

# *Analysis*

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## HW1 Analysis

### 1. Compatibility Protocol

#### **POP RFC**

The POP RFC defines rules that allows programs to interoperate.

#### **Fragile**

As with many software systems, it's a bit fragile. The rules need to be followed exactly.

#### **Consistent**

The two ends of the dialog need to be consistent.

#### **Cheap**

Considering how much value it has unlocked, the POP protocol is not very complex (i.e. cheap to build). The value is coming from somewhere else -- the protocol itself is simple and cheap.

#### **Standard: Any-Any Synergy**

POP is only valuable because all the computers voluntarily participate. The community creates the value -- the standard just enables it.

#### **Non-Profit**

All the most important protocols underneath the Internet (TCP, IP, SMTP, POP, IAMP, HTTP) so far were developed essentially in a non-profit way. Something outside the usual Econ 1 world is at work. The for-profit companies participate, but the standard is not act as "property" in the traditional sense.

### 2. Layers

#### **POP : Sockets : TCP/IP : Physical Net**

Built on top of infrastructure layers. Each layer does not need to know the implementation details of the lower layers.

#### **"OSI" 7-Layer architecture**

A formal structure that describes how the layers, or "stack" of a networking system might be divided.

You can change the implementation of a layer, and the upper layers don't care.

TCP/IP was more "let's try building something" -- it doesn't map onto OSI exactly.

Now engineers know about the OSI model conceptually, but everyone uses TCP/IP.

Lesson: you can only get so far just standing around the whiteboard -- at some point you have to build something and learn from it concretely (and then you may throw it away).

## Network Effect

### Popularity Value

Part of the value of something is its popularity (or "marketshare")

### Compatible / Incompatible

### Camp A vs. Camp B

## Positive Feedback Loop

When its popular, that makes it more valuable, which makes it more popular.

### Virtuous Cycle

### Vicious Cycle

## Network Effect Components

### Compatibility

### Books

### Training

### Other systems

### "Mindshare" -- classical marketing

## Anxiety

Consumers have an intuition about the winner-take-all results, so they don't want to pick the "wrong" one. Ironically, this reinforces the network effect, making the winner-take-all pressure all the worse.

## Results

**Winner Take All**

**"Invest" in marketshare**

## Trumps Technology

The network effect force tends to dominate matters of cost, quality, technical merit, etc.

## Proprietary Picture

A, B, C -- each tries to maintain its own, incompatible domain with its own positive feedback network effect.

## Network Effect Winner

A has 50% market share, B and C each have 25%. Network effect forces to: A has 90%, B and C each have 5%

## Compatibility Examples

**Fax**

**Beta/VHS**

**TCP/IP**

## Status Examples

**Real Estate**

**College**

**Sexual Selection Pressure -- Peacocks,**

**Zebras**

## Commodities -- No Network Effect

**Bread**

**Pencils**

**Paint**

One can imagine a corporate fantasy paint that can only be painted over with the same brand of paint. Of course it's obvious to consumers that they don't want such a paint.

## Liquid Nitrogen Gasoline

However, vs. other forms of energy, gasoline does enjoy a network effect.

## Inertia

Inertia is just network effect over time -- grafting products to take over the network effect of old popular products.

Software is high inertia. You tend to keep using what you were using before. There is cost and uncertainty to switching.

Gasoline is low-inertia -- if you bought Shell gas this week, you can easily switch to BP next week if they are better on price or service. Sadly, software does not benefit from such clean competition.

These effects make an atmosphere where "once you are winning, you tend to keep winning." Microsoft benefits from these effects currently. However these effects can benefit standards based efforts also.

## The Prisoner's Dilemma

Two prisoners A and B

1) If A gives evidence and B remains quiet, A goes free, B gets 5 years

2) If both remain quiet, both get 1 year

3) If both give evidence, both get 10 years

If each prisoner pursues their "greedy self interest" then they both go away for 10 years.

If they could somehow cooperate, they would maximize serve their overall self -- 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

Requires trust or enforcement