Analysing IP Mobility Protocol Deployment Difficulties

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The Positive

- We have the specifications for full functionality mobility support
- Support a range of networking scenarios (IPv4, IPv6, mixed, networks, hosts, unchanged hosts, bootstrapped, hierarchical, optimized, …)
- Many implementations, commercial & academic
- Some deployments

The Negative

- The IETF mobility protocols not in large-scale use in the most popular link layers (2-4G, WiFi)
- Does not exist as standard feature and turned on by default on your MAC, PC, or Linux computer
- The general experience about switching to another network attachment is that your IP address changes

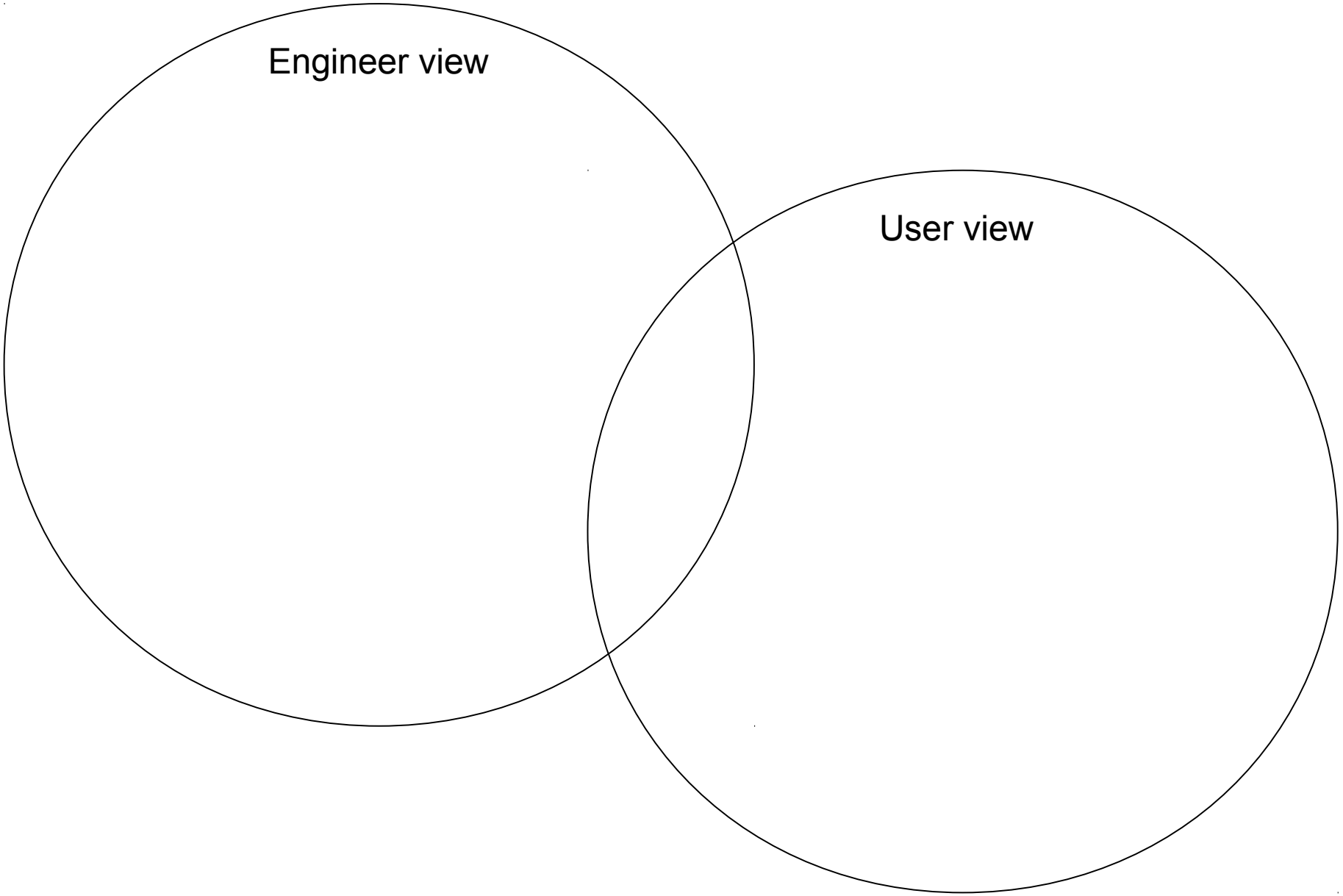
For some reason, Mobile IP is not helping the world solve the problem it was intended to solve

Why?

