The v5 Approach for v4 to v6 Transition

- Transition Wan Services
- Transition Customer Entities
- Packet Modifying Entities
- Transition E2E paths
- Transition Packet Formats
- Packet Modifying Functions
- Packet Modifying Functions in Transition Entities
- Transition Address Format
- Examples of E2E path details

Transition Wan Services

- Legacy
  - **W4** v4 Wan service (v4 address)
  - **WM4** v4 mobile Wan service (v4 address; access to a GM gateway)
- Transition specific
  - **W5A** v5A Wan service (v4 address; /48 v6 prefix)
  - **W5B** v5B Wan service (/48 v6 prefix; access to G6 and GT gateways, each at known v4 and v6 addresses)
  - **WM5** v5 Mobile Wan service (v4 address, access to a GM gateway; /48 v6 prefix)
- Target
  - **W6** v6 Wan service, fixed or mobile (v6 prefix)

(Envisaged new terminology: W4-, WB, W6+, WB- instead of WM4, W5A, W5B, WM5)

Transition customer entities

Customer Entity	Version		
	v4 (legacy)	v5 (intermediate)	v6 (target)
Application	A4	A5	A6
Host Protocol Stack	H4	H5	H6
Site Local Routing	LR4	LR5	LR6
Customer Edge Device	E4	E5	E6

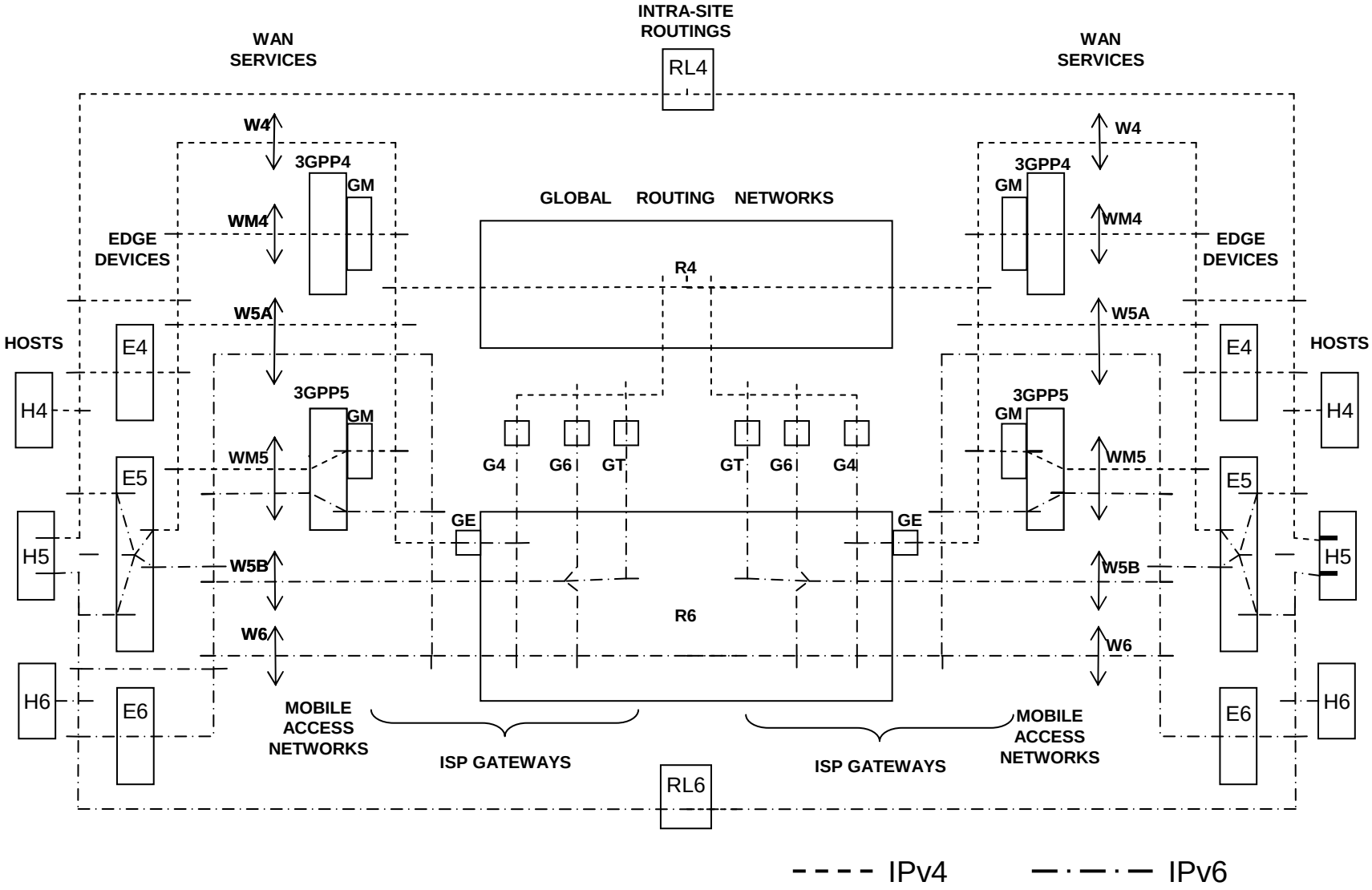
(Envisaged new terminology: "B" instead of "5")

Packet Modifying Entities (hosts and gateways)

