Internet Addressing

Danny Cohen
DE, Sun Microsystems
and Adj Prof at USC/CS

Question: What would Jon have done about the addressing challenges currently facing us?

Answer:

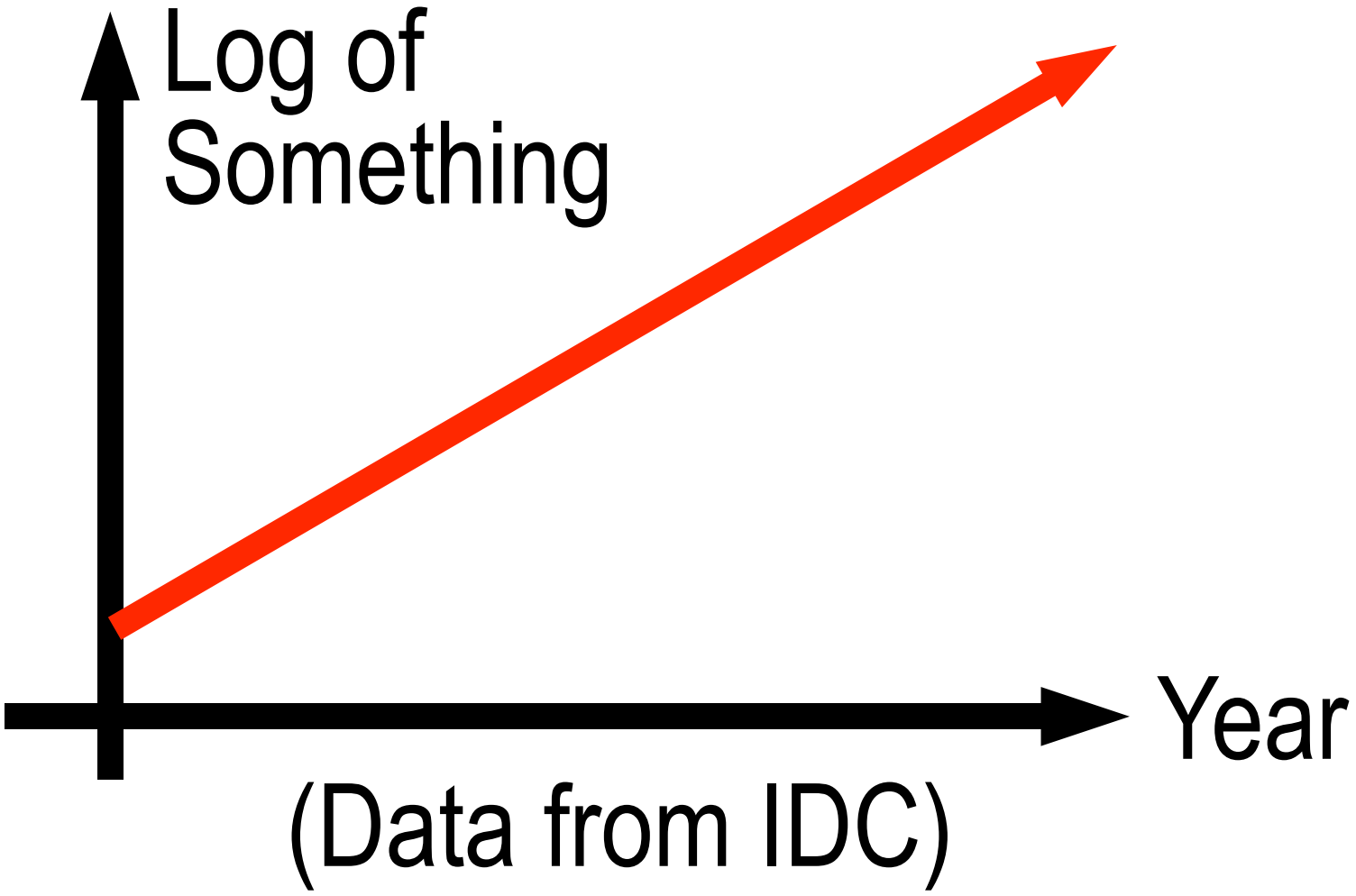
The Numbers Shortage

- It's a problem of the phone system
- It's a problem of the Internet
- Caused by ***use***, not by ***quantity***
- NANP allowed only 6X expansion
- The global phone system allows infinite expansion

The Fixed-N Approach

- Choose a large N for address bits
- when out of numbers do { **N *= 4** }
- It worked for the Internet:
  - Start with 8 bits (1822)
  - (N*=4)= 32 bits (IPv4)
  - (N*=4)=128 bits (IPv6)
  - (N*=4)=512 bits (IPv8) ad infinitum

Moore's Law for Addresses



The Variable-N Approach

- Extensible variable-length addresses
- Allows independent expansions
- Distributed, like DNS
- Requires more local smarts in nodes than what the fixed approach requires

Example: Calling a Room

- 1-step (direct) addressing makes each room use one entry of the 10-digit address space
- N-step addressing makes the entire hotel use only one entry of the address space, but the hotel needs an operator (or a PBX)
- It's convenience *vs.* efficiency

Why IPv4 has Fixed-Length Addresses?

This question is intentionally left unanswered to protect the guilty

Question: What would Jon have done about the addressing challenges currently facing us?

Answer: Jon would have advocated variable-length addressing

Mt. Whitney, CA

Jon loved hiking there

I told you so...

Last Slide