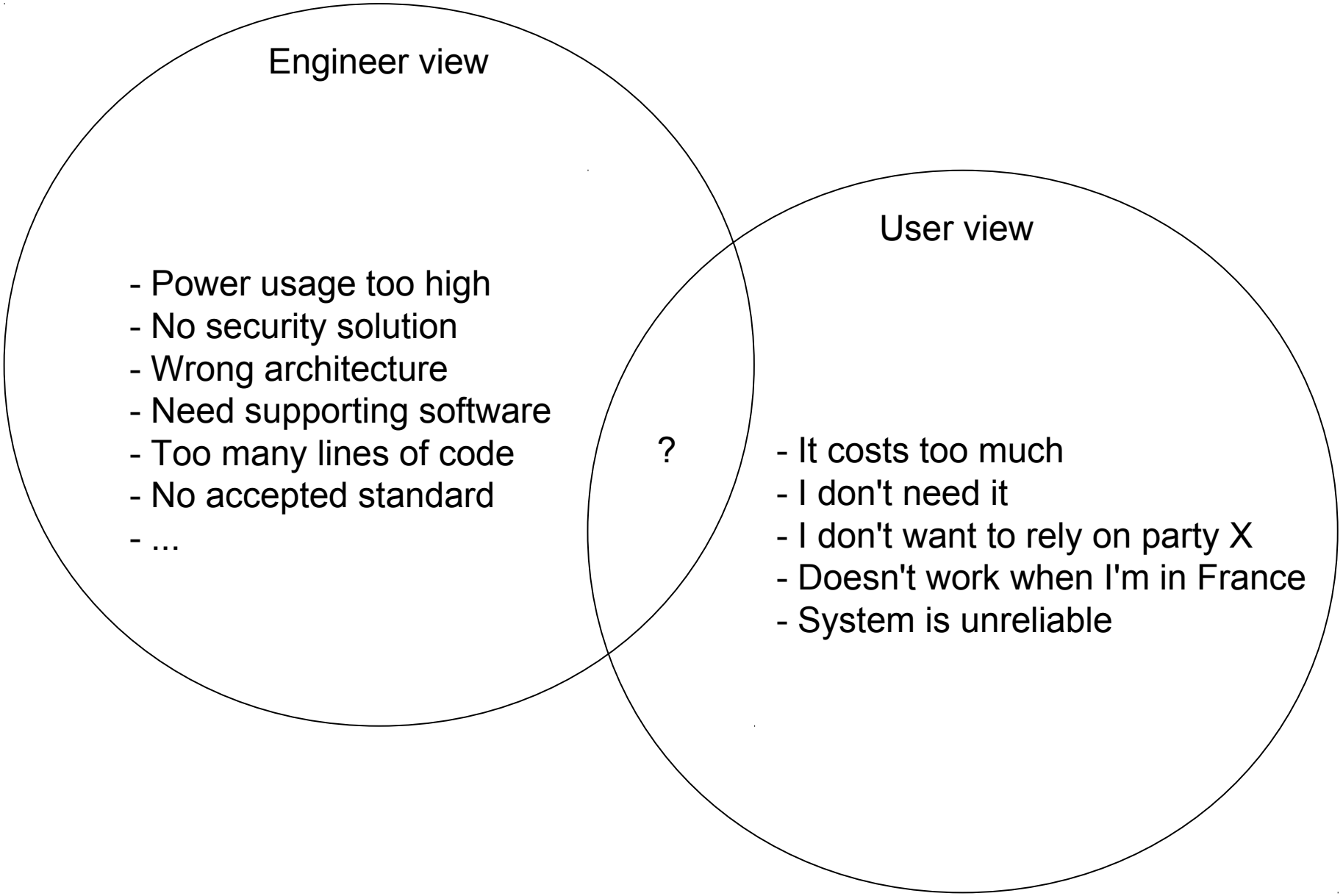
Some Explanations I Heard

- That header is too long
- I cannot pay for the signaling message
- We don't trust the security
- It needs to be distributed
- The implementation is too complex
- The vendors want to do their own thing

