

# *HTTP 3 — Analysis*

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Here's some miscellaneous HTTP features...

## HTTP Caching

Browser cache

Intermediate "proxy" cache -- AOL

## Cache Control

Response field from the server...

Cache-Control: no-cache           ## forbid caching

Cache-Control: max-age=600       ## in seconds

Expires: *date*                   ## a time, or "0" = no cache, this is the old way

## If-Modified-Since request

Use this field in the request

The Server can respond with "304 not modified", if the content has not changed.

The client can just use the cached copy they already have.

## http-equiv

In the HEAD section of the HTML

Effectively add the given name:value binding to the HTTP response

```
<meta http-equiv="name" content="value">
```

```
  <meta http-equiv="cache-control" content="no-cache">
```

```
  <meta http-equiv="expires" content="0">
```

## Description and Keywords

Search engines may be able to use this meta content to better categorize the content..

```
<meta name="description" content="Stanford CS Education Library: a fun 3  
  minute video that explains the basics features of pointers.">
```

```
<meta name="keywords" content="pointer, pointee, reference, pointer fun, basic  
  pointer, pointer introduction, video, animation, animated">
```

## Refresh

Read by the client

```
<META HTTP-EQUIV="Refresh" CONTENT="seconds; URL=url">
```

Can re-load the page on some schedule

Or can "bounce" to another page -- a quick-n-dirty technique if you need to

bounce the client to another page. Not as clean as a real 301 re-direct.

seconds=0 can cause the back button to appear not to work -- very bad

## .shtml

Some server support this.

Directives embedded in HTML comments

Processed by server at request time -- slows things down a bit

e.g. insert mod time of file...

```
<!--#flastmod virtual="foo.html" -->
```

## Web index robots -- Search Engine

"Web Robot" traverses the web -- similar to SiteSucker

Builds an index of which words occurred on which pages

Also try to rate, in some way, which pages are better matches than others

www.google.com is currently the best search engine. Google counts the number of links to a web page to try to rate its quality.

Offer a web-search service. Users type in words, the service returns URLs to the pages that include those words.

Reads the meta tags to get keywords and a summary

Problem: web robot poisoning -- a site can try to feed the robot words that are popular just to attract hits. This is the Tragedy of the commons again.

## Network Effect

Recall..

$N^2$  blowup

Value derives from participation, not tech merit

## Q: TCP/IP, HTTP, HTML

How is it that these rather modest standards, developed in a largely non-profit way, took over the world vs. the many well funded proprietary alternatives?

## The Prisoner's Dilemma

Two prisoners A and B -- can they cooperate with each other?

Each can either "defect" (give evidence) or "cooperate" (remain silent)

1) If A defects and B cooperates, A goes free, B gets 10 years

2) If both cooperate, both get 1 year

3) If both give evidence, both get 5 years

If each prisoner pursues their "greedy self interest" then they both defect and they both get 5 years

If they could somehow cooperate (aka "enlightened self interest"), they would maximize their overall value -- requires trust or other organization between the two.

## The Tragedy of the Commons

"The Tragedy of the Commons," Garrett Hardin, Science, 162(1968):1243-1248.  
<http://dieoff.org/page95.htm> -- originally applied to pollution -- a non polluted

Earth essentially being a big commons that we all benefit from.

Every farmer has some land + there is a large common area

If land is over-grazed, it becomes muddy and worthless

Each farmer's self interest is to graze the common area as much as possible, since they get **all the benefit, but only 1/nth the cost**. This only works for a farmer if no one else does it.

All the farmers do it because they fear the others will, thereby destroying the commons and nobody gets any value.

The Point: Cooperation

## Defecting - Negative Externality

Negative Externality

Economic term for producing something at a cost where the cost is borne by someone else -- basically defecting.

Selling widgets with more profit by polluting the water, while your competitors don't pollute.

Not obeying the stoplight while everyone else does

Sending SPAM email to someone, using up their time and computing resources

## Government / Organizing /

## Cooperating

Government, the one sentence definition: create an atmosphere where individual self interest leads to individually and collectively highest values.

The prisoners are able to form an enforceable pact that neither will give evidence.

The farmers form an enforceable pact where they agree to each graze the common area sustainably.

Each individual has less freedom / latitude, and yet each individual is better off.

Set up trust and enforcement so we can all avoid the tragedy of the commons.

e.g traffic lights

e.g. pollution laws

The tragedy of the commons is a "bug" in the pure market system -- the area where I am most open to non-market, government regulation. (monopolies are the other bug in the market system.)

