

Strategic
Computing and Communications
Technology

CS 294, EE 290X, IS 290, BA 296
Spring 98

Feb 23: V.1
Network effects

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Outline

- Network effects
- Lock-in

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Network effects

- Externality:
 - One consumer affected by another with no compensating payment
- Network externality:
 - Value of product depends on how many other consumers use it
 - Negative: fashion, congestion
 - Positive: facsimile

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Network effects in computing and communications

- Direct network effect:
 - Product in hands of different consumers are directly complementary
 - Facsimile, video conferencing, etc
- Indirect network effect:
 - Products share a common base of content
 - WWW, word processing format, storage format

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Networking of computers

- Results in more powerful network effects
 - Direct:
 - End-to-end compatibility; e.g. TCP/IP, CORBA
 - Indirect:
 - Information content; e.g. Web

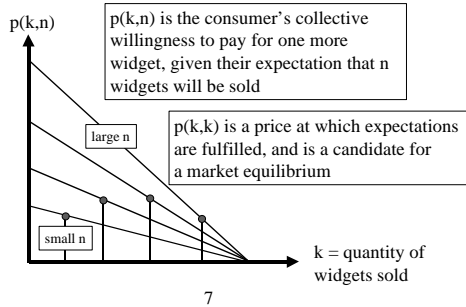
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Market dynamics

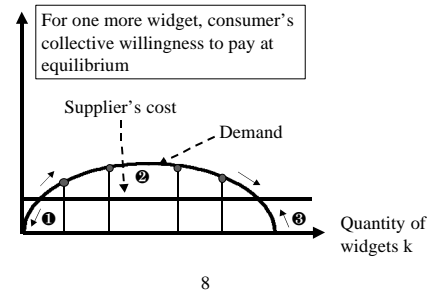
- Critical mass:
 - Smallest number of adopters for which value of product just exceeds supplier's cost
- Positive feedback:
 - More sales stimulates higher demand which increases sales further
 - Until market penetration reaches point that remaining consumers have low intrinsic demand

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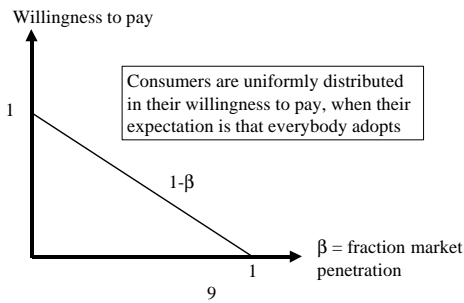
Fullfilled expectations



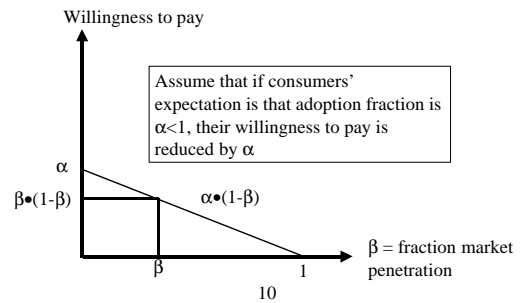
Consumer demand



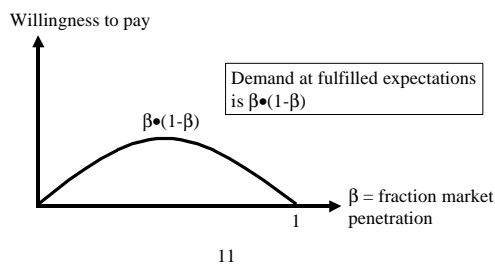
Hal's example



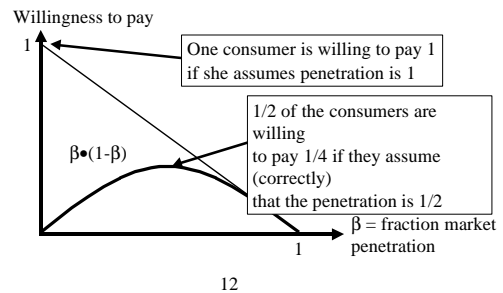
Hal's example (con't)



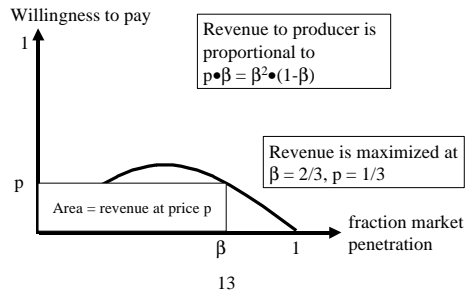
Hal's example (con't)