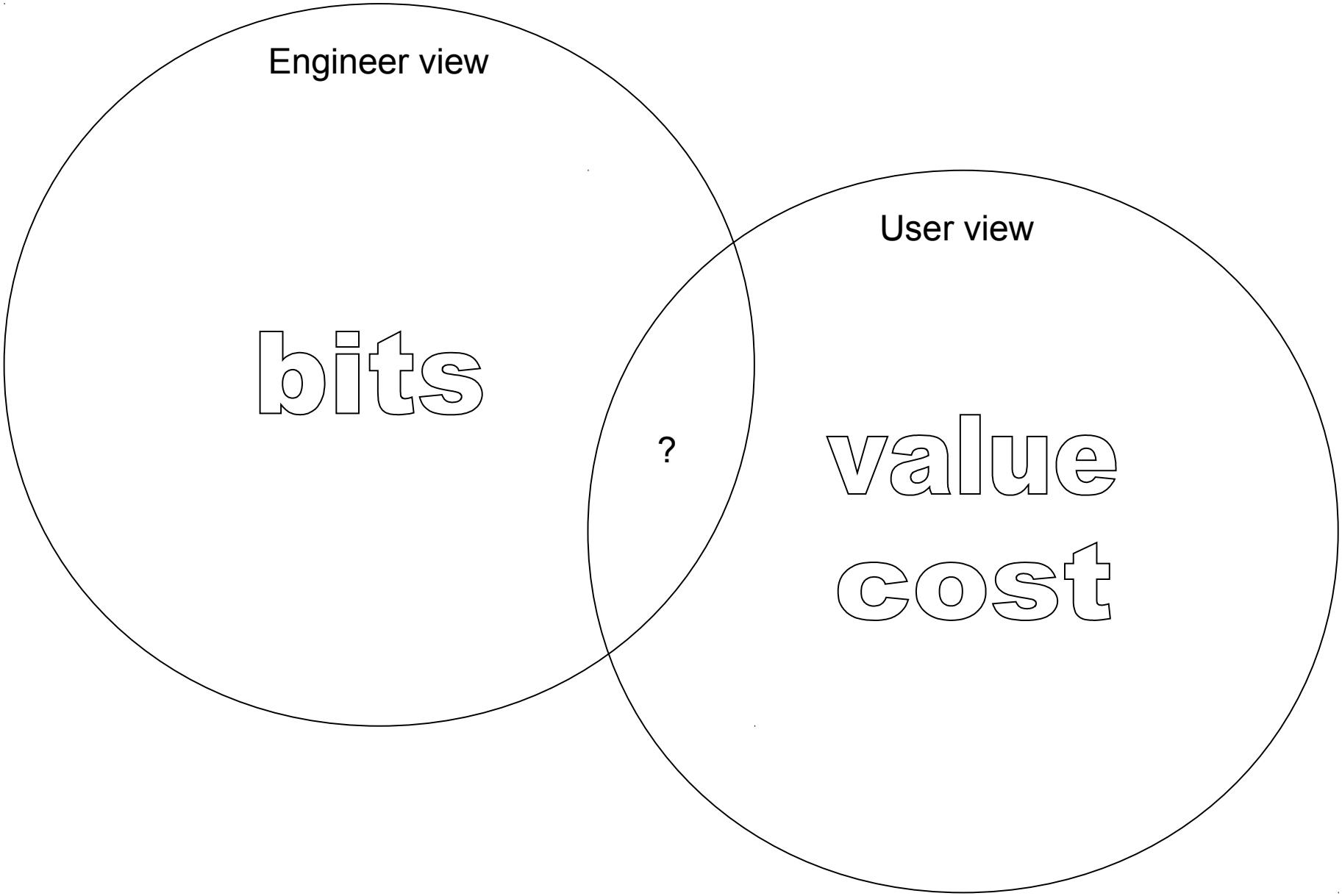
Engineer vs. User Views



Engineer vs. User Views



Engineer vs. User Views



Some Real Issues that Affect Deployment (in My Opinion)

- Competing solutions elsewhere in the system
- Unclear motivations to provide the service
- Affects too many parts in the stack
- Too many dependencies

Competing Solutions

- Most link layers deal with local mobility aspects
  - IETF WLAN & 802.11 access systems
  - 3GPP cellular networks (actually IP layer mobility!)
- So within those networks there is no need for additional mobility support
- Most applications today have no trouble surviving address changes
  - They had to, because there was no Mobile IP
  - They had to anyway, because of NATs
  - Only geeky stuff needs stable IP addresses
    - E.g., SSH (but google for Koponen-Eronen-Särelä)
- So where do I need mobility?

Unclear Motivations to Provide the Service

- Why am I setting up a home agent?
- Administrative, user management, traffic filtering, and bandwith cost
- A user can be connected by fiber and do all his or her P2P downloading via the home agent at 100 Mbit/s or 1000 Mbit/s
- If I am the network provider for, say, cellular network service, why am I making it easy for users to not use my service? What's in it for me? Does this increase my revenue?

Affects too Many Parts of the Stack

- Typically needs a kernel-level modification
  - IPsec-integration is a special case of this more general issue, but technically even harder
- If I deploy some software that needs Mobile IP service, it is not easy for me to replace system components underneath
  - But I can do something in my app easily

Too Many Dependencies

- Client software
- Operating system modifications
- Home agent service

- Application developers, operating system vendors, and operators working together?

Conclusions

- As usual, the issues are practical and business related
- But most of us who work in developing the technology are focused on technical improvements
- If I can wish for an ideal technical solution, it would be all in user space, run on top of UDP/TCP, allocate home agent service just like DHCP allocates an IP address today, handle connectivity changes like MP-TCP
- But it is harder to solve the business issues