Suggestions Towards Next Steps in RRG

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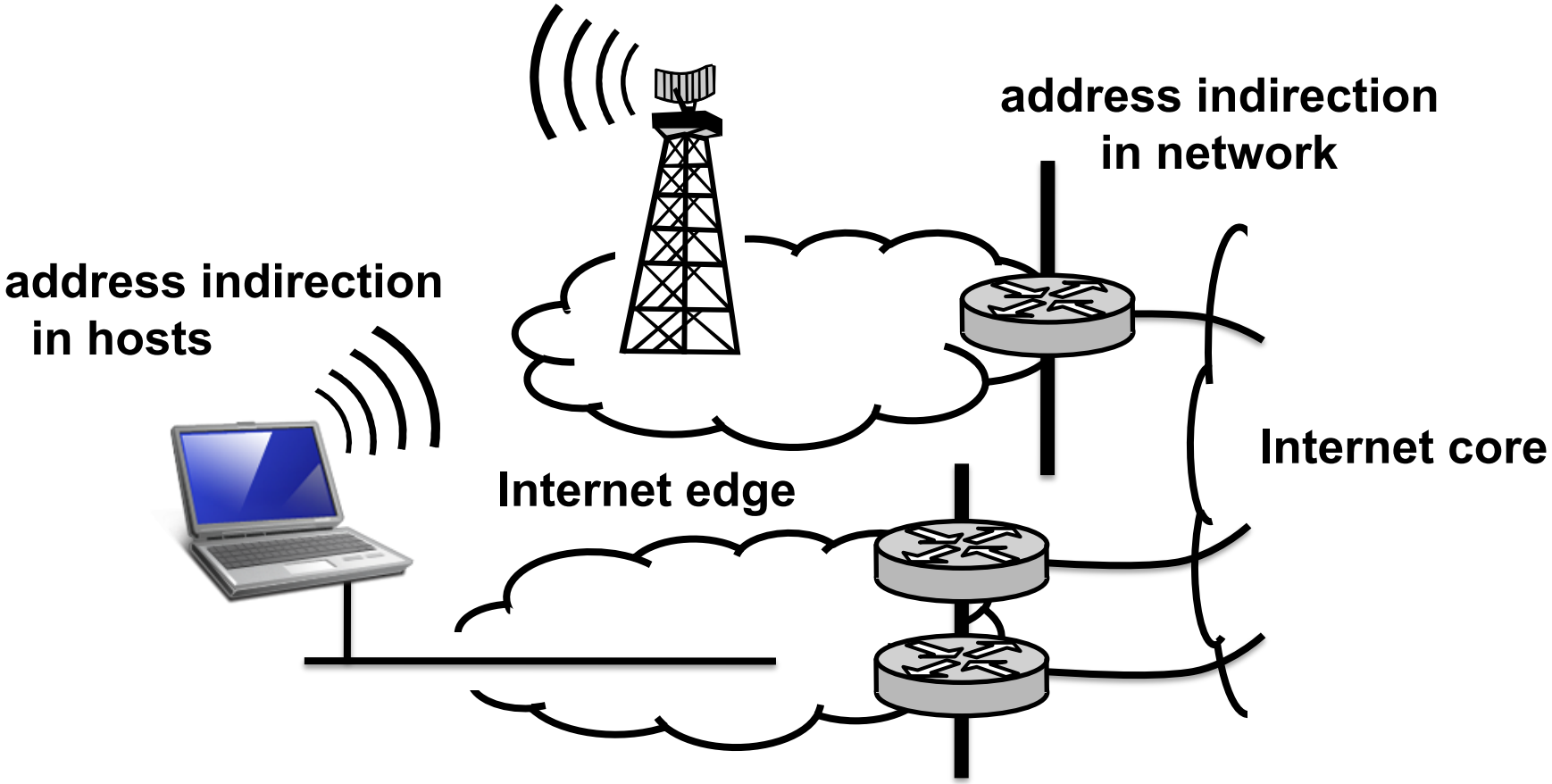
Routing research group meeting at IETF 73. November 2008

