

What are Today's Digital Identities?

- Conventions associating one piece of data to another
 - > www.nominum.com to see web page
 - > "Anna Kournikova" into Google window
 - > Shell.nominum.com for SSH
 - > 160.192.177.128.in-addr.arpa for email verification
 - > pvm@Nominum.com for email
 - > pvm@a21.com to log on to Amazon
 - > Dial +1-650-381-6100 on a phone
- Anything we type or click on to identify what we want.
- The first step in any communication.

One Way to Evaluate Their Significance...

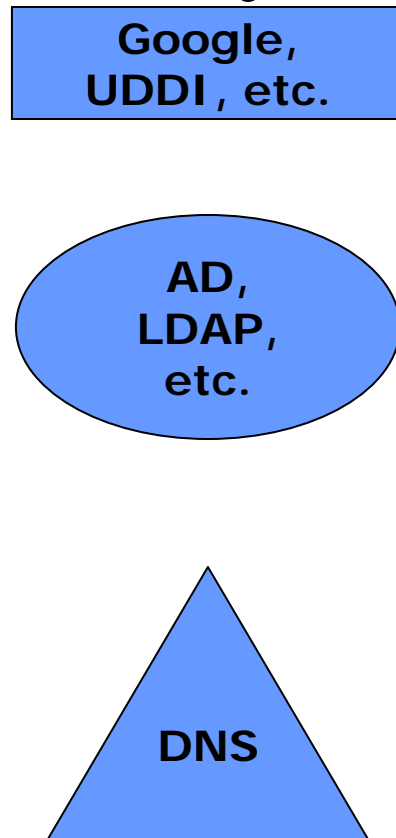
- .COM
 - > Verisign has \$7 billion market capitalization
 - > Registrar gets \$2+ per name at retail
 - > Registry (central database) gets \$6 per name
 - > Over 30,000,000 names in .com
- Google
 - > \$61 billion market cap
- Phone numbers
 - > In 2002, US phone companies, desperate for cash, raised over \$10 billion by selling phone directory operations

The technology landscape

Early 1980's
Theory:



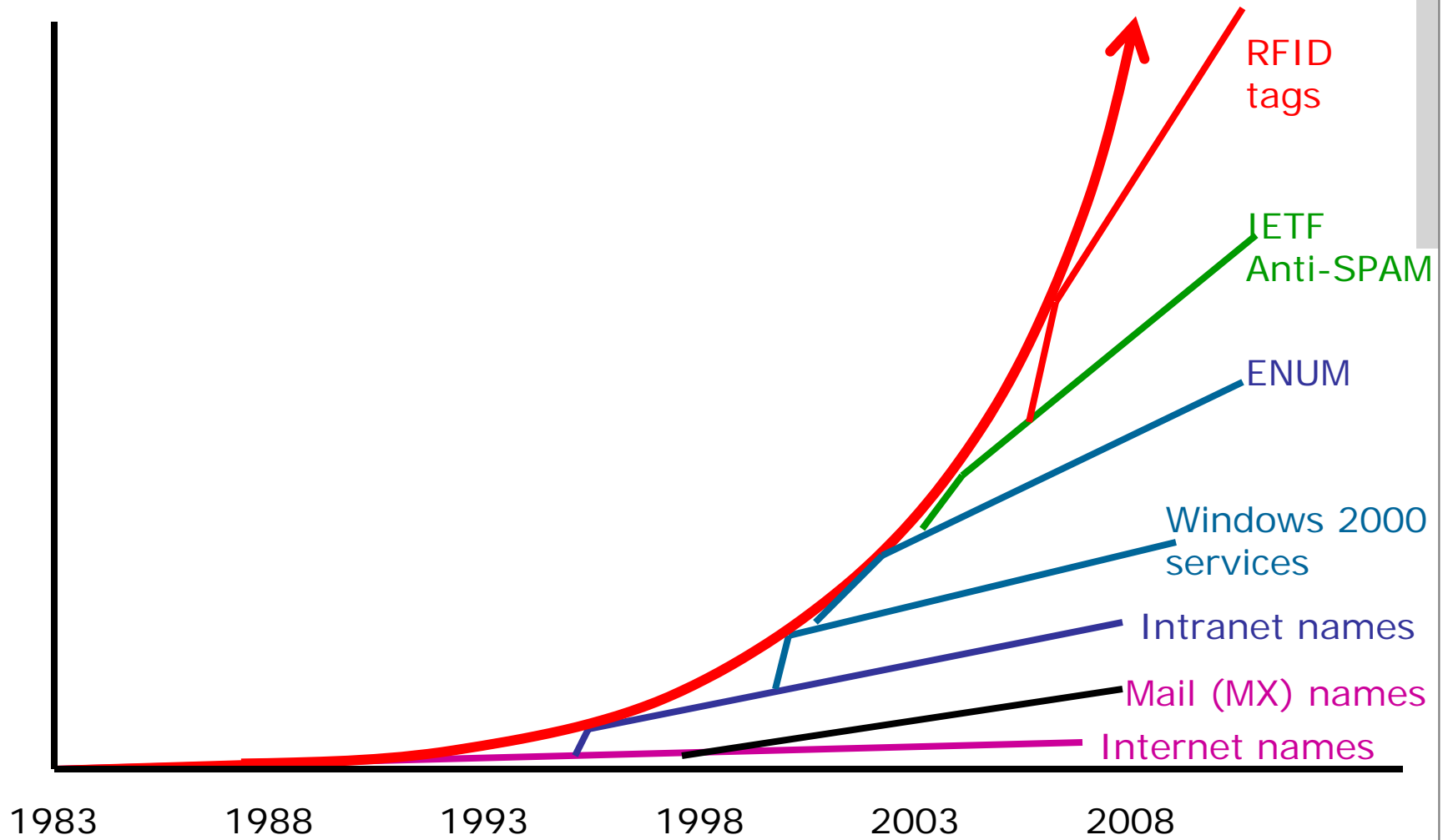
Today's
Reality:



