DAOLI NAME

How to Connect Smart Dusts

DaoliName Service

May 2019

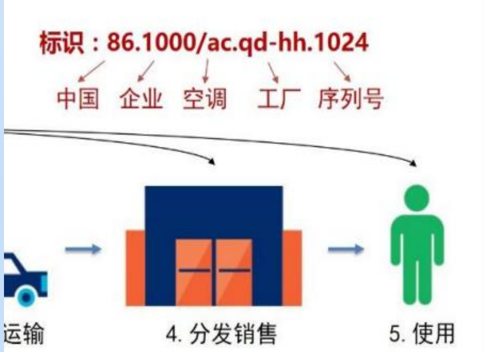
Smart Dusts Connect?
May I know your name dust?

- Once upon a time, like father like son in the name of, ..., postcode, library study, inventory management, ..., domain names, ...
- 1992: DARPA-CNRI proposed “Handle System”
- 1994: DOI (Digital Object Identifiers) implementation
- 2003: IETF Handle System RFCs
  - RFC3650 Handle System Overview
  - RFC3651 Handle System Namespace and Service Definition
  - RFC-3652 Handle System Protocol (ver 2.1) Specification
- 2017: Chinese IoT Name Resolution Whitepaper

工业互联网产业联盟
Alliance of Industrial Internet

工业互联网标识解析—
产品追溯白皮书

（2017年）



Common Need: Good IDs = structured, can be scalably managed

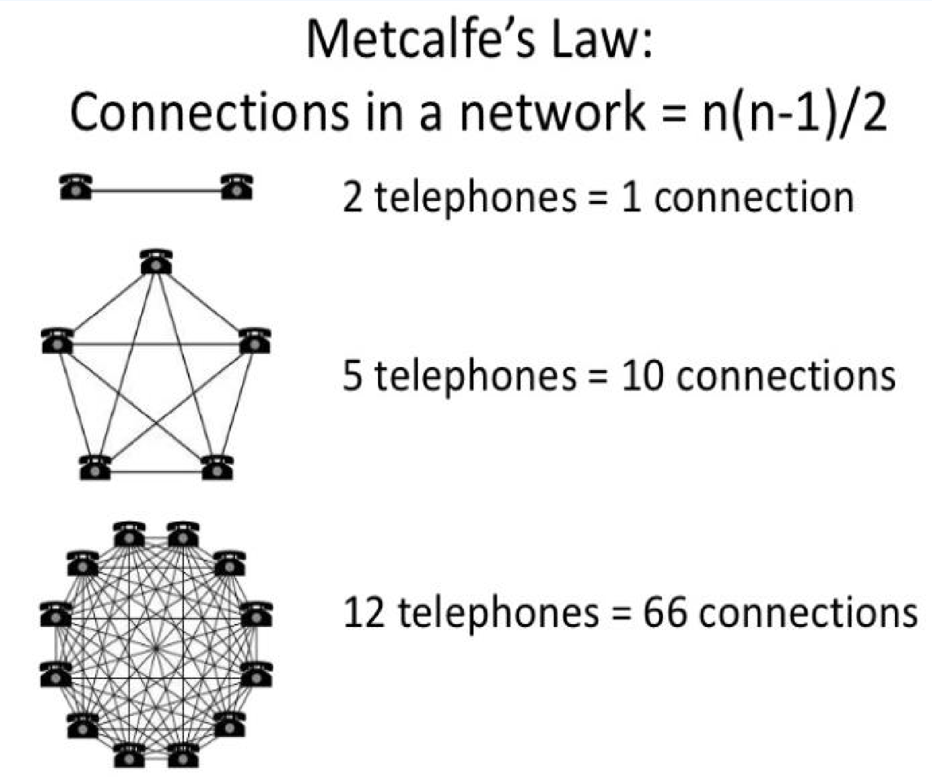
Peer-to-peer Connection Multiply^2

One phone is useless

Two phones are very useful, no wonder cryptographers are so addicted to study Alice and Bob

Metcalfe's Law: n phones p2p connection = n^2 multiply revenue for, e.g., “The Phone Company”

However unless phone numbers are structurally organized, line plugging girls would have been in nightmarish job



Metcalfe’s Law:

Connections in a network = n(n-1)/2

2 telephones = 1 connection

5 telephones = 10 connections

12 telephones = 66 connections

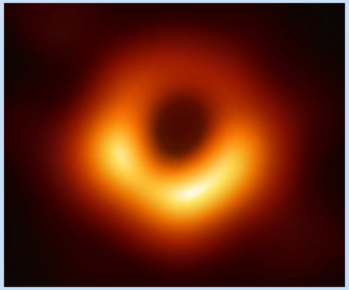
Mandate Starting 2019: Smart Dusts Must Know Each Other Securely

With dusts already smart, crypto does authentication
Public Key: n nodes authentication complexity = n