Solution Approaches: Host vs. Network



seeking for a one-size-fits-all solution

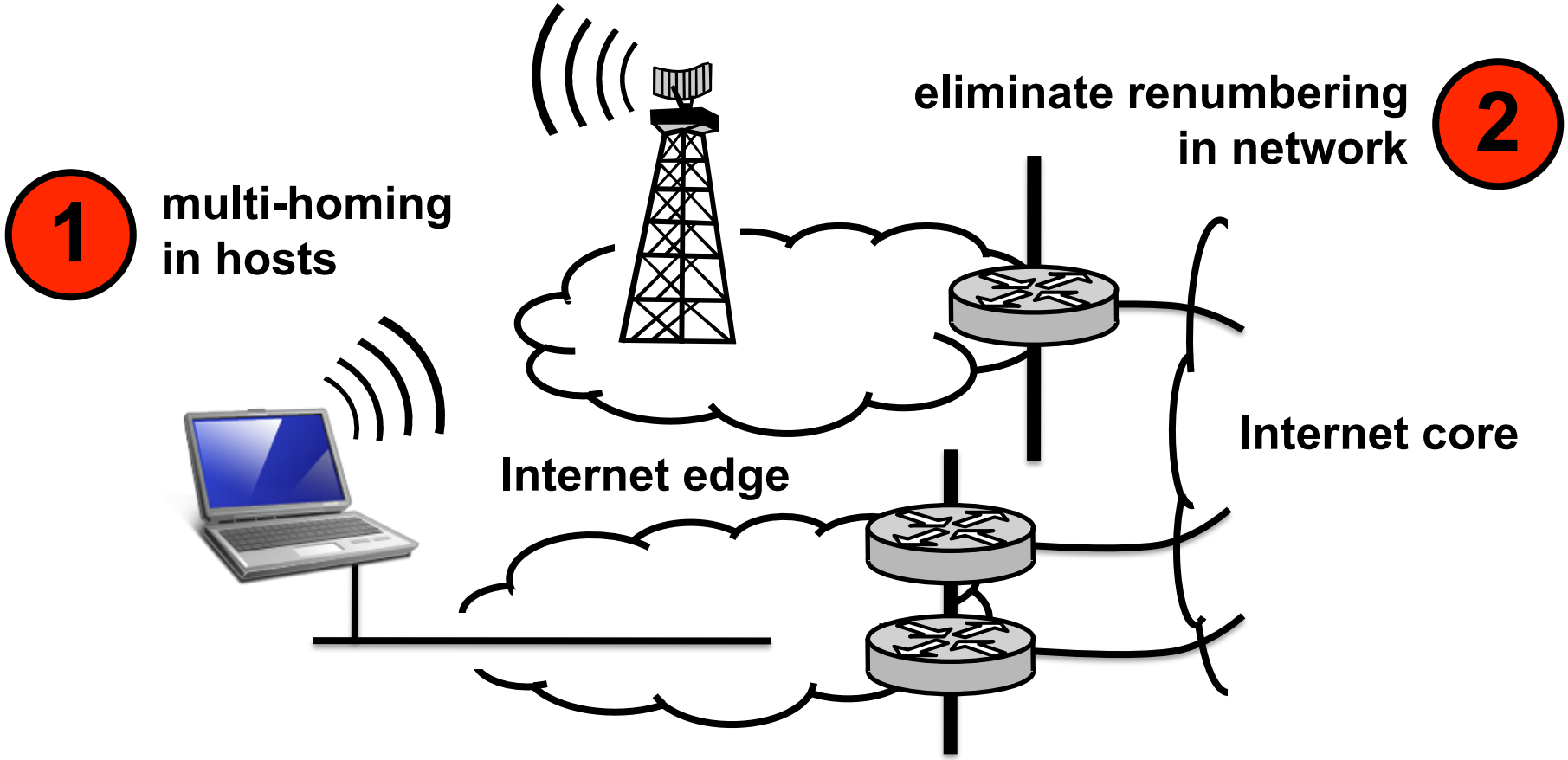
- to enable multi-homing and failover
- to eliminate renumbering

Solution Analysis

		benefits	technical maturity	deployability
network-based solutions	proxying (LISP, Ivip)	no renumbering multi-homing	longer path	lack of incentives
	translation (Six/One Router)	no renumbering multi-homing if bilateral support	NAT-like effect	clear incentives
host-based solutions	ID/address split (HIP, ILNP)	easier renumbering multi-homing	well understood	small incentives
	address indirection (Shim6, Six/One)	multi-homing only – requires renumbering	well understood	small incentives

- all solutions with strengths and weaknesses
- solutions can complement each other

