Traffic-engineering-compatible multi-homing with HIP & Six/One

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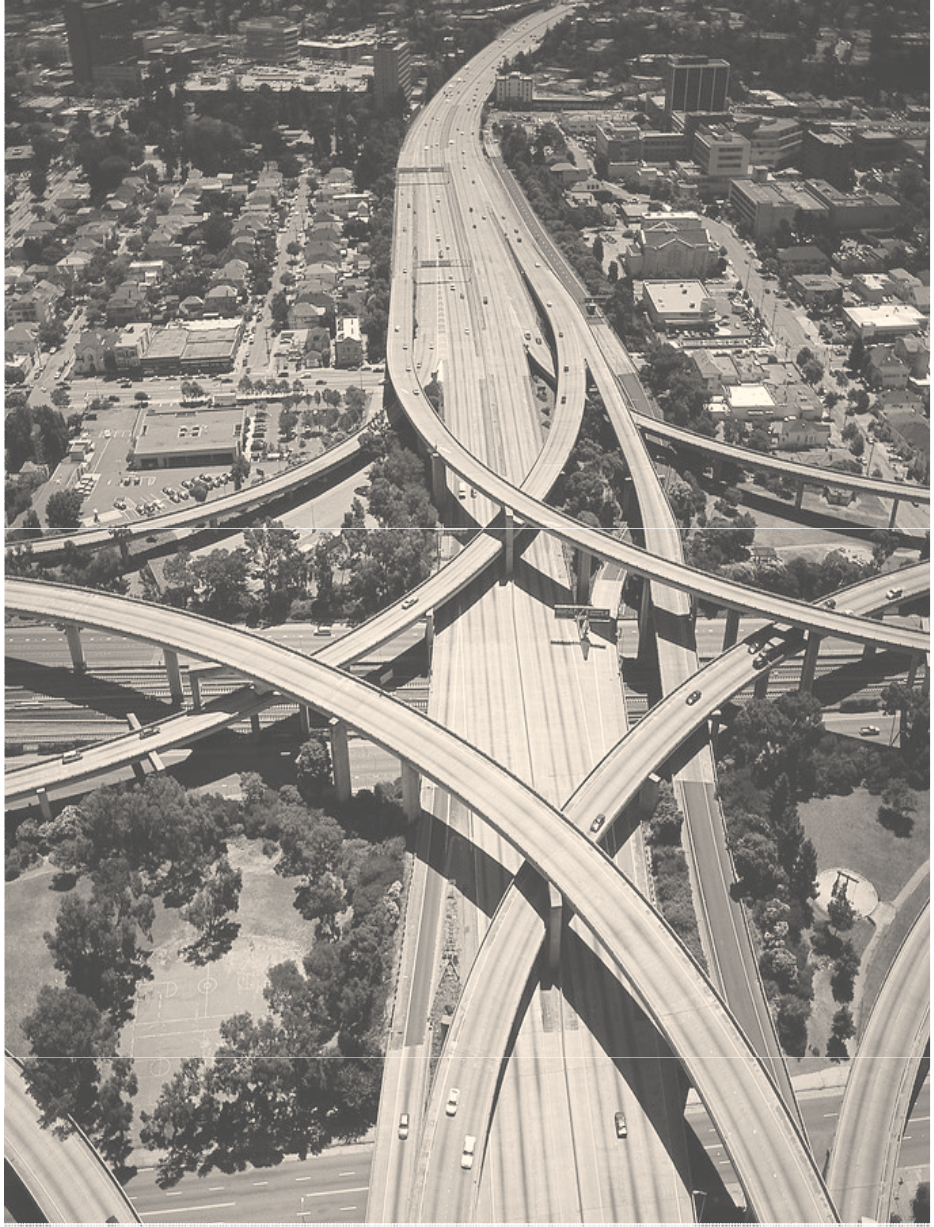
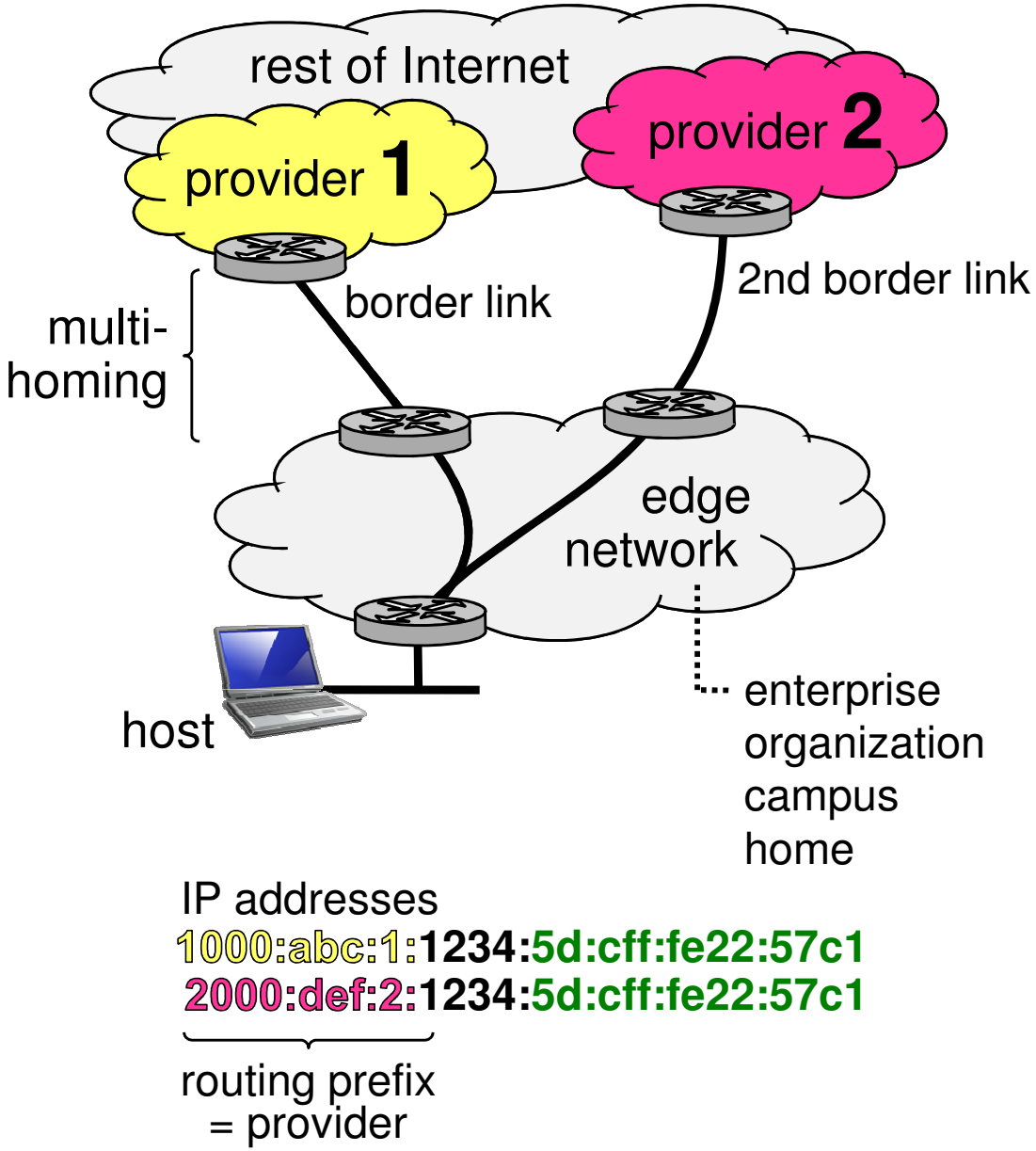