- Legacy
  - **GM** IPv4 Mobile access network gateway (NAPT)
- Transition specific
  - **H5** bistandard Host
  - **E5** bistandard customer Edge device
  - **G6** v6 Gateway (v6 traffic between v4 and v6 routing networks)
  - **GT** v6-v4 Translating Gateway (connections from v6 application to v4 application)
  - **GE** v4-v6 Edge gateway (v4 Wan service at the edge of an ISP v6 routing network)
  - **G4** v4-v6 Gateway (v4 Wan service between the v4 and v6 routing networks)
- Target
  - (None)

(Envisaged new terminology: HB, EB instead of H5, E5)

Transition E2E paths



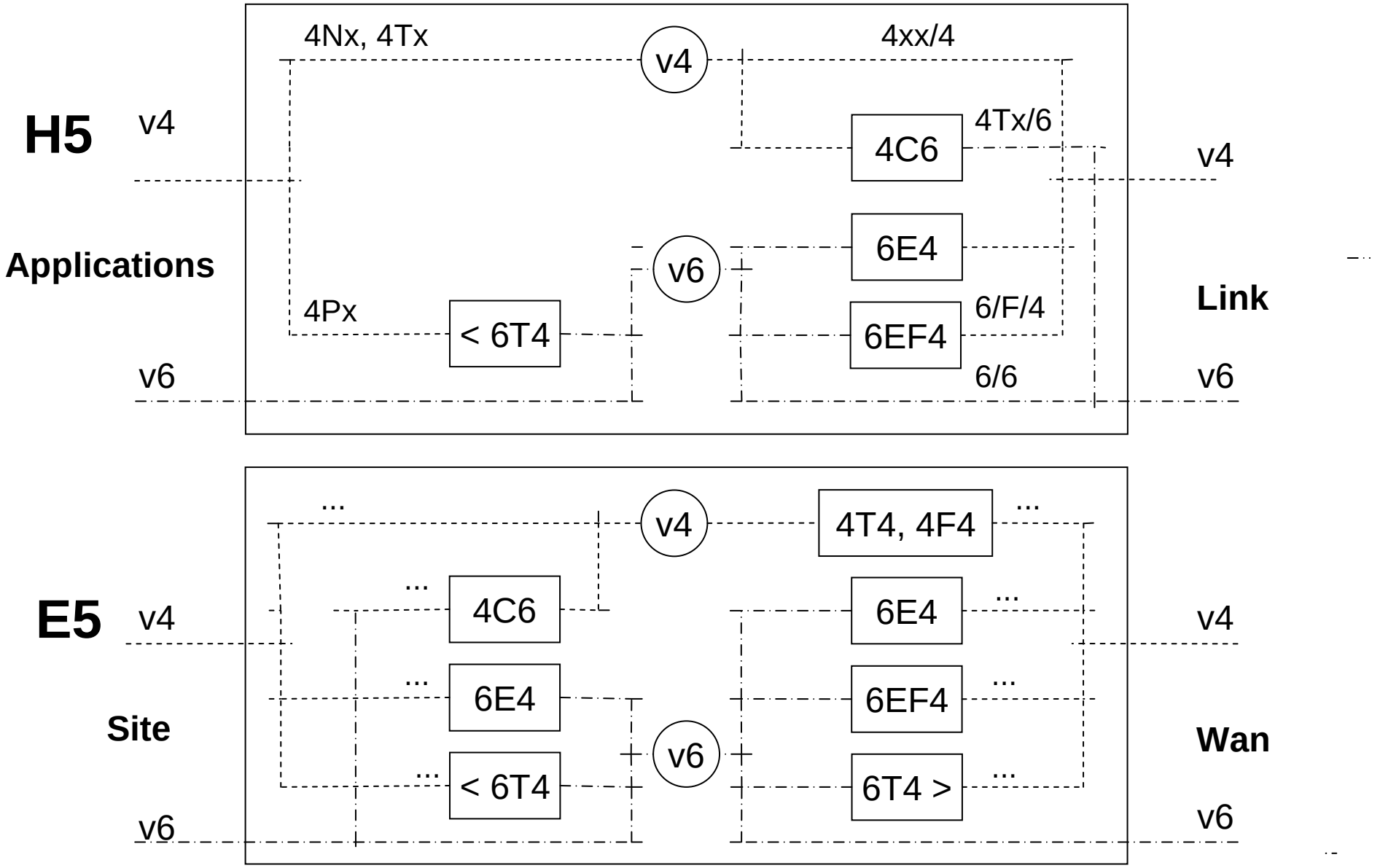
Transition Packet Formats

- Application part
  - **4xx** : application is v4 at least at one end
    - Each x is N, F, T or P
    - First x is for the left hand side host; second x for the other one
    - **N** : native address and port (unchanged E2E, no constraint)
    - **F** : the port is the host forwarding port assigned in its edge device for its v6 encapsulation (address and port unchanged)
    - **T** : translated address, possibly translated port
    - **P** : translated address and protocol, possibly translated port
  - **6** : application is v6 at both ends
- Encapsulation part (recursive once)
  - **/4** v4
  - **/6** v6
  - **/F/4** v4 under UDP encapsulation used for port forwarding
  - **/C6** v6 with one address Conversion for forced routing via a GT gateway
- Examples : Legacy 4TN/4; Transition 6/4, 6/F/4, 4PN/6, 6/4/6, 6/C6; Target 6/6