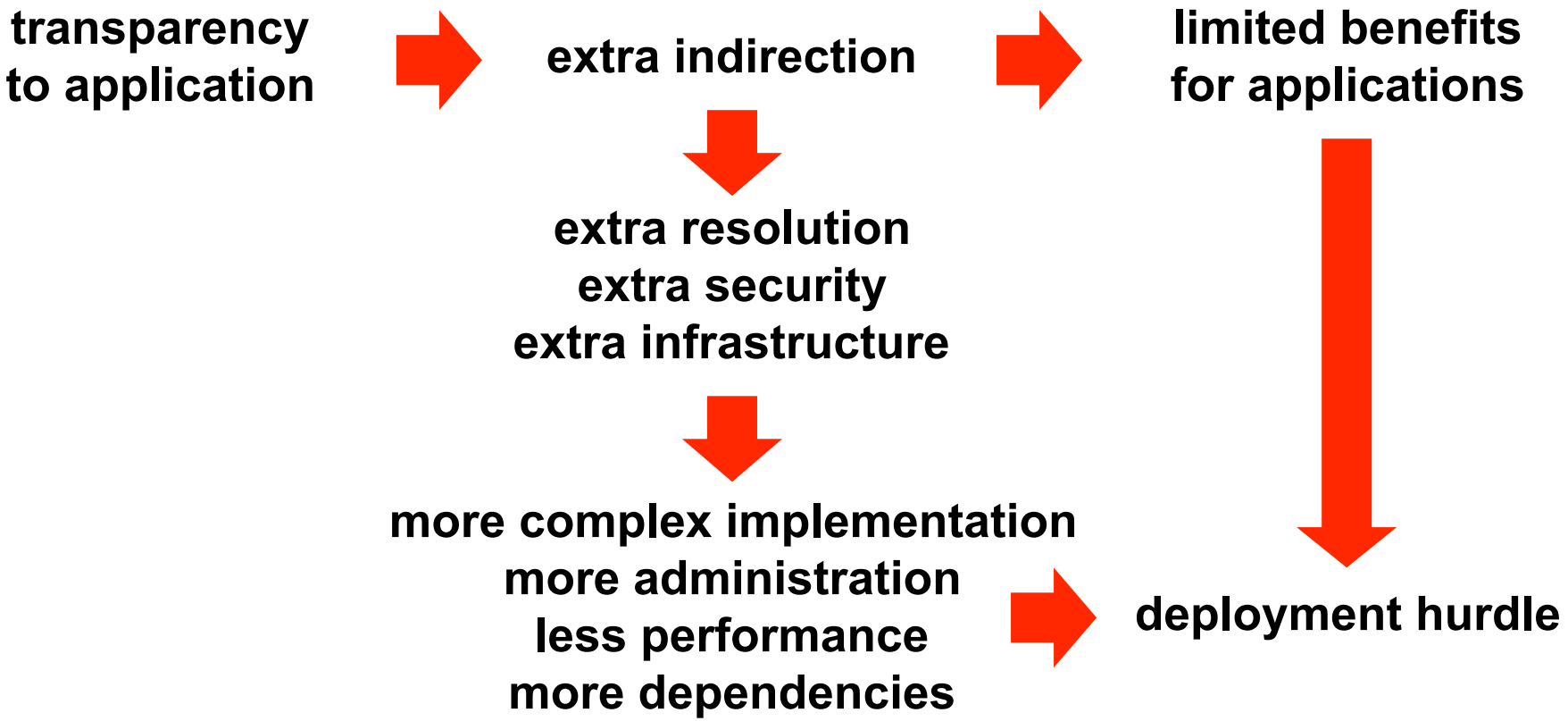
Proposal of “Dual Approach”