Limits in HIP multi-homing

Multi-homing with Six/One

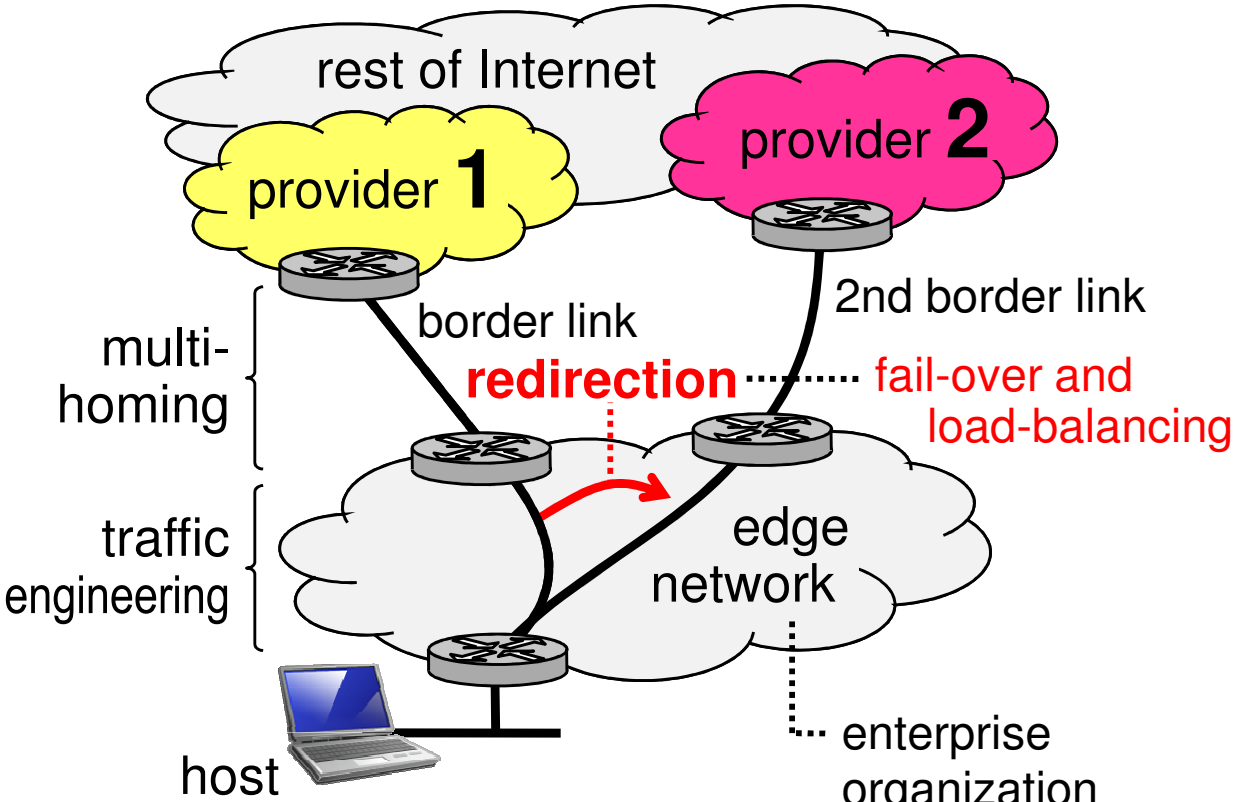
Combined Six/One & HIP

Traffic Engineering in Multi-Homed Edge Networks



- HIP multi-homing extensions do not allow traffic engineering
  - IP address encodes provider
  - Host selects IP source address
  - ⇒ Provider (= border link) fixed
- Provider selection by edge network desired
  - E.g., based on network load
  - Requires IP source address enforcement by edge network
  - Six/One multi-homing protocol supports this
- Integrate Six/One into HIP