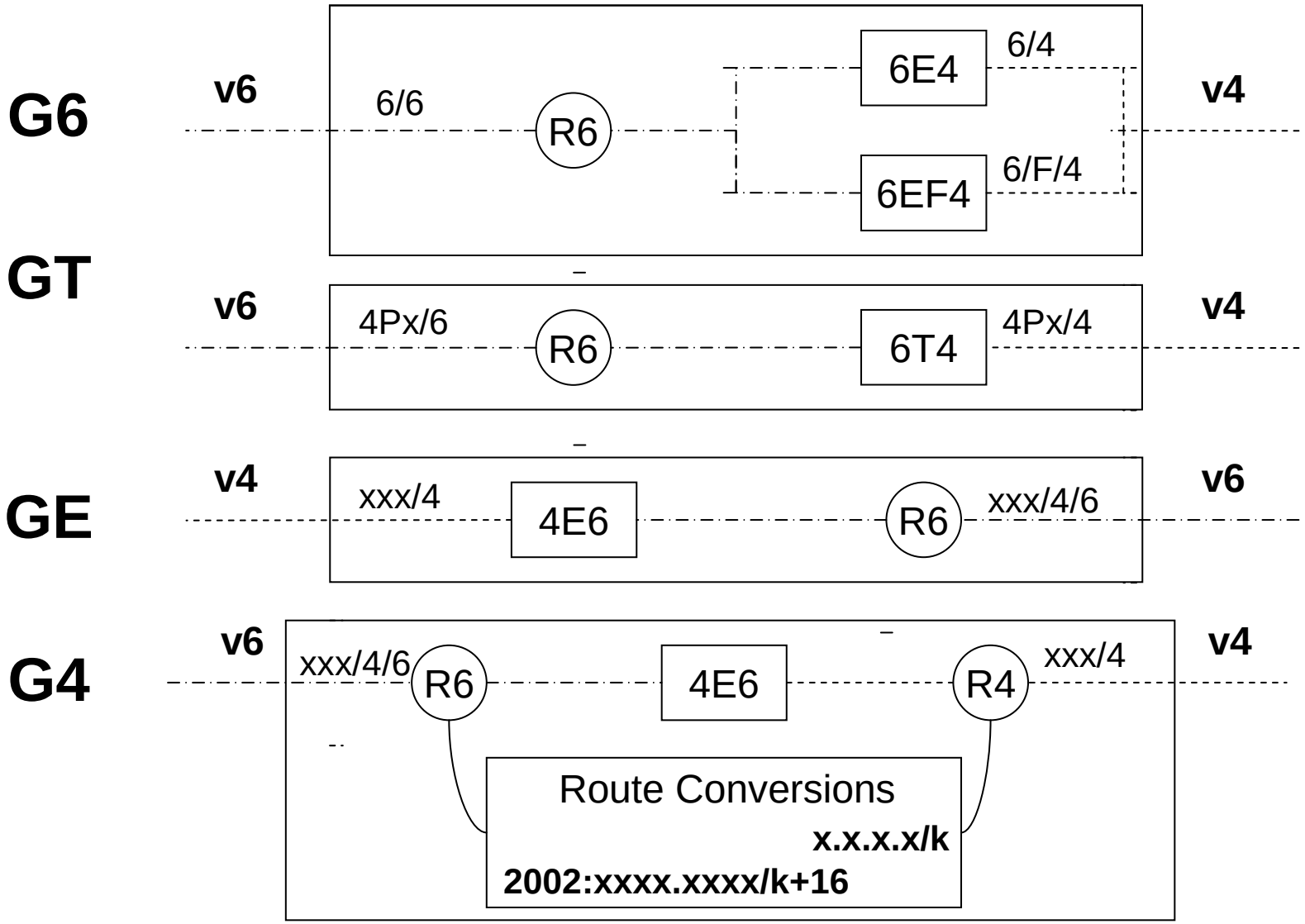
Packet Modifying Functions

- Legacy
  - **4T4** v4 address and port Translation, for one side originated connections, stateful (NAPT)
  - **4F4** v4 port Forwarding (address translation based on a static port forwarding table)
- Transition specific
  - **6E4** v6/v4 Encapsulation (protocol 41)
  - **6EF4** v6/UDP/v4 Encapsulation (port 3544, or port assigned to port forwarding in an edge device)
  - **6T4** v6-v4 address and port Translation, for v6 originated connections, stateful, neither fragmentation nor DNS-ALG
  - **4C6** local v4 conversion to v6
  - **4E6** v4/v6 Encapsulation (protocol 41)
  - **6C6** v6 address conversion, for gateway forced routing
- Target
  - (None)

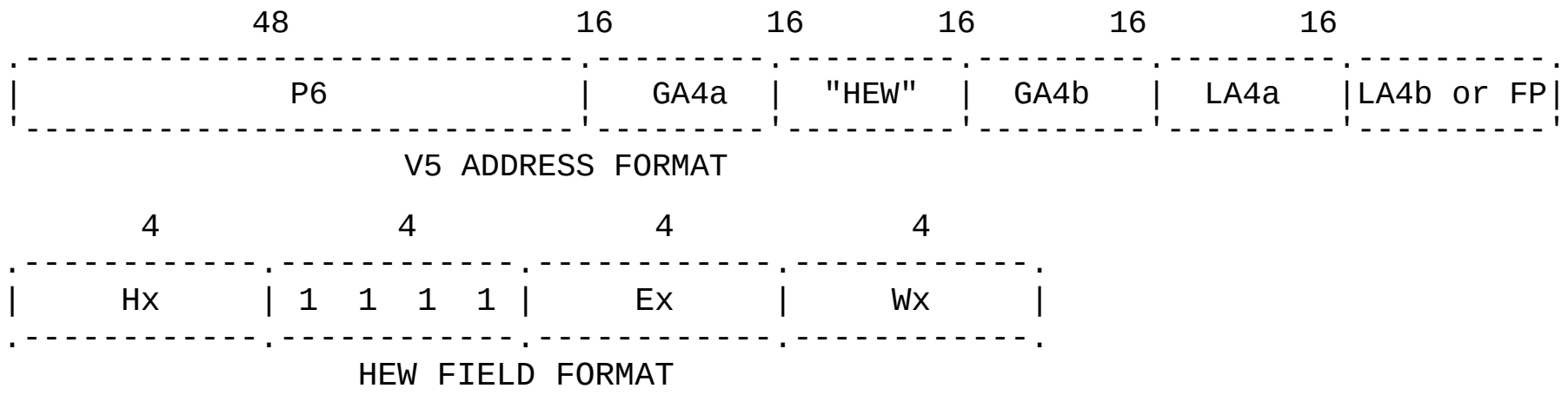
Packet Modifying Functions in Transition Entities (1)