host-based + network-based solutions

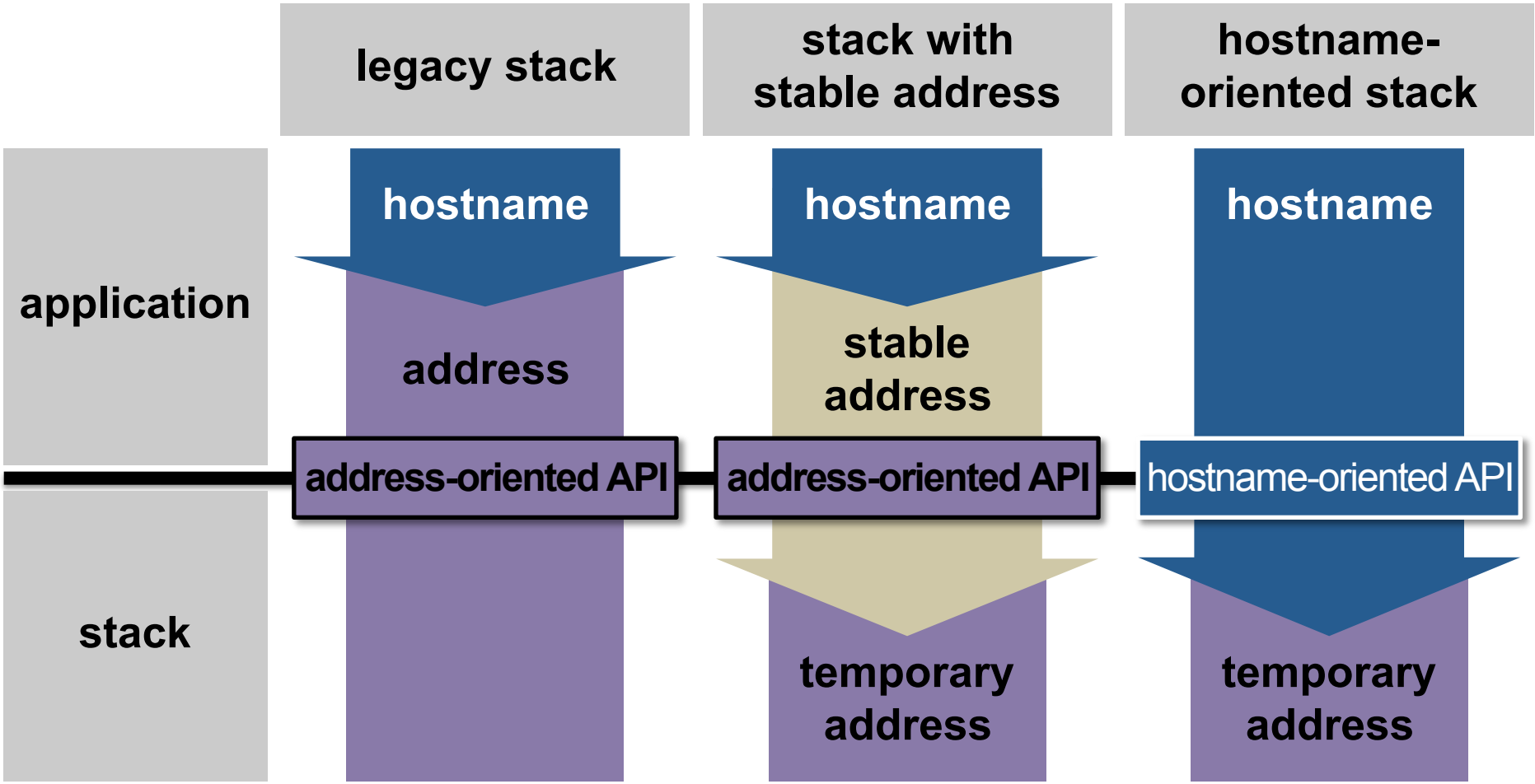
- independent of each other
- complementary in benefits

1st Solution Part: Host-Based Multi-Homing



- application transparency implies deployment hurdle
- API evolution proves desire for transparency unfounded

