LIN6: A Solution to Multi-Homing and Mobility in IPv6

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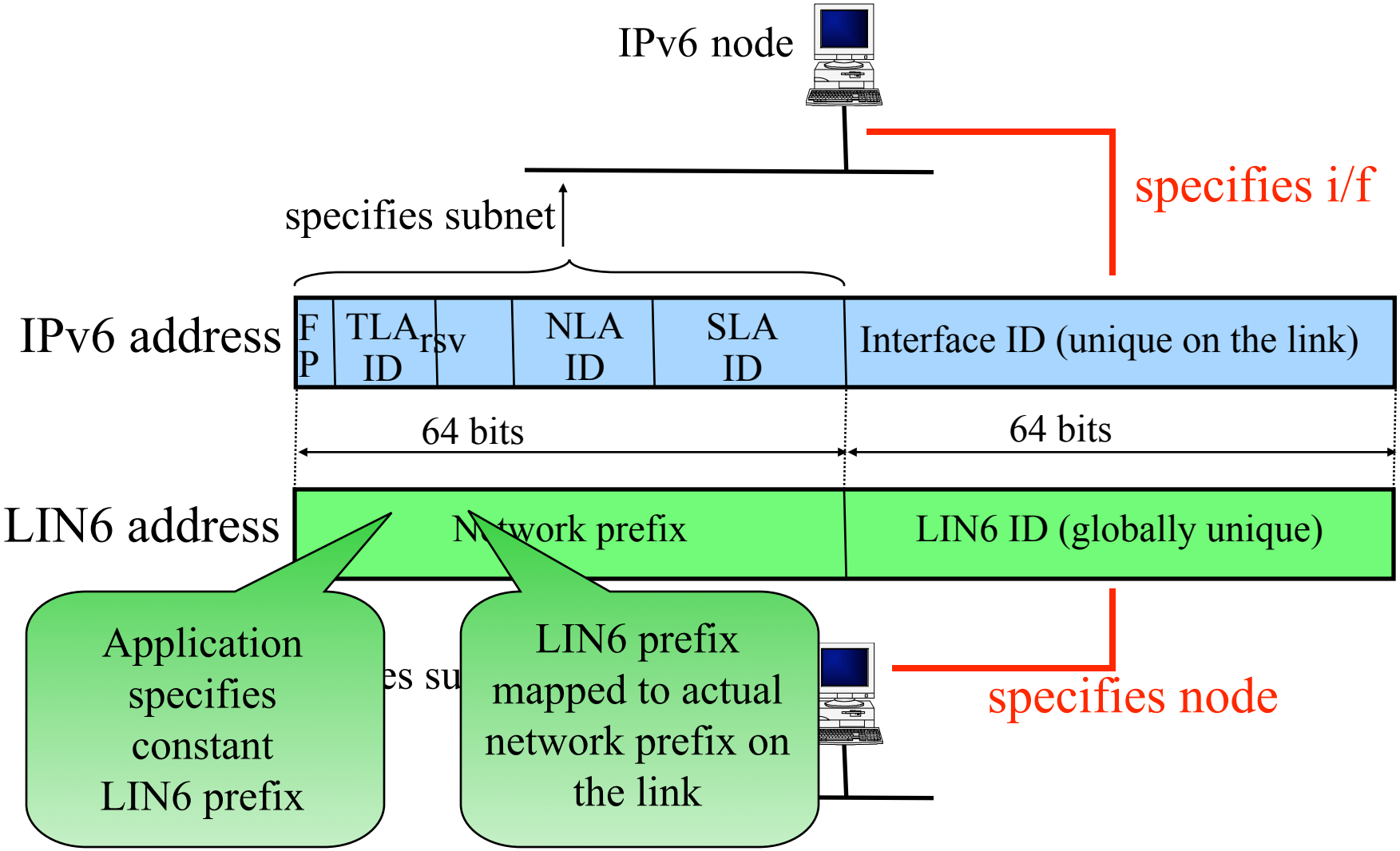
WIDE PROJECT