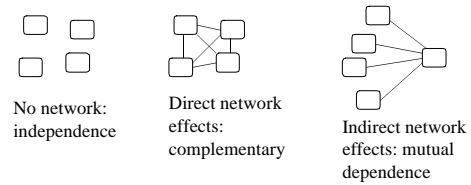
Hal's example (con't)



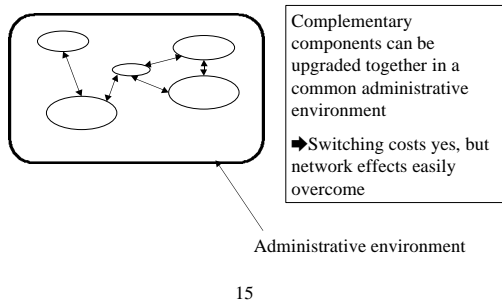
Hal's example (con't)



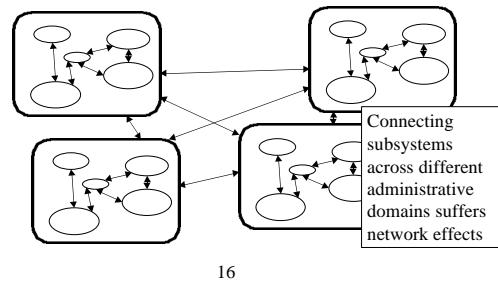
Two types of network effects



Architecture and networks



Direct network effects

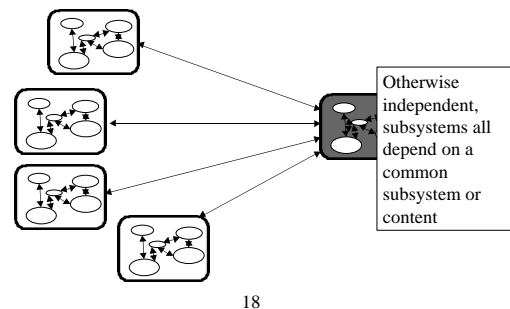


New importance to computing

- Direct network effects arise in
 - enterprise applications
 - inter-enterprise commerce
 - collaborative applications

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Indirect network effects

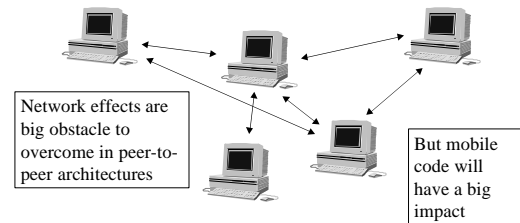


Examples

- Indirect network effects have always been prominent in computing
 - software availability
 - information content
 - trained workers
 - complementary subsystem suppliers

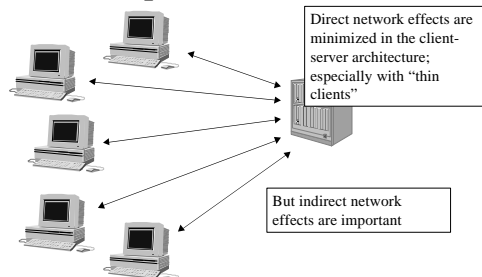
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Example: peer-to-peer



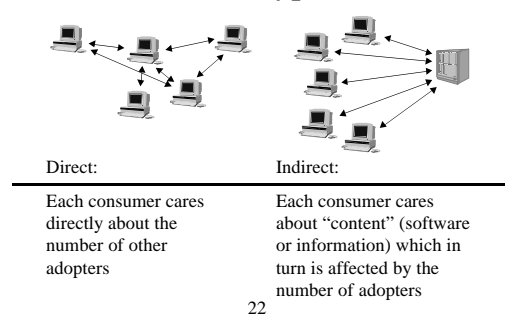
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Example: client-server



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Two types



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Question:

- Which of the following products demonstrate positive feedback, and particularly discontinuous demand as a result:
 - Facsimile, PalmPilot, Internet, Pet Rock, Web, music on CD, Wintel platform
- Which are direct and which are indirect?

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Dark side of positive feedback

- Positive feedback results in winner-take-all effects
 - Accentuated where there are large supply economies of scale
 - Examples?
- Other products that cannot achieve or fall below critical mass rapidly lose share
 - Examples?

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Partial answer

- Apple Macintosh
- Minidisk
- Prodigy
- Sony Beta
- others?