Traffic Engineering in Multi-Homed Edge Networks



IP addresses
1000:abc:1:1234:5d:cff:fe22:57c1
2000:def:2:1234:5d:cff:fe22:57c1

routing prefix
= provider

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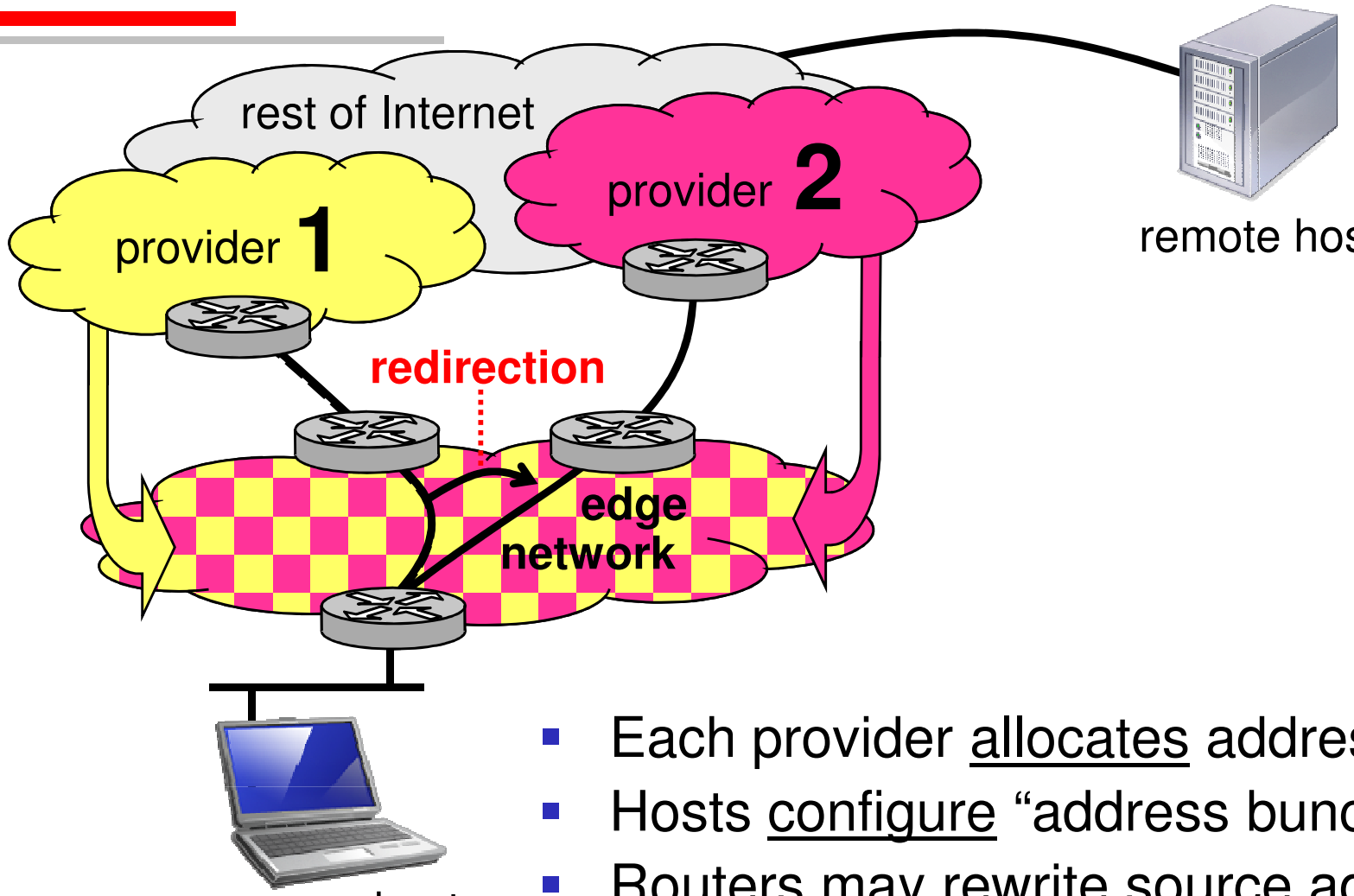
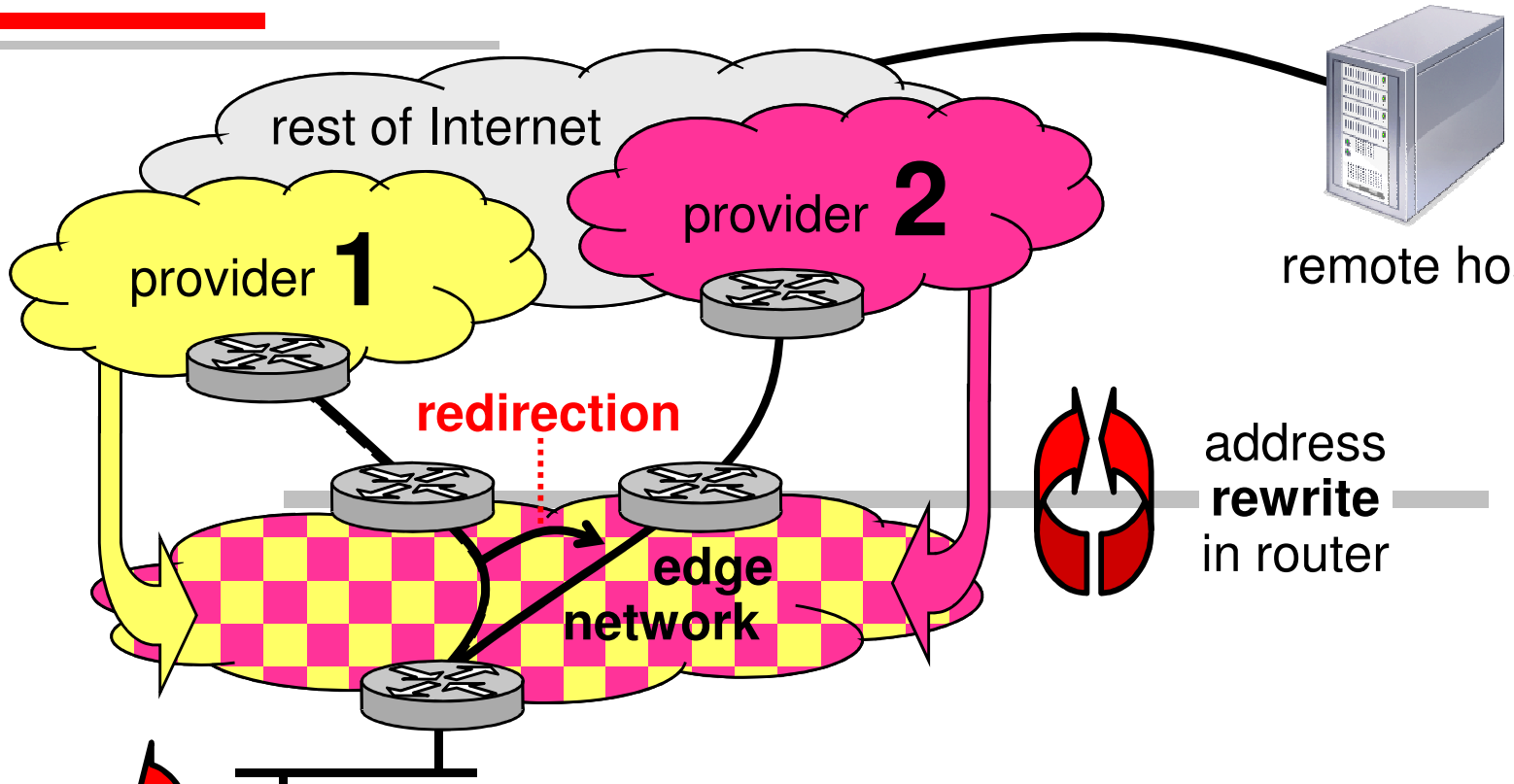
Six/One in a Nutshell