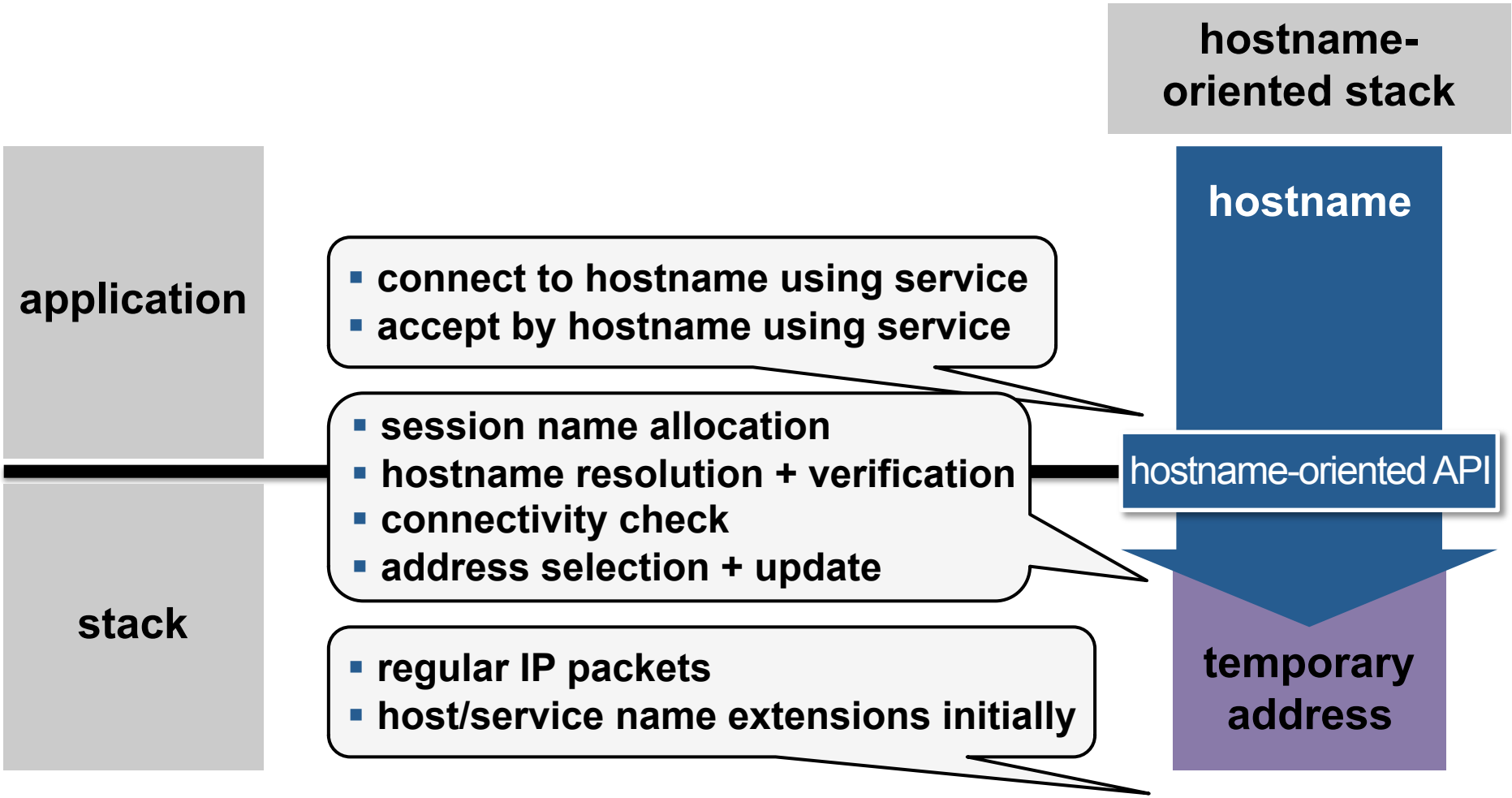
Hostname-Oriented Stack



backwards compatibility — not transparency

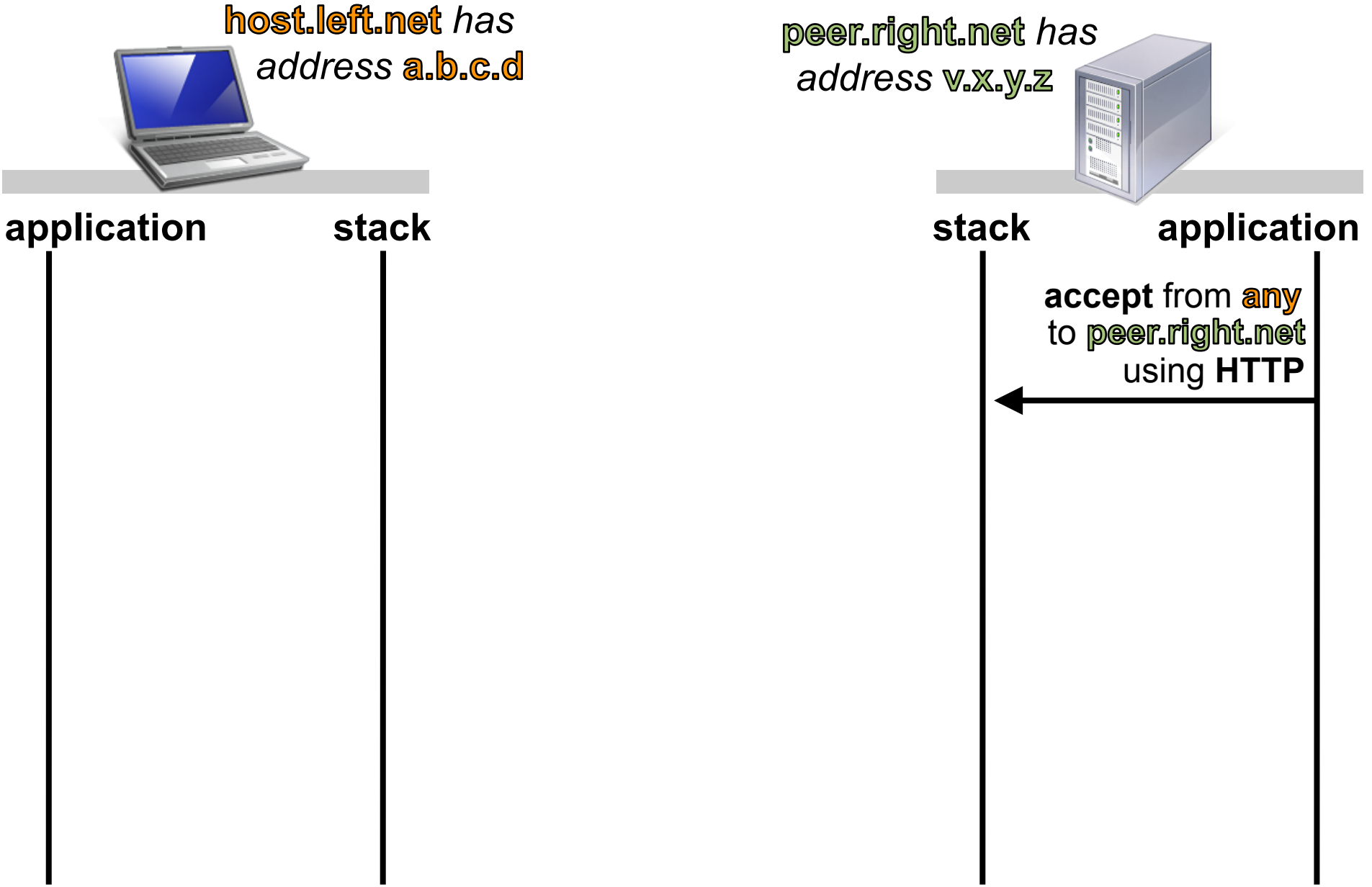
- simpler stack architecture
- easier application programmability (indirection in stack)

