**The Economics of Networks**
Nicholas Economides, 1996
*International Journal of Industrial Organisation* 14: 673-699*

TP5: Distribution Networks
Lecture 3, Friday, 25 October

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*see http://www.stern.nyu.edu/networks/papers.html

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### Our presentation

- What is a network?
- Compatibility of components
- Network externalities
- How big will the network grow?
- Coalitions and standards
- Issues of quality
- Other strategic considerations
- Summary of key ideas

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### What is a network?

- A set of complementary components (e.g. links & nodes) that provide goods/services demanded by consumers
- Networks can be *two-way* e.g. the public telephone network or *one-way* e.g. broadcast television
- A pair of vertically integrated industries is equivalent to a one-way network

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### Compatibility of components

- Compatibility is the costless combining of components to produce demanded goods
- In many cases component compatibility can only be achieved through specific technical standards
- Providers can choose whether to make their components partially or fully incompatible with the components of other firms
Network externalities

- Networks exhibit positive consumption and production externalities: the value of a unit of the good increases with the expected number of units to be sold.
- **Direct externalities** occur when customers are identified with components. Value increases directly with the expected number of customers (e.g. telephone network).
- **Indirect externalities** are typical of one-way networks: additional customers increase demand for components and indirectly the number of different components offered (e.g. games consoles).

How big will the network grow?

- With network externalities, the value of good X increases as more of complementary good Y is sold, and vice versa. Explosive positive feedback stops beyond a certain equilibrium quantity due to consumers’ decreasing willingness to pay.
- Firms in perfect competition will provide a smaller network than is socially optimal (and possibly no network at all if the production costs are too high).
- A monopolist (who cannot price discriminate) will support a smaller network and charge higher prices than perfectly competitive firms.

Coalitions and standards (1)

- Oligopolists can form coalitions to produce compatible components (i.e. to a “standard”).
- Considerations when forming/joining a coalition are:
  - The strength of network externalities
  - The relative sizes of the coalition and individual companies
  - Expected changes in competition between coalition members
- The selection of the common standard is driven by the profits expected by each company by using each of the available options.

Coalitions and standards (2)

- For a vertically integrated company (i.e. producing all the components of a good) the incentive for compatibility depends on the relative sizes of each combination of its own and its competitors components.
- If incompatibility is chosen, prices of goods will be lower (as profits from whole systems - rather than components - are lost if demand decreases).
- When developing their strategies, companies will decide on compatibility, then structure and finally price.
- If the main companies choose incompatibility the number of component providers will be smaller.
Issues of quality

- Significant quality coordination problems arise in a network with fragmented ownership if the quality of the good is determined by the lowest quality component
- A vertically integrated monopolist will charge less for components A and B and provide them at a higher quality than two separate monopolistic companies would

Other strategic considerations (1)

- Monopoly holders of technology may invite competitors in and even subsidize them, in order to grow the network
- Conversely a monopolist can foreclose any firm by denying it access to a bottleneck facility or implement a vertical price squeeze (e.g. local telephone services)
- Vertical disintegration is not desirable for a firm that offers end-to-end service (because of the loss of its monopoly power)
- The value to a firm of any network link depends on which other links it owns

Other strategic considerations (2)

- History matters: it is a predictor of future network externalities. Strategic advantages, such as first mover advantages, can have long run effects
- When network externalities are strong the adoption path of an innovation may be discontinuous i.e. a large number of customers switch to the new technology at once. Companies can use strategies (e.g. pre-announcement, penetration pricing) to overcome customer inertia to switching

Summary of key ideas

- Network externalities
  - Bigger networks increase the value to all participants
  - Expectations of a larger network increases customer willingness to pay (DD moves to D'D')
- Company profitability
  - Constrains maximum network size
  - Drives compatibility and network structure decisions