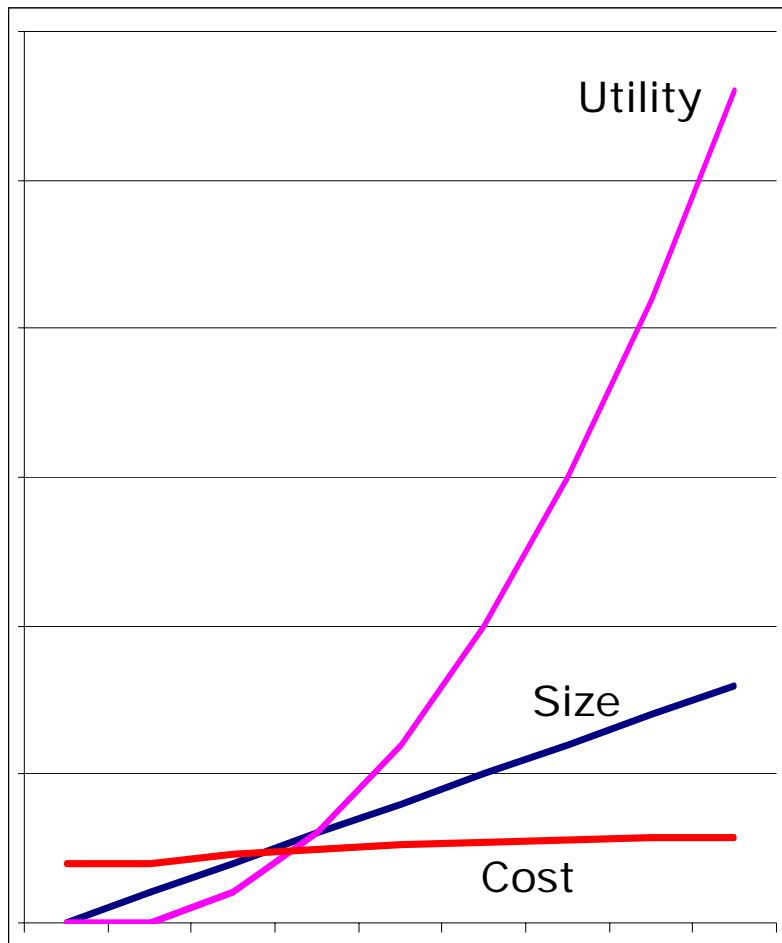
- In the beginning, theory said there would be one monolithic service – X.500
 - > Searches
 - > Lookups
 - > Schema
 - > Access Control

- In practice, there are many services & applications, with different properties, at 3 levels:
 - > Web
 - > Directory
 - > DNS

DNS use is growing exponentially



Security and Metcalfe



- Metcalfe's law says utility of network is proportional to square of number of members.
- Or utility proportional to number of potential connections.
- Challenge has been to make sure cost grows (much) less than utility and less than size if possible
- With the commercialization of the Internet, law breaks down (e.g. spam, \$)

Implications

- Keeping undesirables out is the new job for the directories
- How does my wireless USB camera talk only to my wireless USB computer and wireless USB hard drive?
- 1983 – How do I unify mail addresses?
2005 – How do I disconnect SPAM
- 2005 – How do I store the ENUM directory for VOIP?
2008 – How do I disconnect SPIT?

IS VOIP = POTS V2

- Enterprise VOIP is usually two separate, but not equal, IP networks. Is this convergence?
- Why VOIP
 - > Bandwidth is free?
- How to VOIP
 - > Dumb networks, no matter how many servers it takes in the core?
 - > So that VC-based companies can sell \$100K-\$500K boxes?

Open Source Network Technology History

- Very important to technology introduction
 - > Router
 - 1971 University of Edinburgh DCN OS
 - 1977 Fuzzball routers, later NSF backbone
 - 1981 MIT C gateway RFC898
 - > TCP
 - BBN for DEC timesharing
 - BSD for UNIX
 - > DNS
 - 1983 PDP10 root server code at ISI
 - 1984 BSD Unix implementation at UC Berkeley
 - 1986 Production

Observations on Segments

- Applications
 - > Wins on both sides
- Operating Systems
 - > Usual Microsoft vs Linux *et al* issues
- Infrastructure (DNS & DHCP)
 - > Size matters
 - > Diversity matters
- Routers
 - > Low end is consumer product
 - > High end is both hardware ("milk") and software ("wine")