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# A Layered Naming Architecture for the Internet

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# Introduction

- Basically a literature survey which gathers existing research and propositions together
  - DNS suits poorly for naming data and services
  - Proposes that naming and resolution should be divided into three layers instead of one
    - 1) services and data become first class objects
    - 2) accommodate mobility and multihoming
    - 3) integrate middleboxes (NATs, firewalls etc.)
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# Design Principles

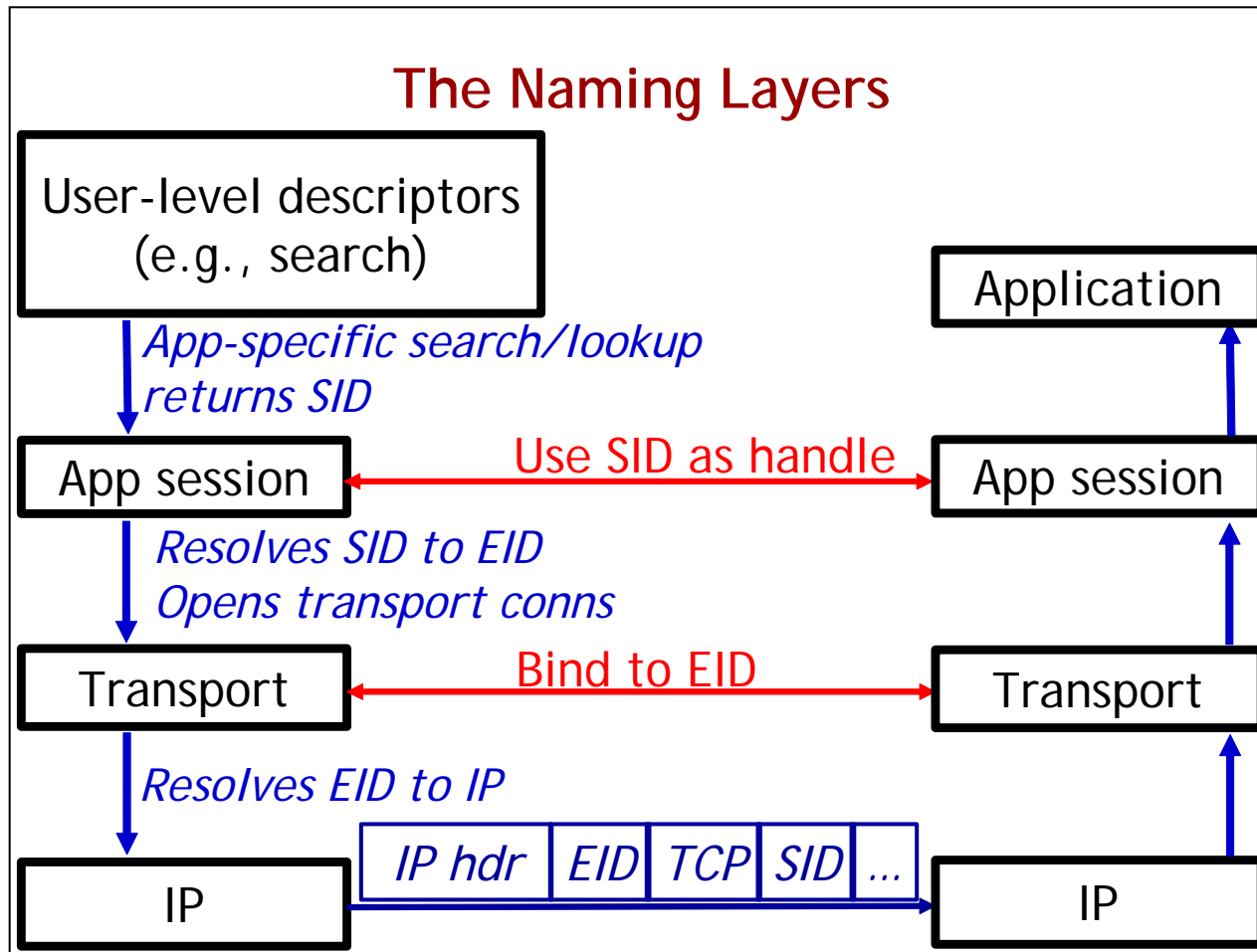
- Names and protocols
  - Namespace and network elements
  - Resolution and delegation
  - Sequences of destination
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# Names and protocols

- Names should bind protocols only to the relevant aspects of the underlying structure
  - => Name services and hosts separately
  - Service Identifier (SID): host independent service or data name
  - End-point identifier (EID): location independent host name
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# The naming layers