Packet Modifying Functions in Transition Entities (2)

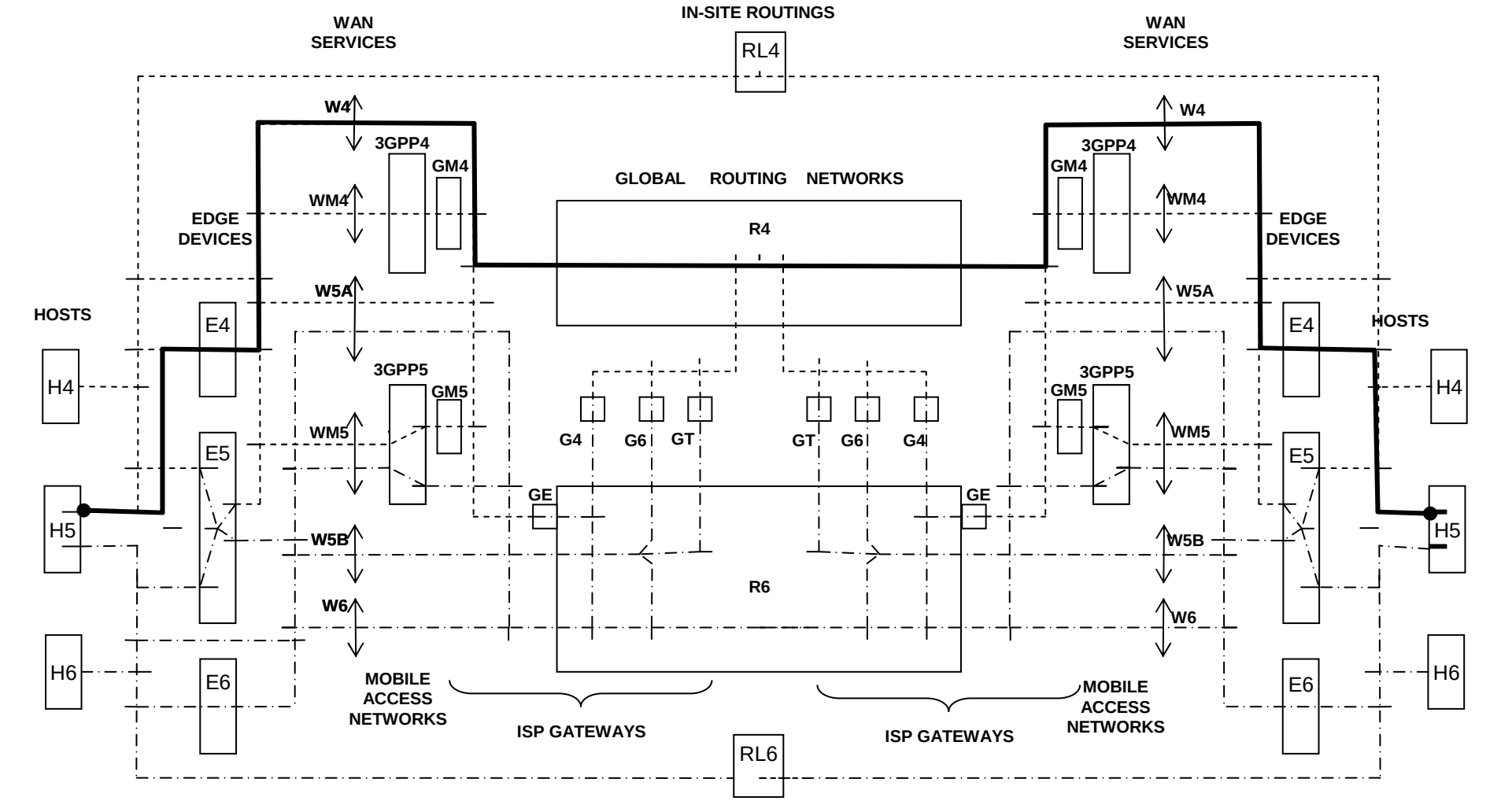


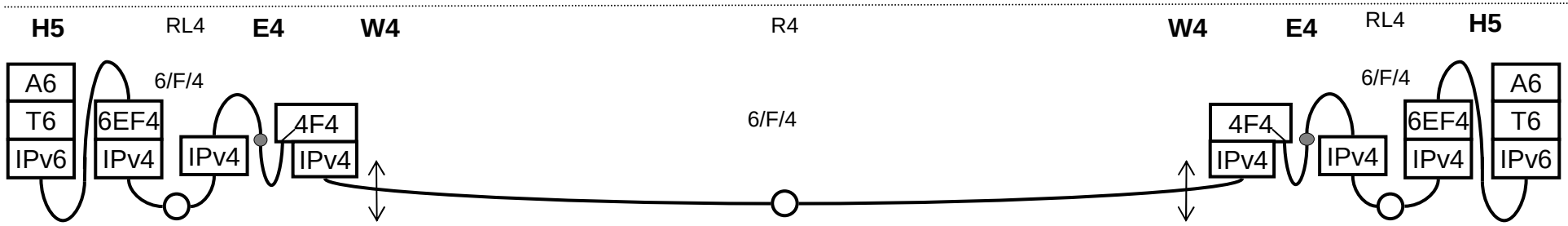
Transition address format



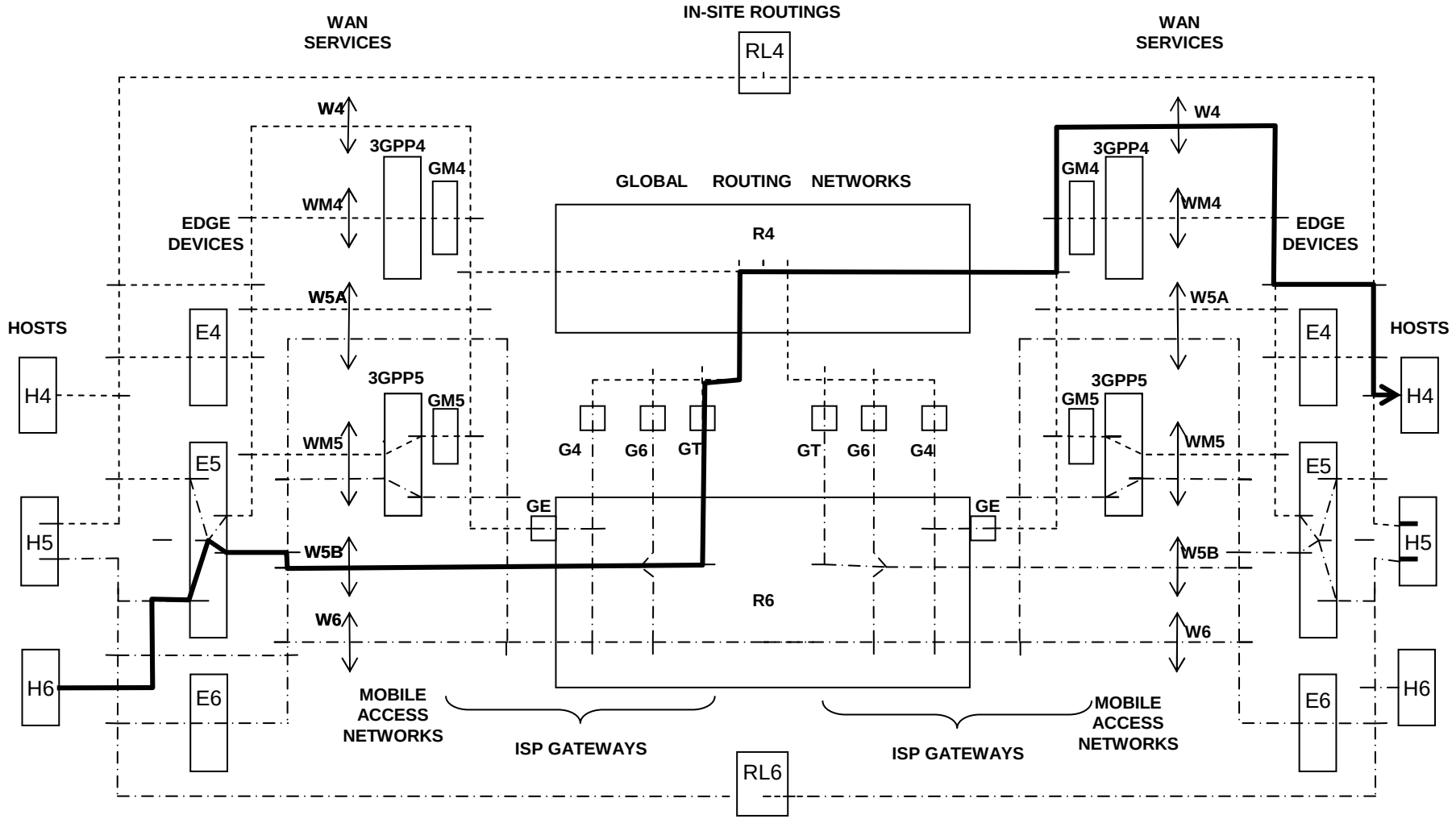
- **Hx** = 4 (H4), 5 (H5), or 6 (H6)
- **Ex** = 4 (E4), 5 (E5), or 6 (E6)
  (Variant for Hx and Ex: "5" replaced by "B")
- **Wx** = 1 (WM4), 2 (WM5), 4 (W4), 6 (W6), A (W5A), B (W5B)
  (Variant : 2 (WMB), 7 (W6+), B (WB))
- **P6** : /48 v6 prefix (0x2002.<v4 address> if the Wan service is v4)
- **GA4** : v4 global address (of the site or of its G6 gateway)
- **L4A** : v4 local address
- **FP** : forwarding port (for the /F/4 encapsulation)