Hostname-Oriented Stack

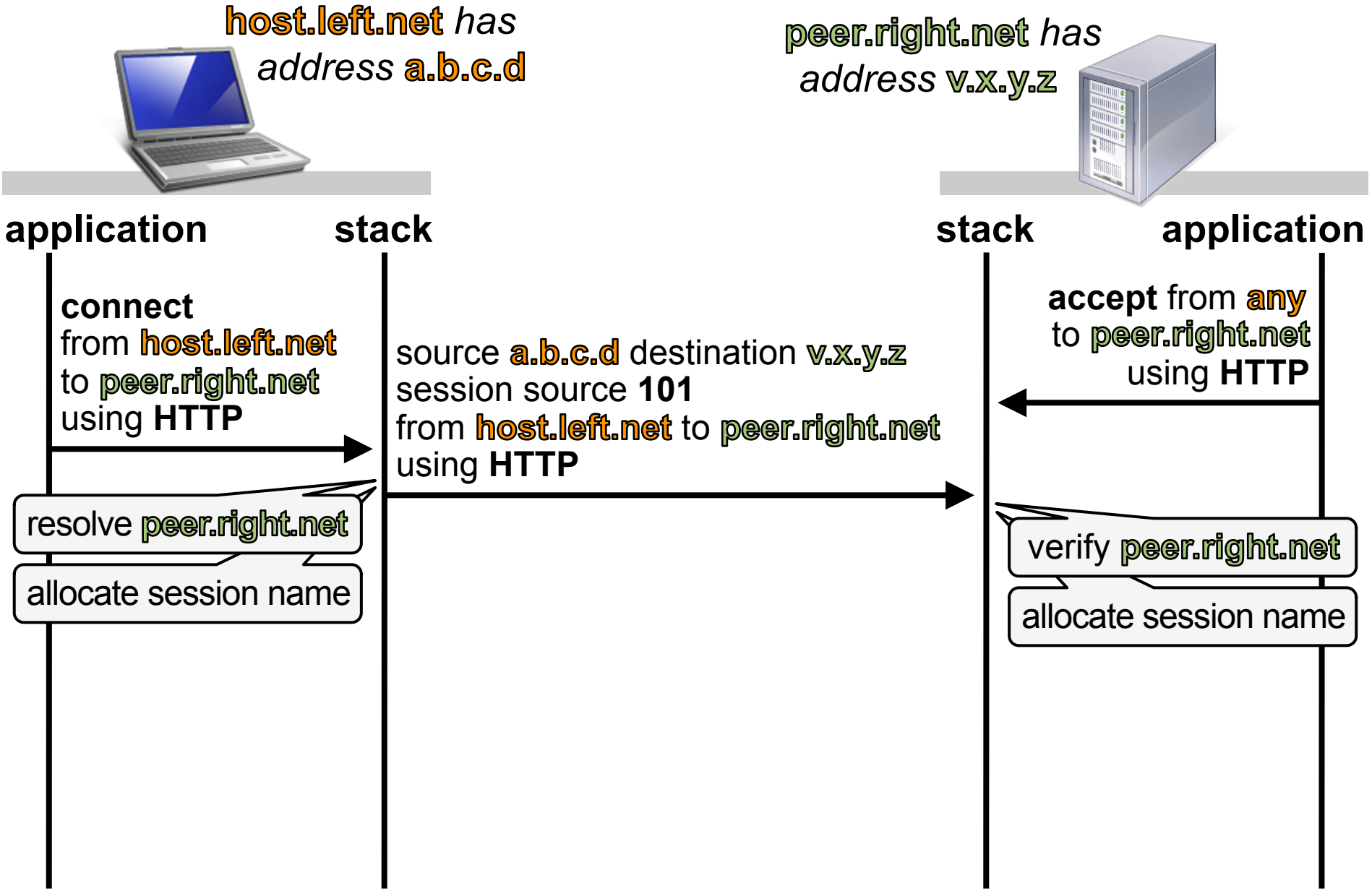


- explicit service names supersede well-known port numbers
- session names = port numbers without service semantics
- regular IP packets on wire