- Each provider allocates addresses
- Hosts configure "address bunch"
- Routers may rewrite source address
- Hosts recognize rewrites and adapt
  - Address mapping at hosts' IP layer
  - Address ownership verification via crypto interface ID in address bunch

Six/One in a Nutshell



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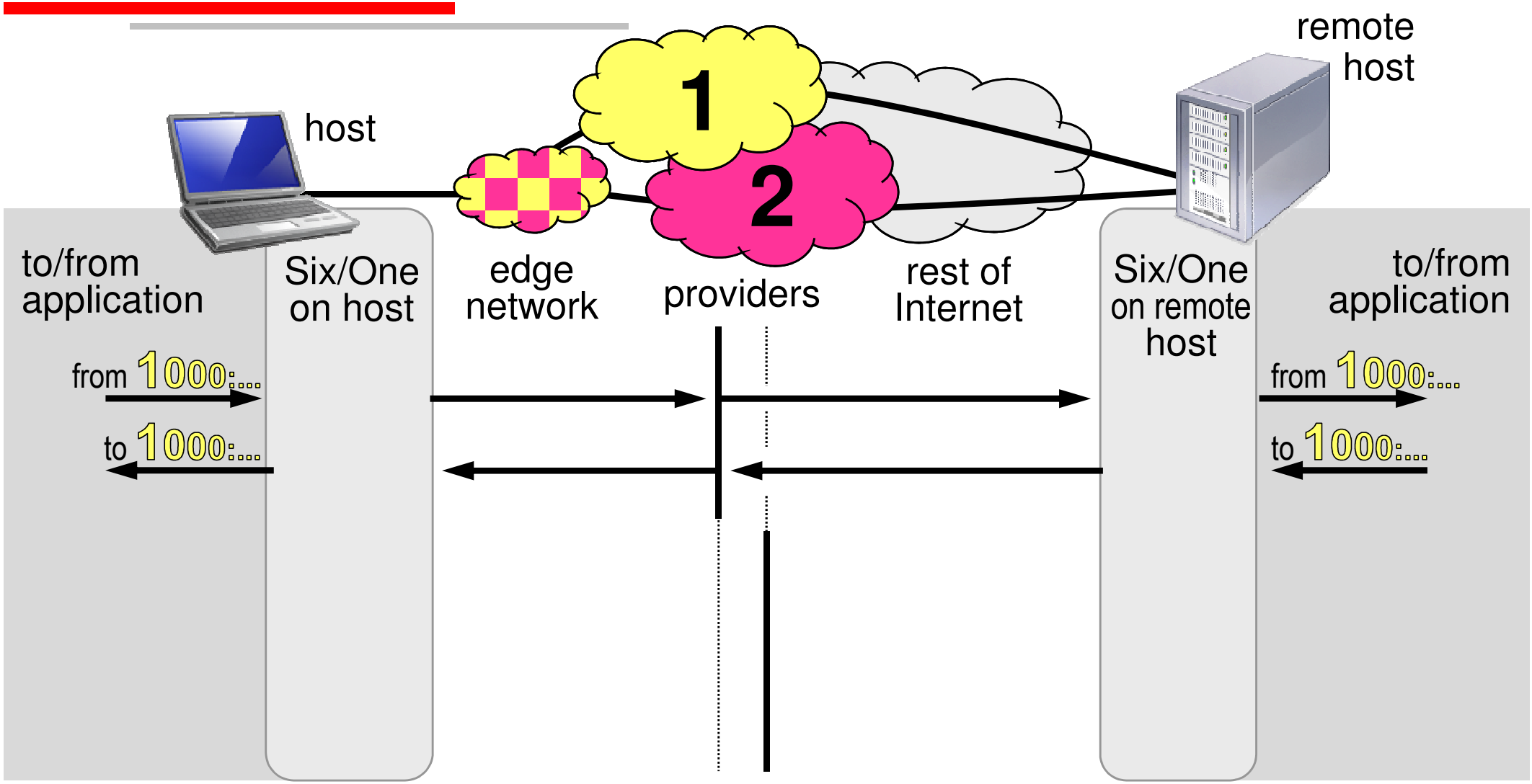
Six/One: Mapping and Rewriting in Detail