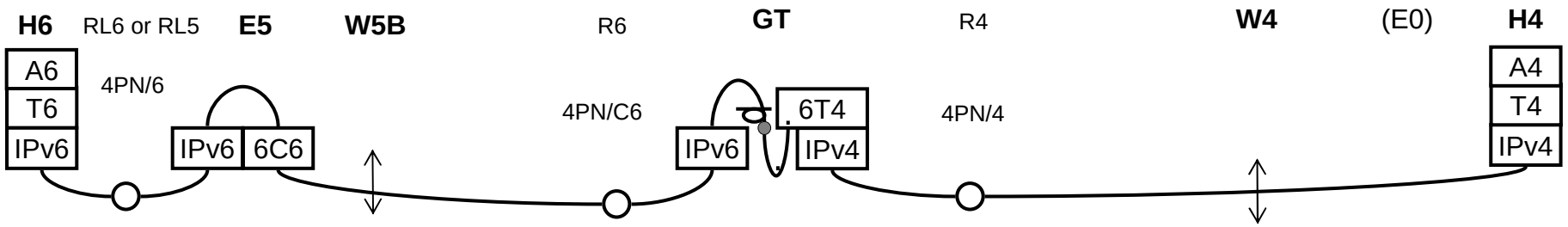
E2E Path 1 : P2P between two bistandard hosts in v4 sites at v4 addresses



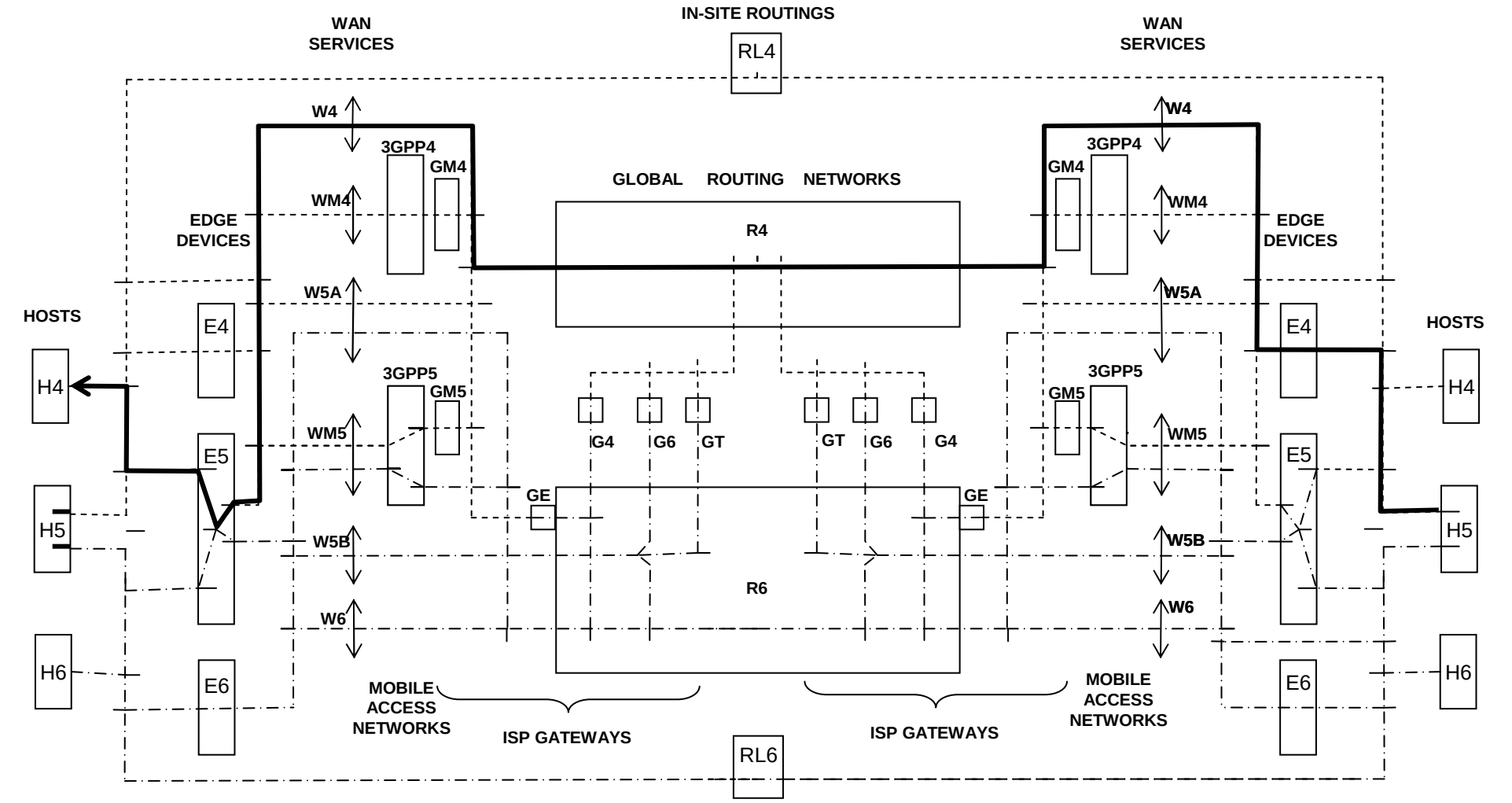


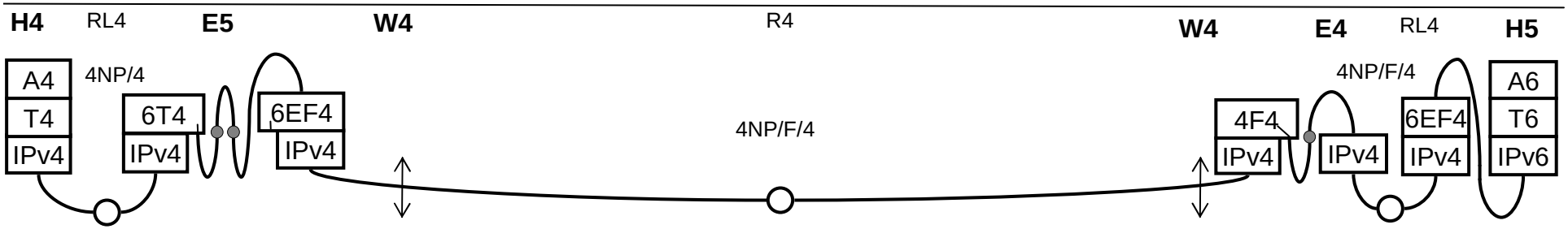
E2E Path 2 : v6 client behind a v6 edge at a v5B address calling a v4-only server at a v4 address