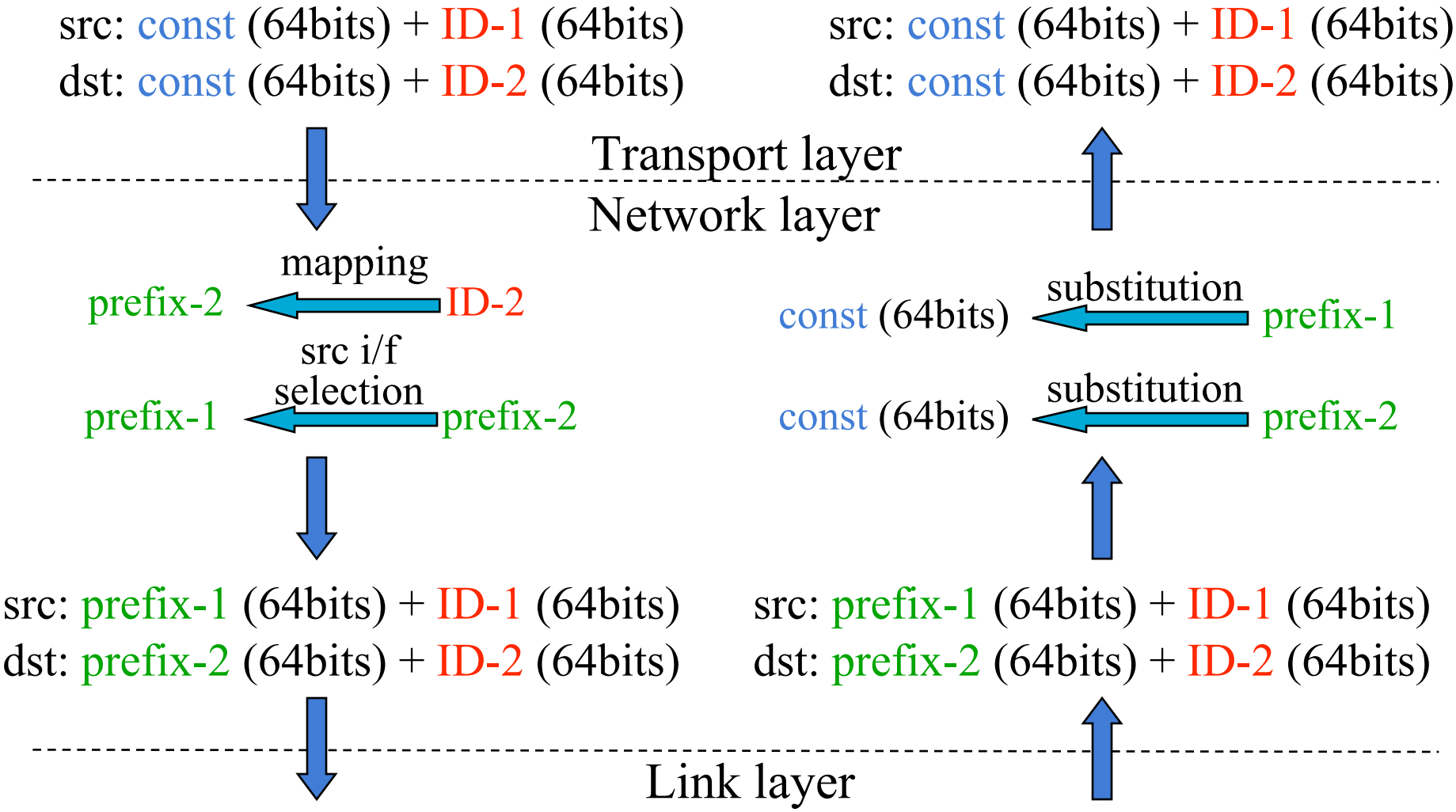
Overview

- LIN6: Location Independent Networking for IPv6
- Based on 64-bit node identifier
  - IPv6 address is a locator
- Attacks several technological issues
  - Multi-homing
  - Mobility
  - Security
- Coexists with current IPv6
- Runs on BSDs, Linux, Win2K
- I-D is available at: http://www.lin6.net/
  - draft-teraoka-ipng-lin6-02.txt