Case 1: no rewriting

- Host selects source address
- It thereby suggests provider
- Routers accept host selection

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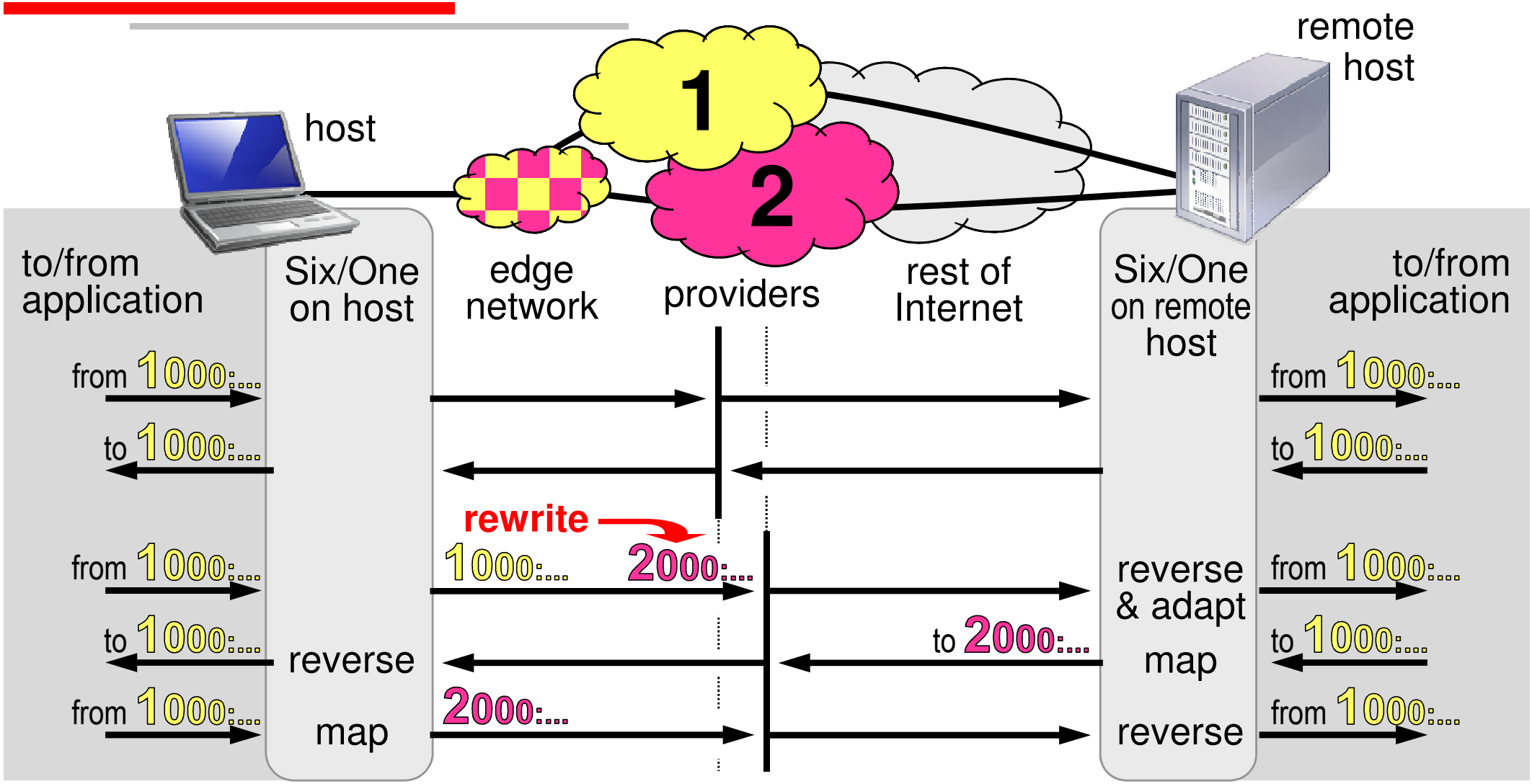