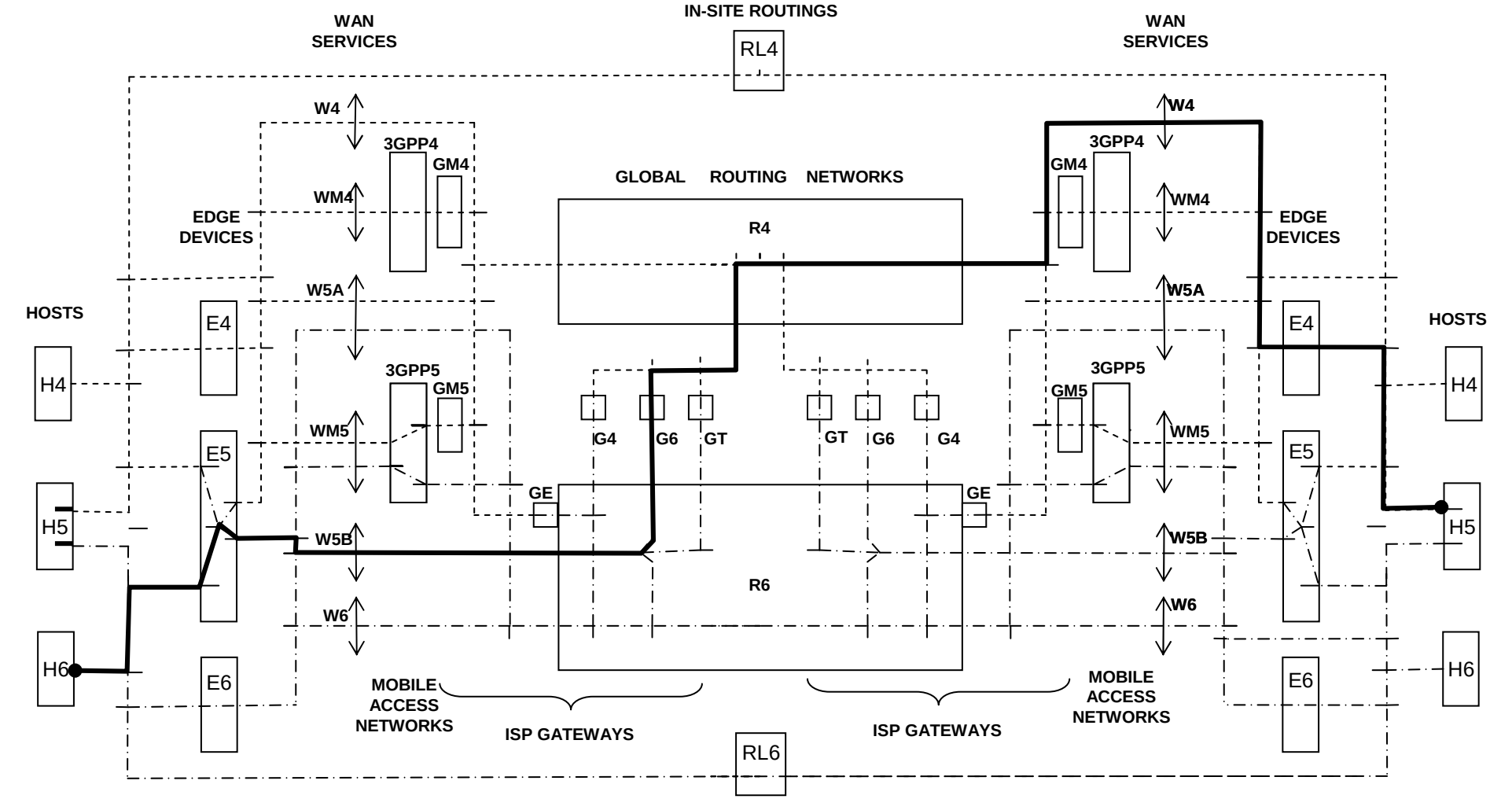


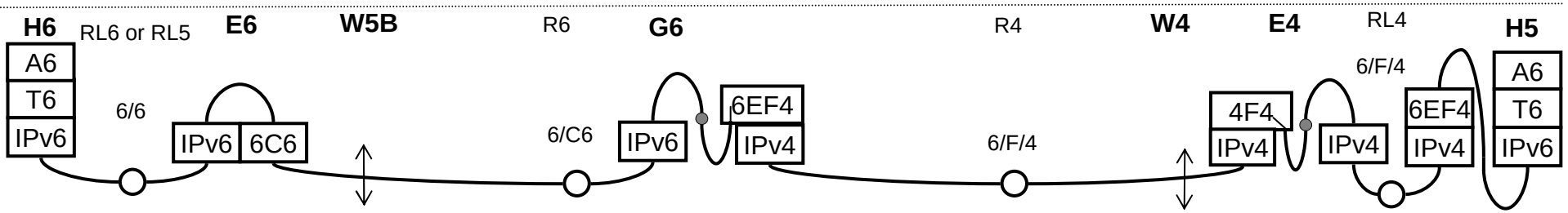
E2E Path 3 : v4-only server behind a bistandard edge at a v4 address called by a bistandard client in a v4-only site