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# Namespace and network elements

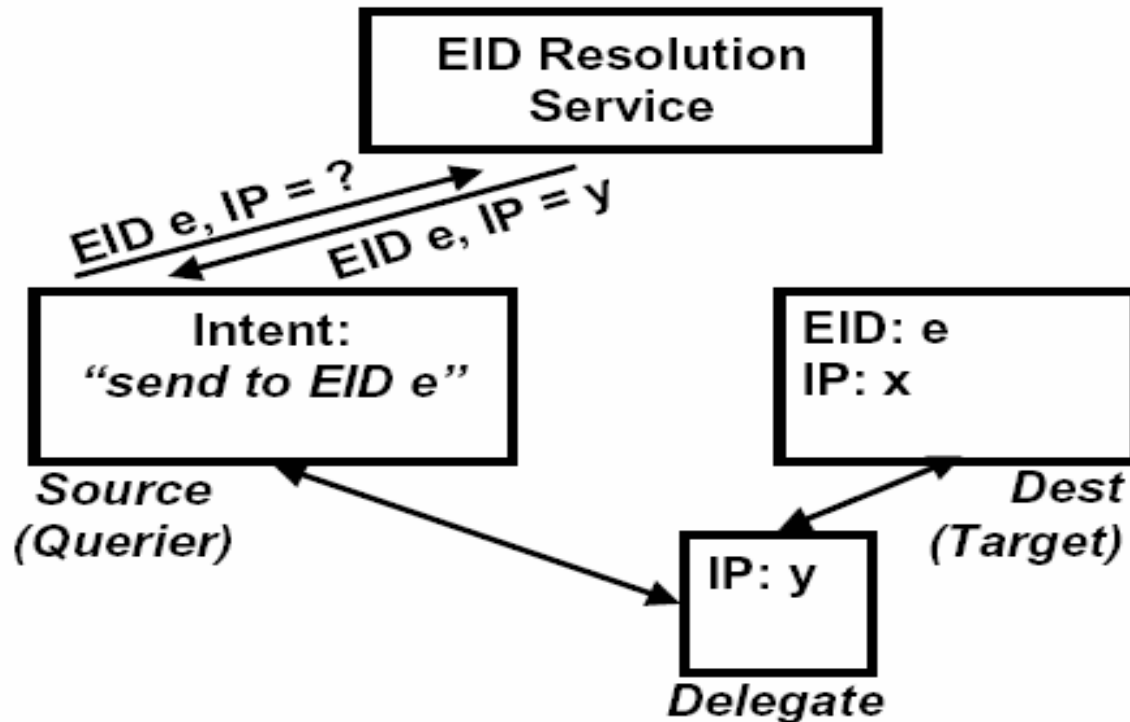
- Names should not impose arbitrary restrictions on the elements to which they refer
  - => Flat namespace!
  - Large flat namespace can be used to name anything
  - Flat namespaces can be scalable resolved in DHTs
  - Flat names are not user-friendly
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# Resolution and delegation

- A network entity should be able to direct resolutions of its name not only to its own location, but also to chosen delegates
  - Delegation enables the use of middleboxes such as firewalls and NATs
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# Resolution explained



**Figure 1: EID-level delegation.** A source queries on a given EID and is given the IP address of a delegate. The source could also be given the delegate's EID or multiple EIDs (not shown).

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# Resolution continued

- Given an application  $a$ , host  $h$ , service or data which SID is  $s$
  - Application gives  $s$  to the SID resolution layer
    - Receives one or more EID triples (EID, transport, port)
  - Example: if  $s$  represents a web server, then the triple might be (EID of the web server, TCP, 80)
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# Sequences of destination

- Destinations, as specified by sources and also by the resolution of SIDs and EIDs, should be generalizable to sequences of destinations
  - Loose source routing should be available also at the endpoint and service layers
  - Path could be determined by a series of EIDs
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# Related work

- Most direct inspiration: HIP + *i*3 + SFR
    - Prototype: Delegation-Oriented Arch. (DOA)
  - EID proposals: Nimrod, HIP, Peernet
  - Mobility/multihoming: Mobile IP, IPv6, Migrate
  - Intermediaries: IPNL, TRIAD, UIP, P6P, MIDCOM
  - SID-like proposals: URNs, Globe, ONH
  - Other architecture proposals
    - PIP, Nimrod, IPv6, Active Networks, ...
    - FARA, Smart Packets, Network Pointers, Predicate Routing, Role-based Architecture
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