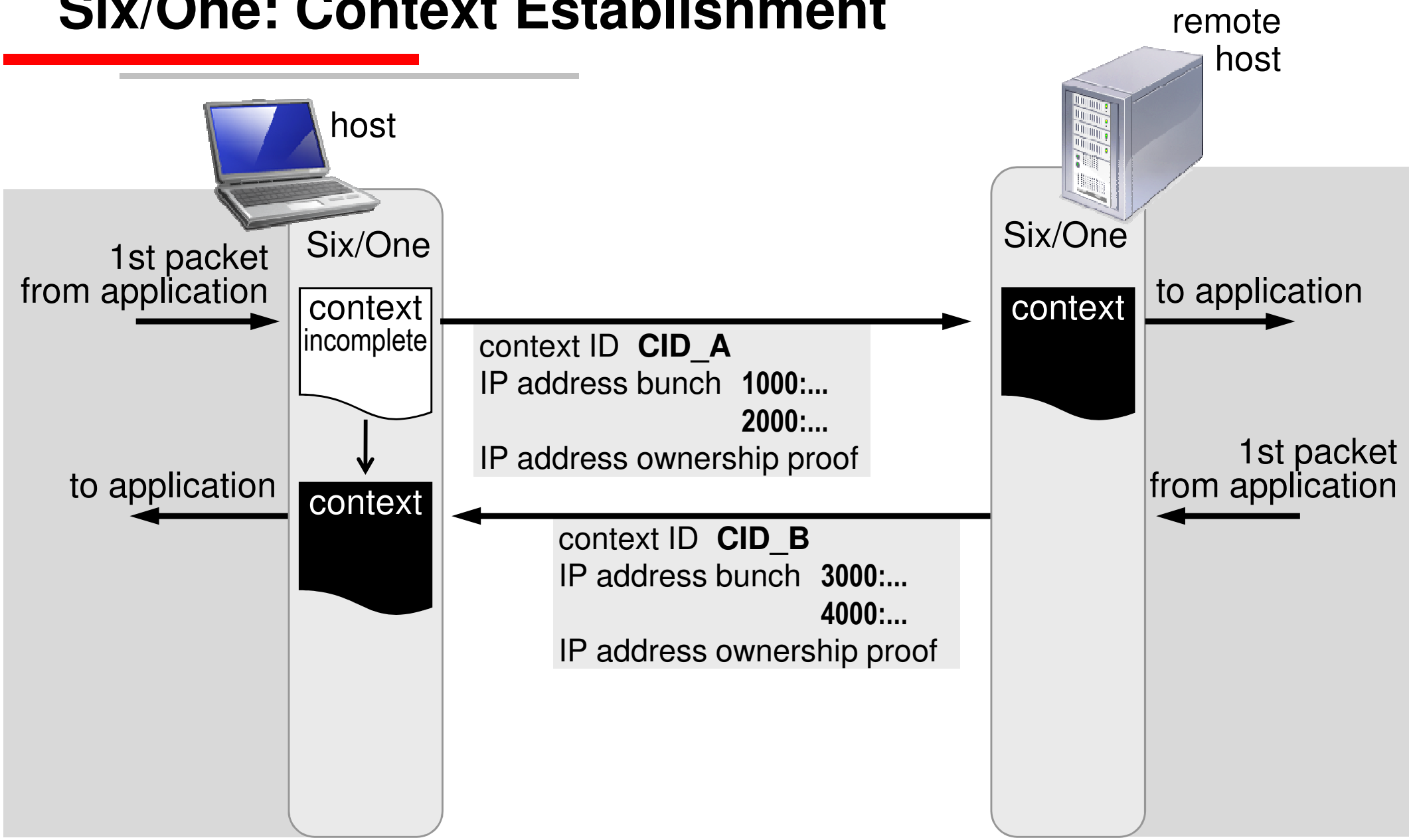
Case 1: no rewriting

- Host selects source address
- It thereby suggests provider
- Routers accept host selection

Case 2: rewriting in edge network

- Router rewrites source address
- Hosts learn new address and adapt
- No address change in application

