
Optimal Interoperability



Christopher S. Yoo

University of Pennsylvania Law School

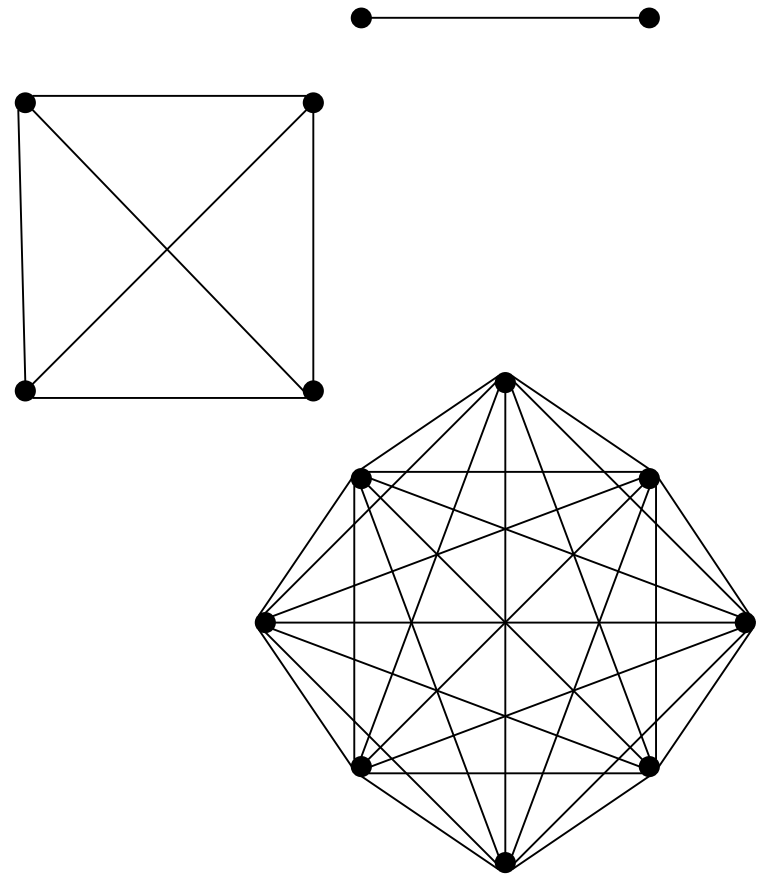
February 8, 2015

In Praise of Interoperability

- Often treated as a categorically positive feature
- Can lead to calls for mandating interoperability
 - Apple iPhone
 - Internet architecture
 - Video game platforms
- Must address existence of non-interoperability
 - Proprietary protocols, exclusivity, specialized services
- Need framework for determining when interoperability is optimal

Metcalfe's Law

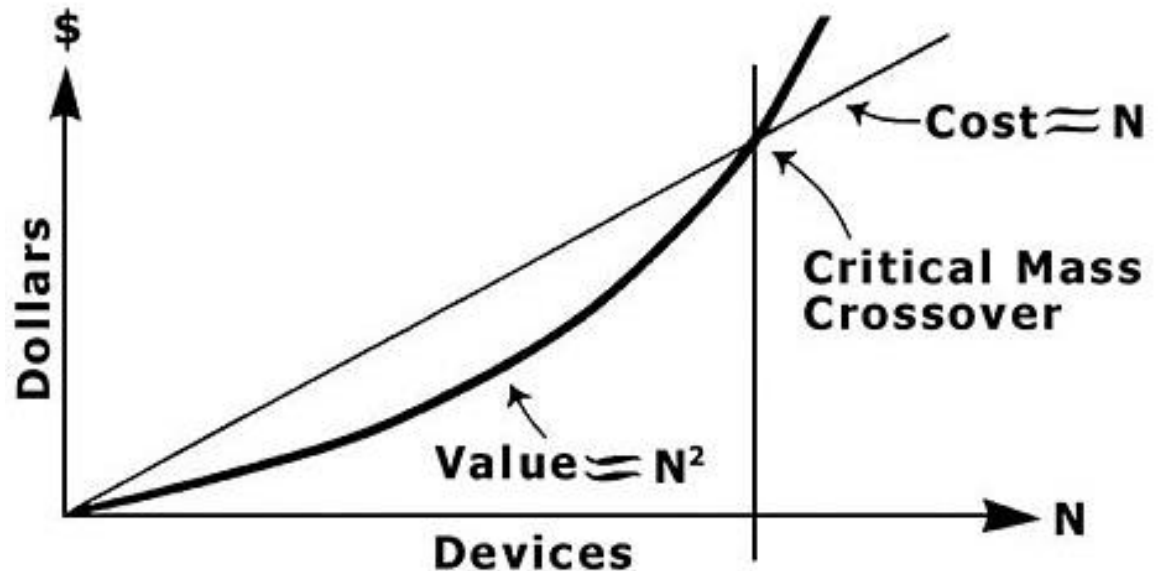
- 2 nodes, 1 connection
- 4 nodes, 6 connections
- 8 nodes, 28 connections
- n nodes, $\frac{(n^2-n)}{2}$ connections



Metcalfe's Law

- Network value is determined by the number of connections
- Number of connections increases quadratically with nodes
- Cost of nodes is linear

The Systemic Value of Compatibly Communicating Devices Grows as the Square of Their Number:



Considerations That Reduce System Value

- Limits to the number of valuable connections/
heterogeneity in the value of connections
 - Dunbar's number
 - Higher frequency/value in certain connections
(e.g., telephones, Facebook)
- Diminishing returns to additional connections
(e.g., Zipf's Law)

Other Potential Tradeoffs

- Efficiency vs. generality
- Lack of coordination
 - IBM
 - Android
- Dampening of competition
 - Shapiro (1999)
 - Lee (2012) on videogames
- Decentralized innovation as a source of value

Other Institutional Considerations

- Gateways
- Equilibria with both interoperable and non-interoperable systems