



# An Architectural Response to Real-world Demands

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# Hypothesis

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- Given the increasing integration of the Internet into the real world, it is worth revisiting its core design principles.
  - The hardest problems to be solved do not derive from technical deficiencies but from a better understanding of real world requirements.
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# Three high-level tenets

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- Design for change.
    - Not motherhood--it has costs.
  - Controlled transparency and trust.
    - Unmitigated transparency is no longer workable.
  - Acceptance of conflict of interest.
    - Design to tolerate tussle, not to resolve it.
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# A first topic--packets

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- Our conclusion: fine-grained multiplexing is a good idea that has passed the test of time.
    - Design for change: +
    - Tussle: ?
  - Missing: architecture for aggregates.
    - Triggers an erroneous call to replace packets.
  - Later: the stateless faith
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# Security

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- Need a new security architecture.
    - Disclosure and integrity among trusting parties is not the hardest problem.
    - Control of bad guys and what they do is.
      - Theft of service, denial of service, end-node attack
      - Communication among untrusting parties.
  - Implication: must use degree of shared trust to regulate transparency.
    - Transparency: -
    - Packets (stateless) make it harder.
  - Implication: must have an approach to identity.
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# The power of understatement

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- The weak semantics of the Internet has benefited us.
    - Permits operation over diverse infrastructure.
    - Permits creative use of “raw” capability.
  - This flexibility is eroding.
    - Drive to the common denominator.
    - Security.
  - Trust-moderated transparency again.
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# Naming and addressing

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- Separate location and identity.
    - Helps mobility: + (well known)(all kinds)
    - Hurts security: - (get over it)
    - Adds complexity: what names are needed for identity?
      - Thesis: a single, global, universal namespace of identities is *NOT* needed.
  - FARA (a later talk) argues that this separation can be achieved.
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# An application perspective

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- Study what they do.
    - They exploit generality.
    - But selectively.
    - They trade what they choose to exploit for the reach they achieve.
  - Suggests a principle: accept that “non-general” nets will be attached to the edge of a general “Internet” core.
    - “Architect” this. Implies application-level state.
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# Help the application designer

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- We don't help the application designer enough.
    - Praising transparency is not much help.
  - Help the application designer think about:
    - What transparency the app needs.
    - What is the desired scope of the app.
    - What naming and addressing is needed.
    - What is the “end to end” analysis.
    - What relay architecture is needed.
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# Reconsider the stateless faith

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- We are drifting away. Design the future, don't drift from the present.
  - Issues:
    - Controlled transparency
    - Theft/allocation of service
    - Region structure
  - Approach:
    - End-system reconstituted soft state.
      - Note: a tussle space
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# Note the unstated

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- Things we took into account.
  - Mobility
  - Sensor nets
- Things we did not take into account.
  - An intermittently connected core.