SAVI Design Taxonomy and Analysis
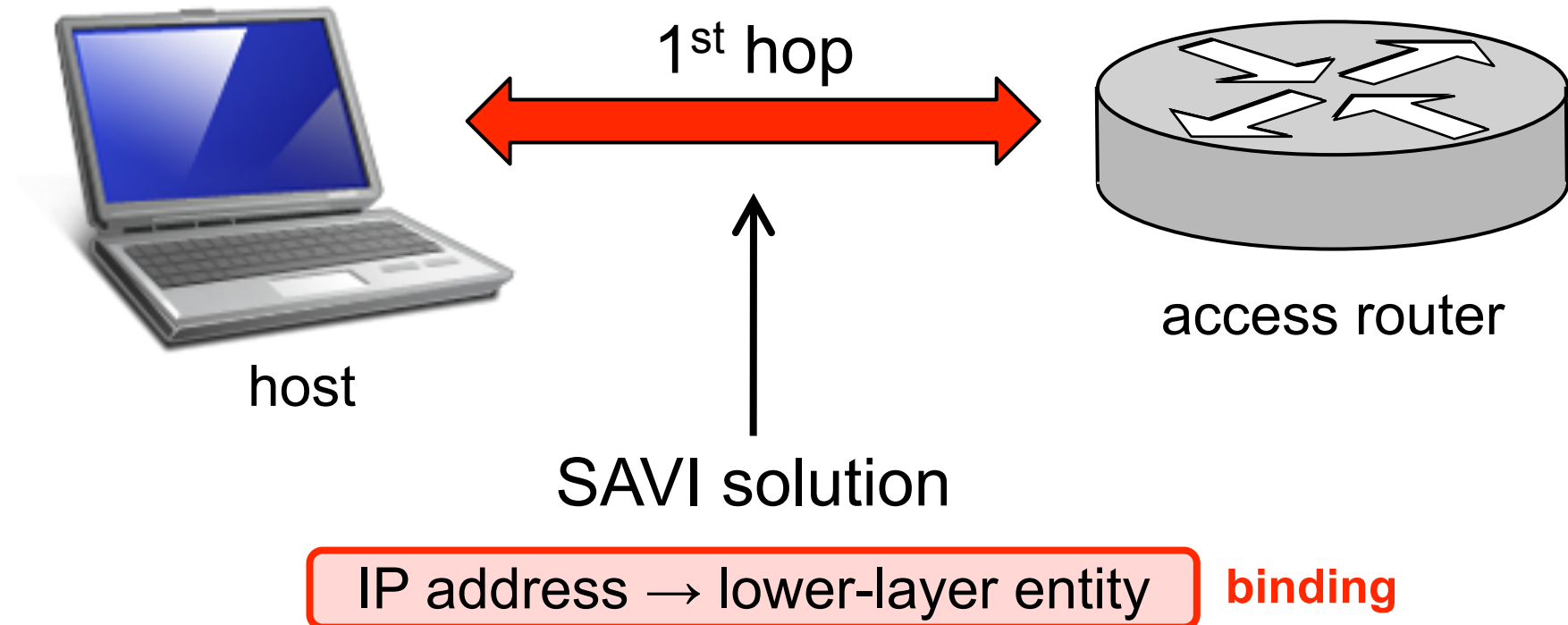
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- challenges
- framework & components
- design freedom
- analysis

Framework for SAVI Solutions

1st hop

host

access router

SAVI solution

IP address → lower-layer entity **binding**

1. derive legitimate IP address from on-link traffic
2. bind legitimate IP address to lower-layer entity
3. enforce binding

Functional Components

binding

association between IP source address and lower-layer entity

binding anchor

lower-layer entity in a binding

binding verification

method for verifying a binding

binding cache

memory that stores verified bindings to avoid repeated binding verification

binding conflict

when a packet's IP source address is in binding cache, but with different binding anchor

binding conflict resolution

method for handling a binding conflict

Degrees of Freedom

which binding anchor?

- switch port
- link layer address

which binding verification?

- check sending host (direct)
- ask other hosts (indirect)

which binding conflict resolution?

- drop packets that cause a binding conflict
- re-verify on binding conflict

Challenges for SAVI Solutions

- multiple IP addresses per interface, or address translator

- multiple link layer addresses per interface

- host mobility at link layer

- hosts with multiple interfaces on same link, or anycast addressing

- routers

SAVI solution can be "default-on" only if it never disrupts legitimate traffic despite these challenges

Analysis

binding verification	binding conflict resolution	multiple IP addresses / address translator	multiple link layer addresses	mobility at link layer	multiple interfaces on same link / anycast addressing	routers
check sending host (direct)	drop packet	yes	yes (switch port) / no (L2 address)	no (switch port) / yes (L2 address)	no	no
	re-verify binding	yes	yes	yes	yes	no
ask other hosts (indirect)	drop packet	yes	yes (switch port) / no (L2 address)	no (switch port) / yes (L2 address)	no	yes
	re-verify binding	yes	yes (switch port) / no (L2 address)	yes	no	yes

binding anchor