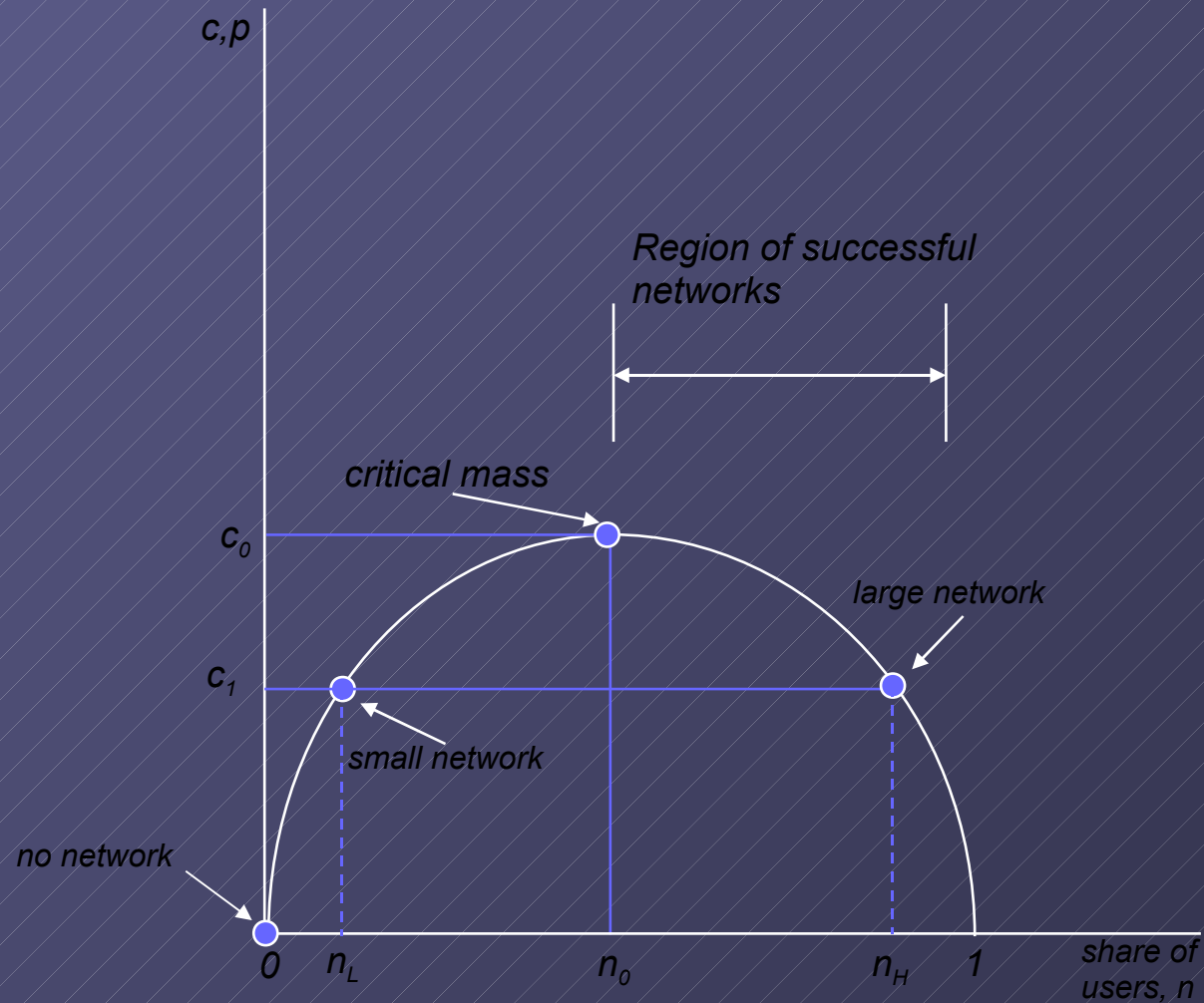
If there are two sets of customers, A and B, and  $C(x)$  is the cost of providing service, then there is a natural monopoly if:

$$C(A+B) < C(A) + C(B)$$

(cost subadditivity)

**Supply-side natural monopoly**

# Demand-side natural monopoly:



Large user network benefits tendency to  
make small networks disappear, large  
networks emerge and survive

Should we do something about  
network externality natural  
monopolies?

**Liebowitz and Margolis: Usually no!**

# *CHAPTER 3:*

*How do we play the game?*

**Increases consumer switching costs**

**Exploits coordination efficiencies**

**Reduces consumer confusion,  
search costs, finger pointing, risk**

**Succeed by closing the platform**

**Encourages partners**

**Stimulates innovation**

**Reduces consumer risk**

**Succeed by opening the platform**



**Succeed by buying critical mass**

**Use critical mass in one layer of a vertical chain of complements to grab critical mass in another layer**

# Case discussion