Six/One: Context Establishment



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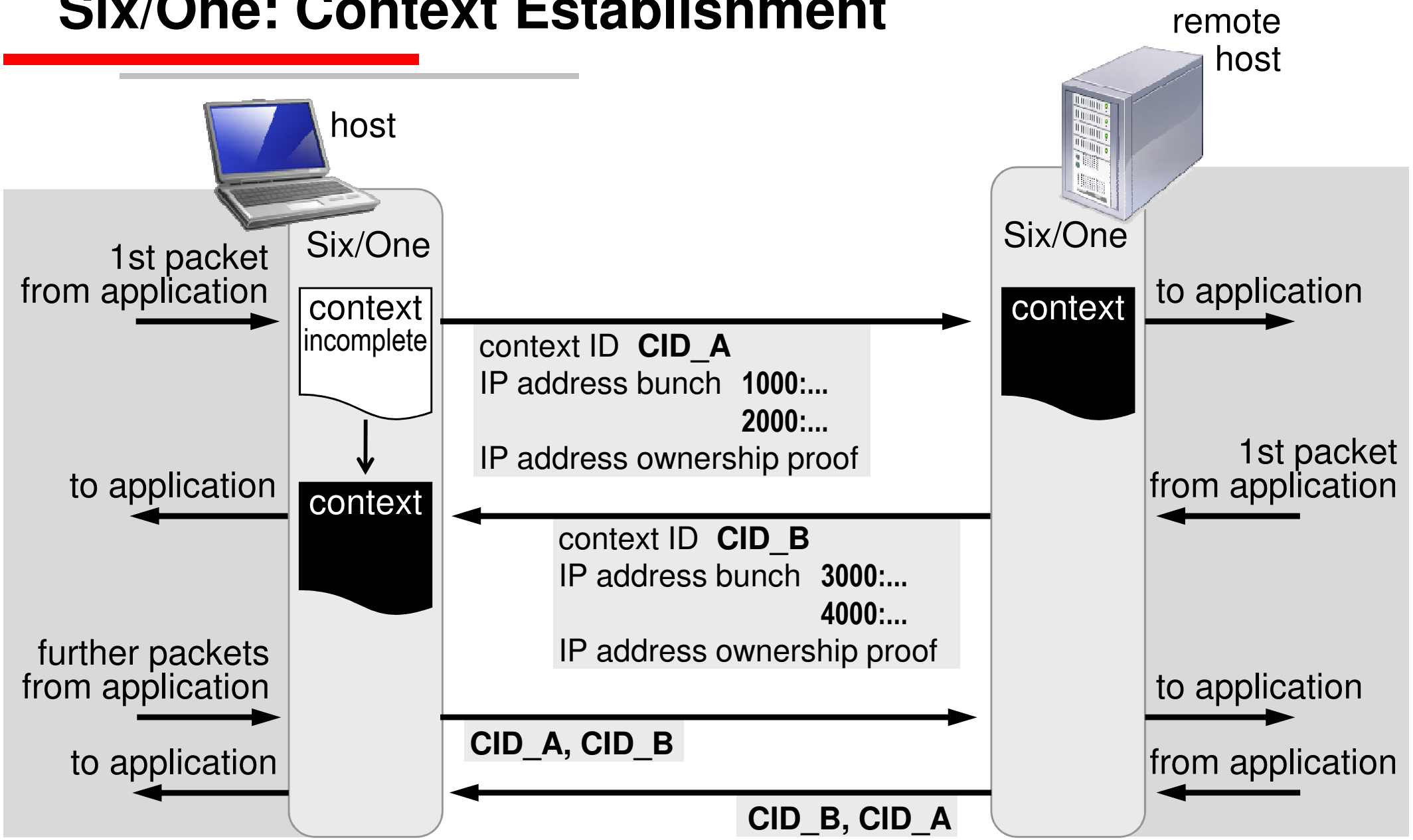
Six/One: Context Establishment



- Context establishment when hosts initiate first communication session
- Context IDs for subsequent look-up
- Routers do not rewrite IP address prefixes before context established

Learning from Six/One to make HIP better

- Six/One is traffic-engineering-compatible
  - Address rewrites in routers and host adaptation enable edge network to select border link
- This functionality misses in HIP multi-homing
- Idea: Integrate Six/One into HIP multi-homing

What's there, what's new?

Six/One	HIP multi-homing
address mapping	✓ HIT/address mapping
context establishment	✓ base exchange
address ownership proof	✓ IPsec authentication
address bunch configuration	✗ not provided
address rewriting in router	✗ not provided
address adaptation	✗ not provided

- Much Six/One functionality pre-exists in HIP multi-homing
- Minor extensions required

- Now integrating missing pieces into our HIP implementation
- Work in progress…