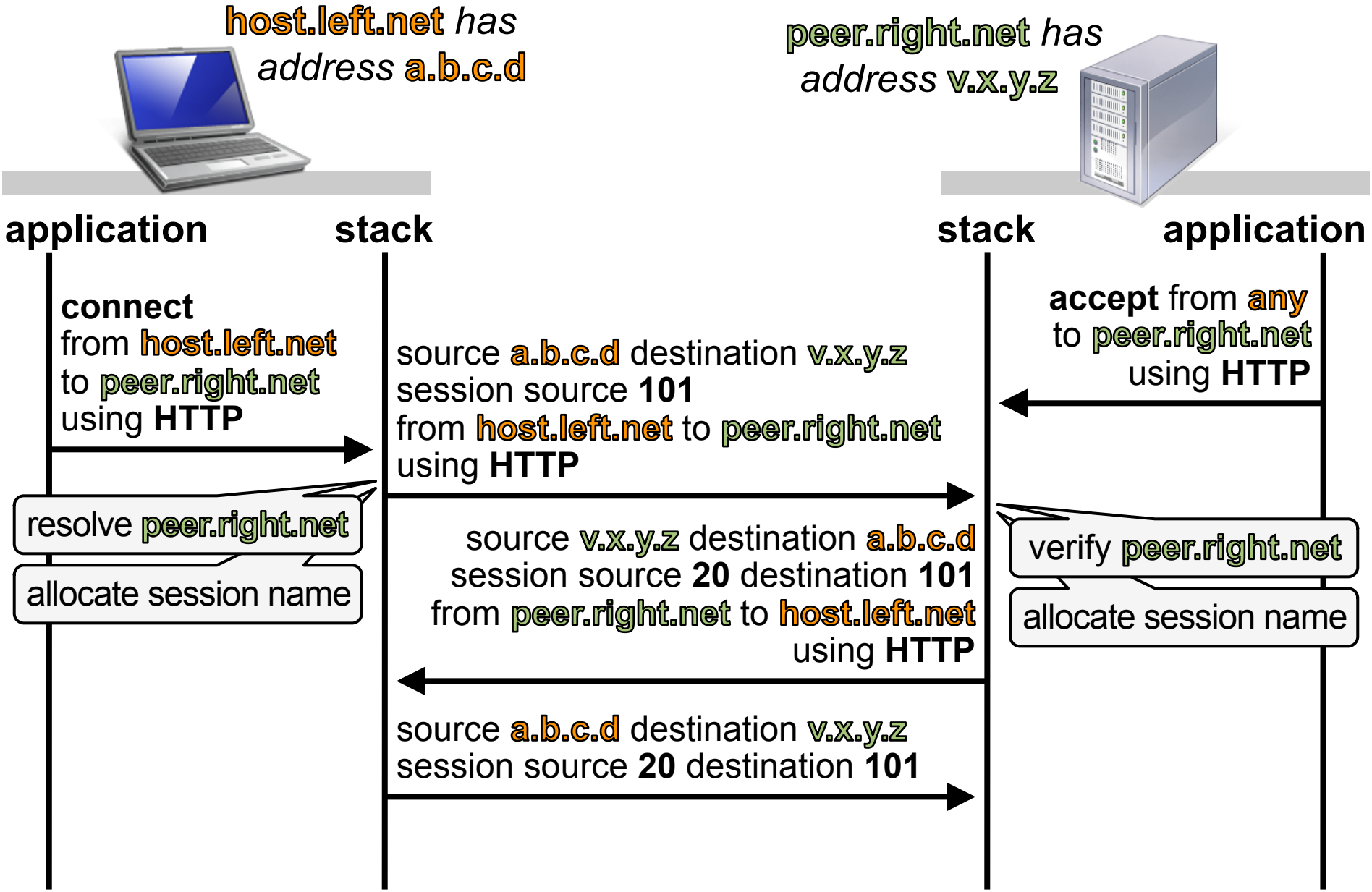
Session Establishment Example



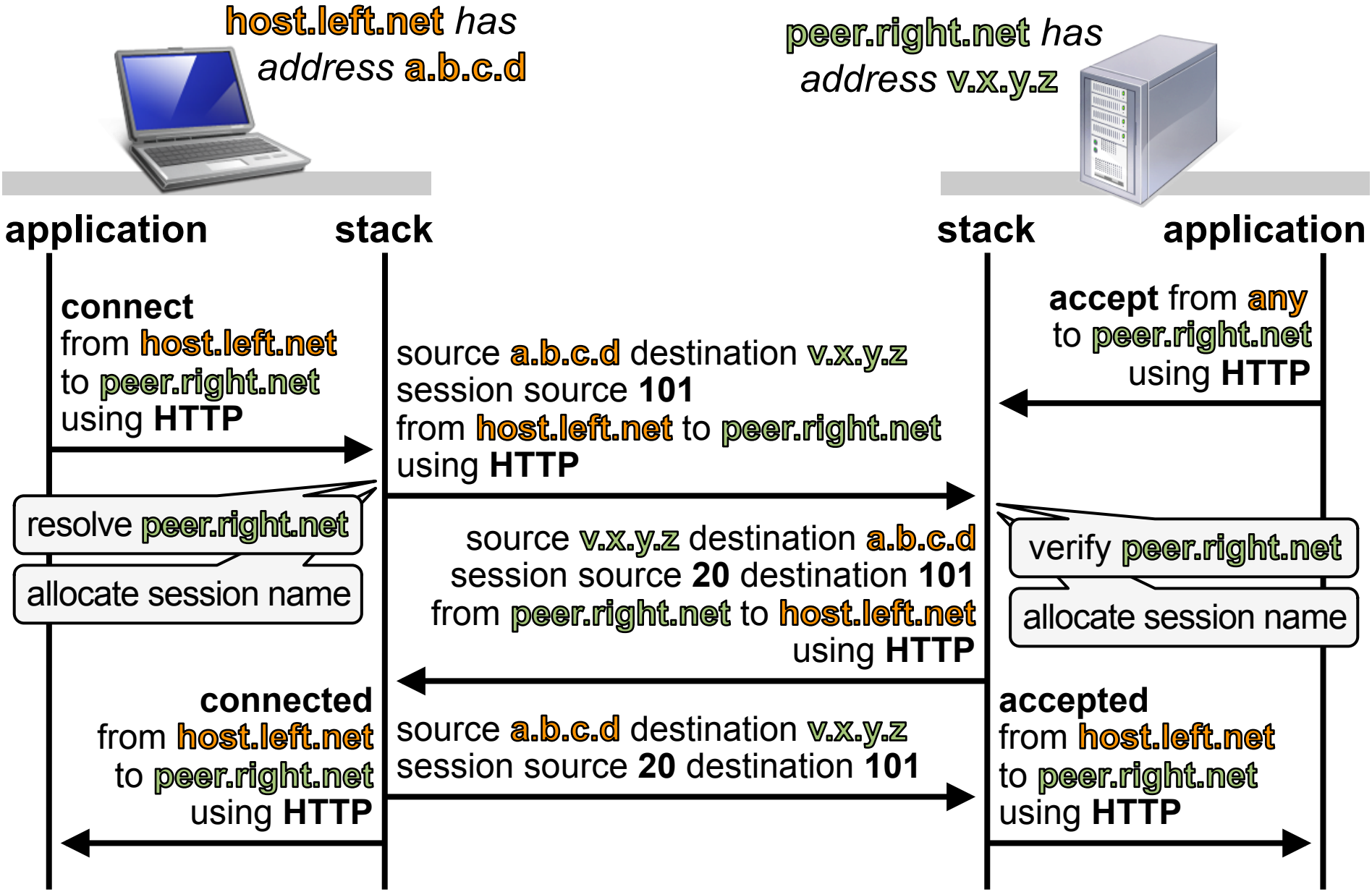
Session Establishment Example



Session Establishment Example



Session Establishment Example



Further Considerations

- connection-less protocols
- bootstrapping protocols
- anonymous protocols
- mobility support
- middlebox support

Multiply Benefits Ease Deployment

	for users	for host admini-strators	for application developers	for OS vendors	for network operators
human-readable hostnames	yes	yes			
multi-homing support	yes		yes		
mobility support	yes		yes		
no renumbering of hosts		yes			yes
no new layer of indirection		yes		yes	
no new infrastructure	yes		yes		yes
addressing functions in stack			yes	yes	
better middlebox support	yes				yes

2nd Solution Part: Avoid IPv6 Renumbering

- could simply be unilateral IPv6 prefix translation
  - reachability via 1-to-1 mappings
  - robust via statelessness
  - transparent to applications via hostname-oriented stack
- as easily deployable as NATs
  - no external dependencies
  - local affects only

Conclusion

- dual approach most reasonable
  - exploit strengths of either approach
  - align costs with benefits

- possible dual approach
  - multi-homing + more via hostname-oriented stack
  - no renumbering in networks via prefix translation