

# *The Internet Lesson*

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## Network Effect

Lots of value --  $N^2$  (N square, for N participants)

Fax machine

SMTP

VHS video format (vs. Beta) -- i.e. why, in the end, was VHS equipment more valuable than Beta equipment? -- network effect

MP3 -- lots of books, tools, players, collective expertise, MP3's made by others

The more participants = more overall value

Aka "Metcalfe's law"

"the usefulness, or utility, of a network equals the square of the number of users."

Bob Metcalfe -- the inventor of Ethernet

## Hard to Dislodge

Once the Network Effect as achieved critical mass, it's hard for a competing standard to become popular. Once the  $N^2$  value has kicked in, it's hard for the small-N competitor to appear at all desirable. A new standard will need to be drastically superior to the old standard to have a chance.

e.g. No tape format can compete with VHS once network effect has kicked in

e.g. DVD can displace VHS

## Proprietary Network Effect

It's possible for a network effect standard to be owned by a company -- a proprietary standard.

If they can boost their standard to become the single dominant one, then the network effect will take over.

Many companies want to use this strategy -- it's hard to start, but it's obviously a great way to make money.

The Win32 API is probably the best example to date.

1. Win32 is the world's most popular application platform
2. Software houses write their applications for Win32, and not for competitor X
3. Users prefer the platform with the largest number of applications -- got to (1)

Other effects

The Win32 API has lots of inertia -- this affects Microsoft. It's hard for Microsoft to change/improve the API over time.

If someone else could make a platform that were compatible with Win32, people might use it. The network effect went with Win32 the platform more than Microsoft the company. (You could argue that marketing is an exercise in getting people to associate the value with the brand name or company instead of the technology.)

In this situation, the new version needs to be evolutionary -- a compatible extension to the high network effect version.

Part of getting network effect to work for you is understanding that market share is more important than immediate profit. Microsoft understood this better than anyone from the beginning.

## Network Effect Participation vs. Tech

Where does the value come from?

No: the technical superiority of the standard

Yes: the participation in the standard

Examples

MP3

VHS

Win32

Theme: it's not the quality of the standard, so long as it is at least adequate, it's the participation of others.

The real reason you want to use MP3/VHS/Win32 is that everyone else is using it, and their participation has created  $N^2$  value.

## Public Standard -- e.g. RFC

Standard -- e.g. RFC

Freely available, well defined standard.

Something controlled by one company, kept secret, and changed without notification does not count.

It's possible for a company owned technology to act as a standard, so long as the information is public and well-defined.

Compatible

It's about being compatible. By being compatible with the standard (which may have some costs) your system now interoperates with everyone else who has volunteered to be compatible with the standard.

Replaceable/Commodity --> Competition

If the standard is working well, then the consumer should be able to replace vendor A's solution with vendor B. This keeps the quality up and prices down. Vendors dislike this somewhat, but it makes the domain more attractive to consumers.

Car example: GM car that only takes GM gas. GM car that works with gas from any company.

$n^2$  Value

The standards allow separately authored components to interoperate with each other thing --  $n^2$  connections. We may not know the exact mechanism, but recent history shows that standards based  $n^2$  networks create a lot of value.

Not proprietary

If anyone is free to implement the standard, no one vendor gets to monopolize the value. It's not like there's some "owner" of TCP/IP that gets all the value out of it. The TCP/IP **participants** collectively receive the value of TCP/IP.

vs. Markets

It's hard for vendors driven by market forces to make good standards (even though in reality, the vendors come out ahead once the standard exists). The TCP/IP, HTTP, email, .. standards ... these were all produced by non-profit groups, often with government funding. I think markets are great for some things, but standards are an interesting and important area they get very wrong.

## How The Internet Came About

Short history of the Internet...

$N^2$  Value available -- there was obviously enormous potential value in connecting all the computers.

Proprietary Failure

IBM, Microsoft, Novell -- they each came up with ways of connecting **their** computers. Trying to create a network effect that included only their brand -- trying to re-create the Win32 money-making franchise. Microsoft in particular has always succeeded by making Microsoft tech work well with other Microsoft tech. The standards based internet goes against the things that have made Microsoft so successful. Nonetheless. Nonetheless, Microsoft has proved it can learn to play under the new rules too (possibly with some monopoly cheating).

Attractive Standards

Homely, ordinary, publicly funded standard like TCP/IP, HTTP, HTML were defined as real standards.

As real public standards, they were attractive to **participants**.

As the number of participants grew, the network effect for TCP/IP, HTTP, etc. etc. grew at the  $N^2$  rate -- at some point they became unstoppable.

## Vendors love/hate Standards

Vendors: bad: you are replaceable, you only get your share of the pie, and no monopoly rents. There will be competition.

Vendors: good -- the pie will be very large, and even if you are small, you can break in since your standards-compliant technology will interoperate just as well as the big vendors.

## Study Question

Microsoft writes the OS that runs 90% of the computers on the Internet. Microsoft word has 95% of the word processing market share on those computers. How is it that we are not using some Microsoft networking tech to connect those computers? How it is that we are using the (relatively low-tech) HTML format instead of the .doc? There must be some other force that helps standards like TCP/IP and HTML succeed.