Internet-Zero Future and Past

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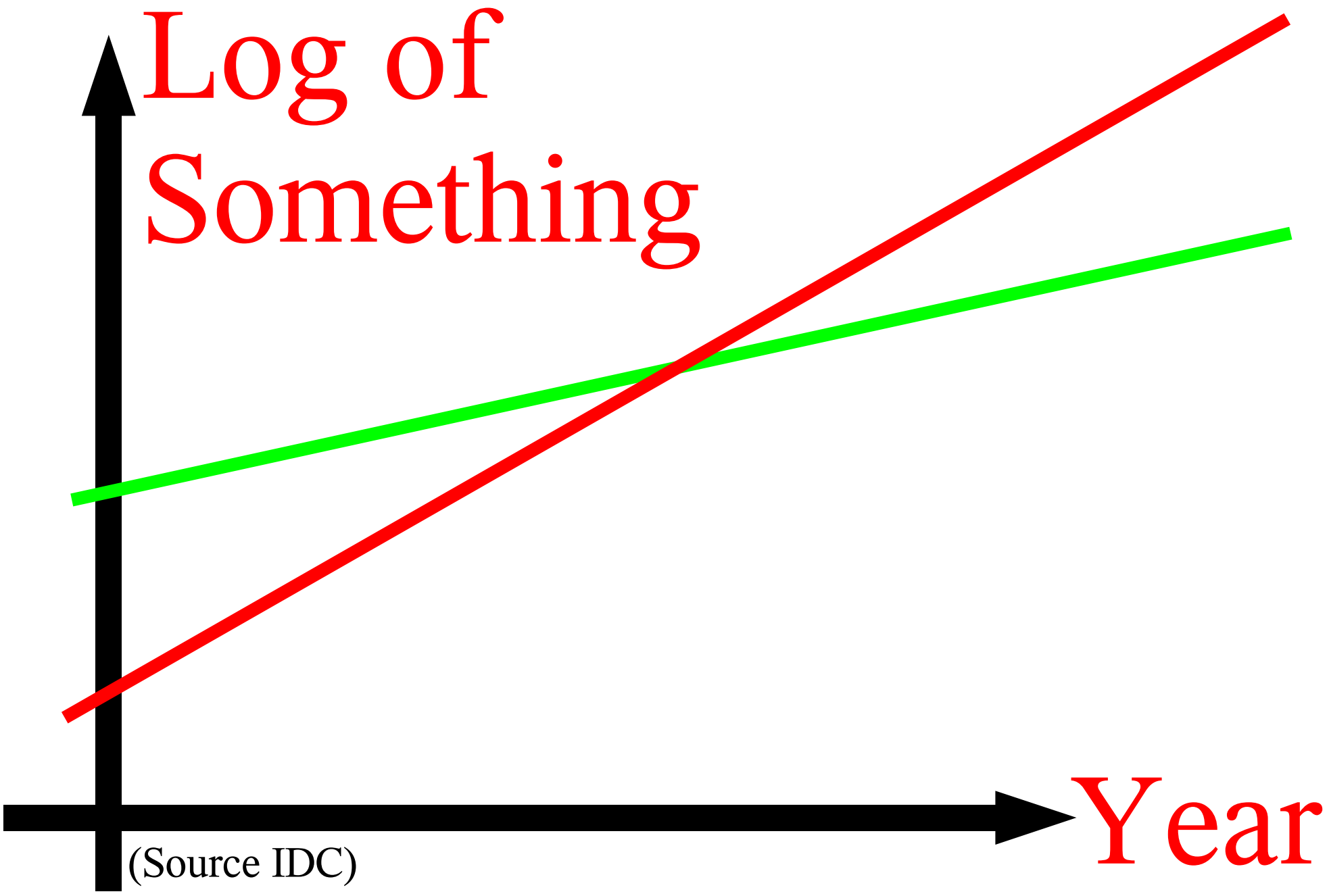
Outline

- I-0: The Future
- Problems and Approaches
- I-1: Lessons from the Past
- Summary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Future Buildings

Many Sensors
Many Actuators
Central Logic
Internet Access

The I-o Vision

Many Sensors
Many Actuators
Central Logic
Internet Access

Many Vendors
Extensible functionality
Extensible devices
Secure operation

Problems

- How to get many vendors to produce interoperable devices?
- How to secure it? How to deny accidental access by neighbors? How to deny malicious access by others?

I-o Approach

- Steal relevant ideas and approaches from Internet-1
- Steal their security system
- Steal their approach to vendor independence
- Steal their approach to extensibility

Lessons from I-1

- Extensibility (performance)
- Extensibility (functionality)
- Extensibility (users)
- Extensibility (vendors)
- Security

“Those who ignore history are doomed to repeat the mistakes of the past”

Performance

The Internet started with 50Kbps, and is approaching now 1Tbps: about 7 orders of magnitude.

The Secret: The internet protocols do not specify performance. (Separation of the PHY layer)

Functionality

The secret: The Internet protocols are designed to be general and extensible, rather than seeking the ultimate efficiency.

Reliable vs. Realtime

- Packet networks can support both reliable and realtime flows of information.
- These flows require different approaches to flow control, to buffers, and to error handling.
- Reliability increases latency.

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As of v3 (and v4) the enroute protocol is called IP, and is separate from the end/end protocol which is called TCP.

Fast IP, reliable TCP

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VoIP or IPuV?

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Should it be called IP-Under-Voice?

Users

Initial fields were too short.

The explosion in the number of users is possible because of the decentralized distributed nature of the Internet and its performance extensibility.

Vendors

The Internet protocols are designed to be general, open, and inclusive. Any device can be connected if its interfaces complies with the open specifications (RFC). This was a unique idea then.

Security

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- The good news: Smart people work on it around the internet
- If we use IP we can steal their security solutions

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- Encourage vendors to produce I-0 devices
- Work with I-0 vendors (UL)

Last Slide