## Soviet Union Example

The post cold-war soviet union and much of the 3rd world can be taken as examples of failing to provide the government structure for cooperation

e.g. Rule of law -- enforceable contracts

No: we'll just remove all the restrictions and let the market run

Yes: we'll have civil structures, rule of law, etc., and the market will flourish within that structure

# Stock Market Example

The US stock market works well, but only with the SEC setting up strict boundaries. There's fierce competition within the boundaries

e.g. defect == lying

Suppose a company puts out false accounting info, and drives up its stock price. This works, so long as the other companies don't, so the notion of accounting info still has meaning. If all the companies do it, then nobody believes any accounting, whole market collapses since, rationally, no one wants to invest since the liars and truth-tellers cannot be distinguished cheaply.

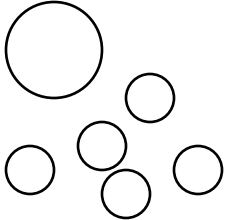
It's ironic that the most rabid market system only works with an equally rabid enforcer -- the SEC. The US gets untold billions of extra investment each year because of the SEC. Why invest in a country with corruption, weak rule of law, lying -- why would the investor want to bear that cost? Just invest in a country where, cooperatively, the participants do not impose that cost on investors.

# Network Effect Marketing

Suppose we are in a domain with powerful network effects.

## 1. Proprietary / non-compatible

Vendors could all be not-compatible with each other. This follows the vendor's natural instinct (just like the prisoners)...



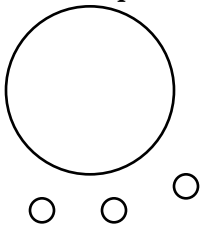
## 2. Monopoly

A vendor would love the outcome where the one vendor gets a large enough market share that network effect kicks in for them -- they get big, everyone else gets small.

e.g. Win32

Every vendor would love to do this if possible.

The market size is a little limited -- the vendor extracts extra profits, produces a lamer product, etc. etc. since the network effect prevents competition.



## Cooperative Standard

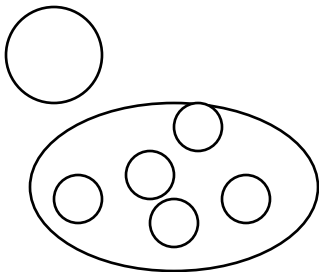
Many vendors could agree to be compatible with each other.

This magnifies the network effect -- vendor A does not just work with vendor A.

Now A works with A, B, C, ..... -- so the network effect is a function of the sum of their sizes.

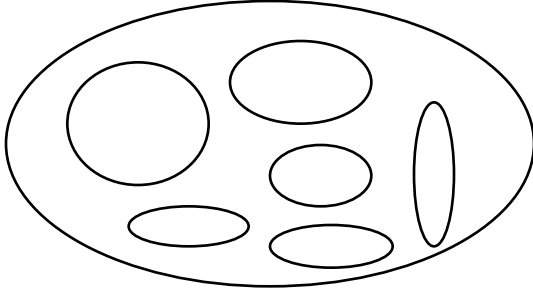
The small guys think this is a big improvement.

If a vendor was near to getting a monopoly, they will hate this idea.



## Cooperative Standard Outcome

The cooperative standard gets big enough for the network effect to kick in. The overall market gets bigger, since competition keeps quality high and prices low, and customers are not afraid of vendor lock-in.



## Cooperative Result

The vendors have to share the market with the other vendors  
But the market is very healthy -- it's attractive to the customers, so it gets bigger.  
To the vendors, this is not as good as getting a monopoly, but it's still a good "2nd best" outcome.

For the users of the technology, this is a great outcome. It makes the market large (lots of network effect) while still forcing the vendors to compete (high quality, low prices).

## How TCP/IP, HTTP, etc. won...

### Theory 1 - Enlightened Vendors

Enlightened vendors. They knew about prisoners dilemma, and chose to cooperate -- create the large market and compete with in. The "unenlightened" strategy was to just all remain incompatible.

### Theory 2 - Demanding Customers

Demanding customers. The customers also know about network effects.  
Therefore, they are demanding to their vendors.

e.g. would you buy a GM car that only ran on GM gasoline?

Customers demand standards-compliant solutions, since that keeps the vendors replaceable -- i.e. keeps competition going.

### Theory 3 - Network Effect Snowball

Public standards are attractive to participants, even little ones.

Perhaps this leads to a "snowball" effect where the market sum of all the little participants tends to pull in more participants and so make better use of network effect than any one vendor. Eventually, the standard is so big, the vendors must comply (theory 2). This theory does not depend on the vendors being enlightened. The participants are naturally drawn to the standard, and network effect drives the outcome from there. A vendor can resist this is they have a monopoly already (e.g. Win32).