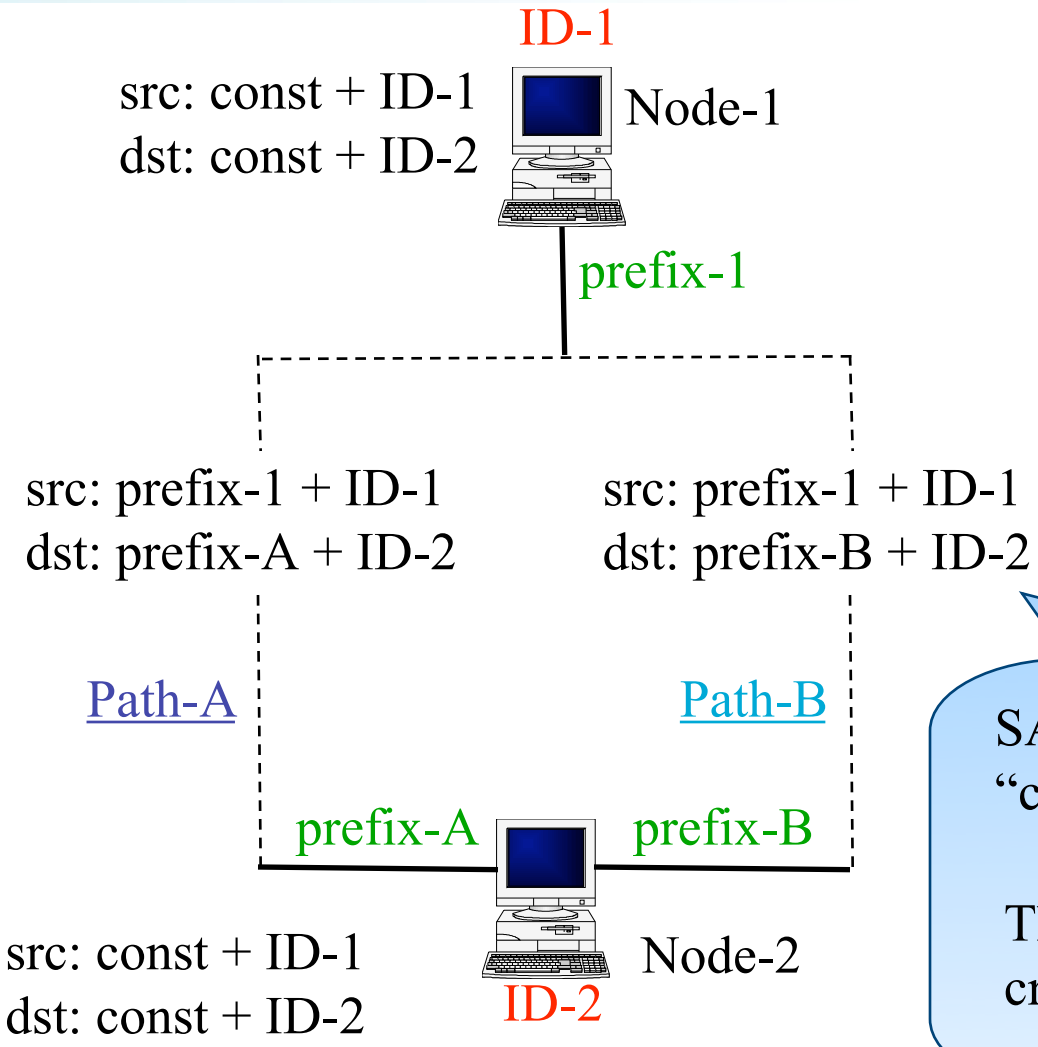
Address Architecture



Communication Procedure



Multi-Homing Support



(1) Node-1 starts TCP session using Path-A with IPsec
(2) Path-A crashes
(3) Node-1 detects it (e.g. ICMP network unreach)
(4) Node-1 continues the TCP session using Path-B with IPsec

SA is established between "const + ID-1" and "const + ID-2"

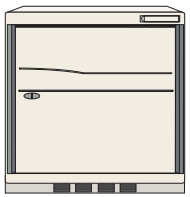
The SA is also valid after Path-A crashes

ID - locator resolution: mapping

Hostn□me → LIN6 Gener□ized ID (AAAA record)

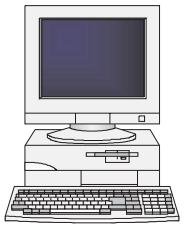
LIN6 Gener□ized ID → M□pping Agent's □ddr (MA record, simil□r to reverse lookup)

6.7.8.9.□b.c.d.e.f.□4.1.0.0.0.lin6.net MA MA1



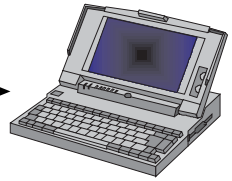
N□me Server

(1) query & reply
(hostn□me to ID □nd
ID to M□pping Agent)



Correspondent Node

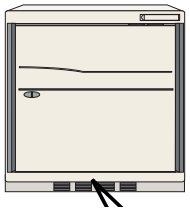
(3) d□1□p□cket



Mobile Node

LIN6 ID =
0001:4□fe:dcb□9876

(2) query & reply
m□pping



M□pping Agent MA1

(0) Registr□tion of M□pping

LIN6 ID → Current Loc□tion

(m□pping)

update: dynamic ID assignment

- -02 assumes that LIN6 ID is assigned statically by an authority
- We are implementing dynamic ID assignment
  - Allows flexible operation
  - Mobile Node generates public/private key pair
  - Using hash of the public key as LIN6 ID

Assignment Procedure

Mobile Node

Mapping Agent

(1) generate public/private keys
(PKa, SKa)
LIN6 ID ID_a = H(PKa)

MA has (PKm, SKm)
signed by well-known
authority (Sigw)

(2) Assignment Request
[ID_a, PKa, T, {ID_a, PKa, T}Siga] → (3)

(run client puzzle)

Verify Message,
Generate K,
shared secret key
for mapping update

(4) Assignment Ack

{K}PKa, T, L, {{K}PKa, T,
L}Sigm, PKm, {PKm}Sigw

(5) Verify Message ←

(6) Send mapping registration
(using K) →

Basic capabilities

3.1.1 Redundancy	supported
3.1.2 Load Sharing	not implemented yet
3.1.3 Performance	not implemented yet
3.1.4 Policy	not implemented yet
3.1.5 Simplicity	yes
3.1.6 Transport Survivability	yes
3.1.7 Impact on DNS	need a new RR type
3.1.8 Packet Filtering	conform

Additional capabilities

3.2.1 Scalability	yes
3.2.2 Impact on Routers	no
3.2.3 Impact on Hosts	modification needed
3.2.4 Host-Routing interaction	no
3.2.5 Operations & Management	good
3.2.6 Cooperation between Transit Providers	no
3.2.7 Multiple Solutions?	no
4 Security Considerations	yes, but needs more work