- Because random private key → random public key, in a close system, e.g., BTC, blockchain, peer node having random ID features anonymity! Who is Nakamoto? p2p = r2r (r = random)

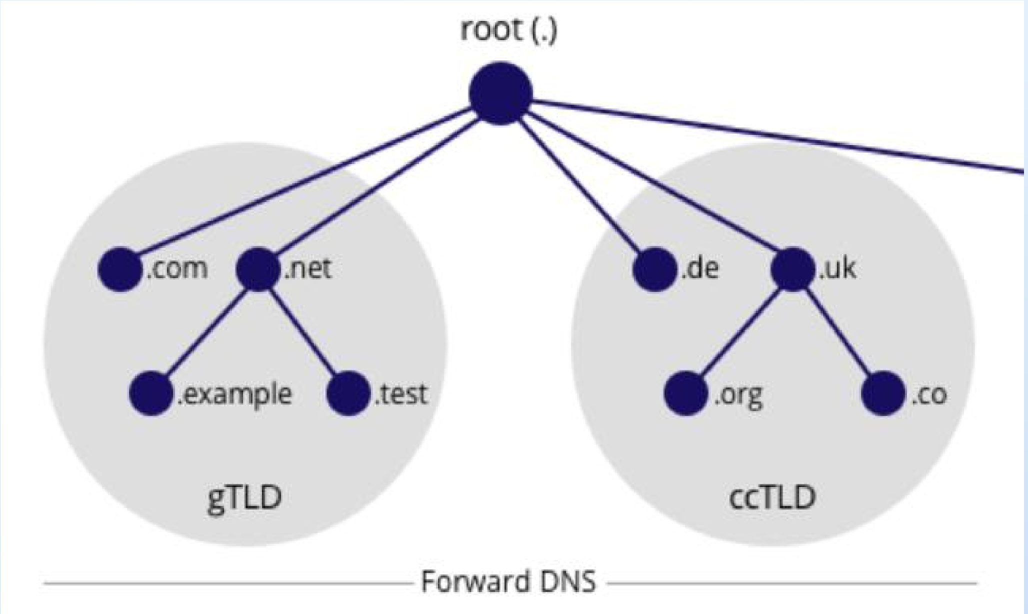
- Open system must use good IDs. PKI: CA binds a good ID to random pub key. A cert may include all revoked certs in the history. PKI has never won clients (Trust CA, not the figure in the right!)

- Identity Based Crypto: A good ID is a public key! Need Private Key Generator (PKG), centralized gravity for attacks! Why not seen any semblance of impact since a promising proposal in 2000?



An Example of Good IDs

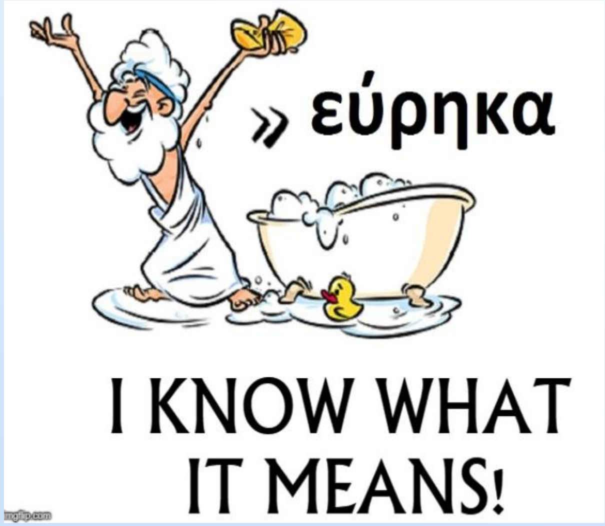
Domain Names: well structured, globally searchable, DNS binds DN to more random looking IPs



DNS is an interactive query-answer system, pyramid sale structure and management efficiency, and the service enjoys natural monopoly

ID as a Public Key (IDaaPK) Inspiration

- Consider a DN = public key, a client can verify binding (DN, IP). IBC can offer a good DNS security solution
- Observe, a returned IP can also be a public key, though looking random, bilinear pairing can verify the binding
- Q: What is one more IPaaPK for?
- Eureka! The private key behind this IPaaPK needn't be generated by PKG anymore!
- The centralized gravity for attacks is dispersed



DaoliName IDaaPK Service

Distributed consensus ledger fixation of "Trustlessly Agreeable Diffie-Hellman Quadruple" (TADHQ)

- TADHQ is publicly verifiable by evaluating bilinear pairings inputting (IDs, IDaaPKs) as elliptic curve points
- No one can alter the TADHQ fixation once entering the ledger
- No CA, no PKG, no centralized single point of attack or failure
- Peer-to-peer, e.g., mobile phone VPN overlaying social network
- Service handles no secret and can be easily elastically scaled in world wide distributed replicas

No Central Authority

The Future is Private but NOT Centralized

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