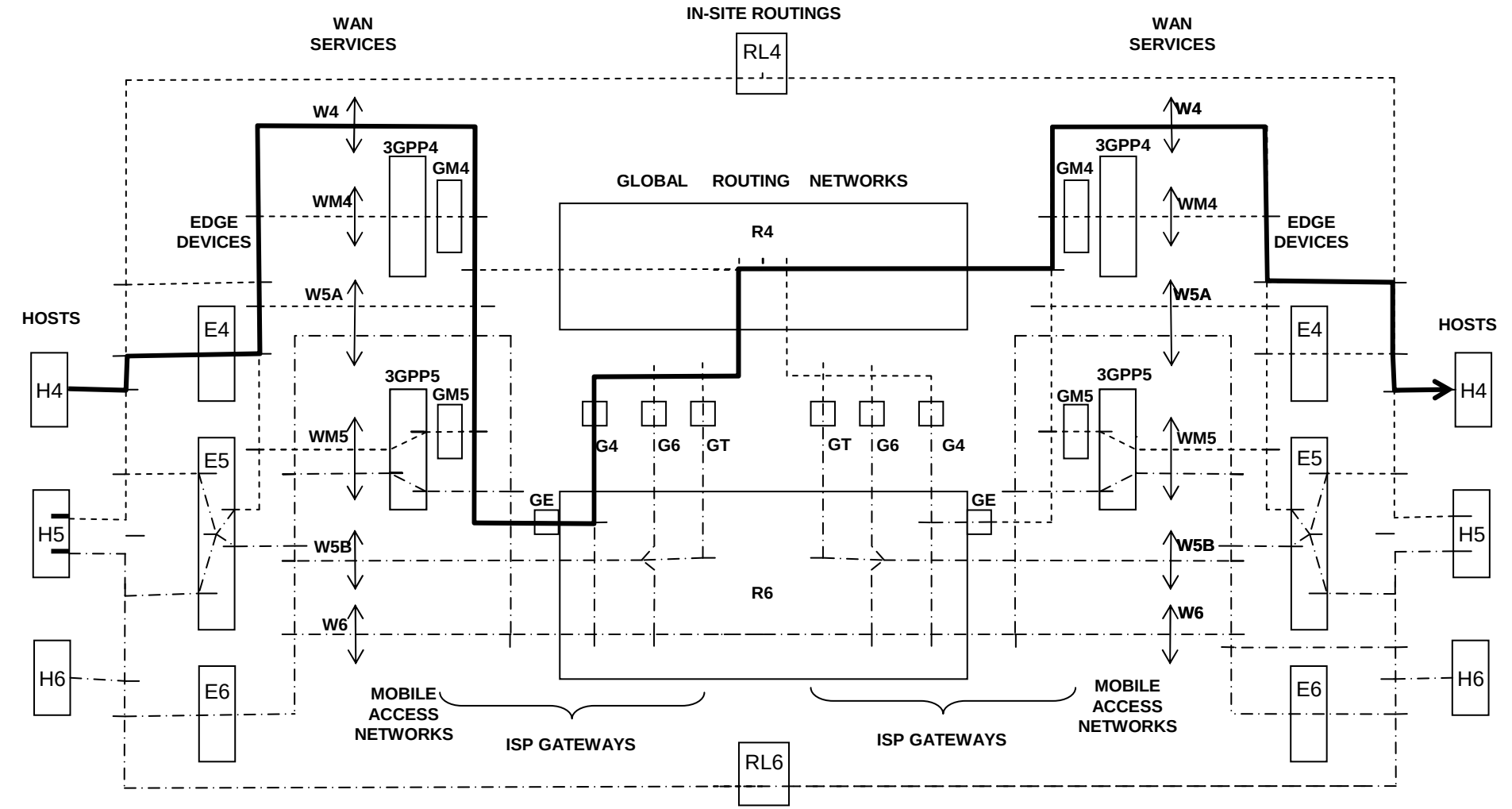


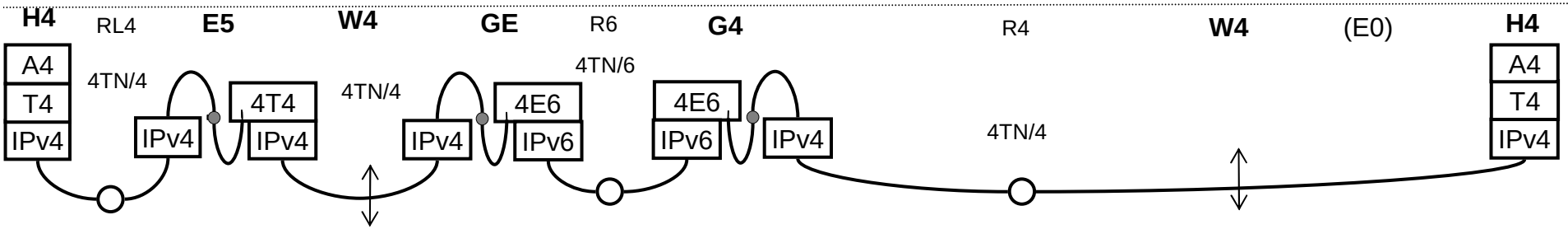
E2E Path 4 : P2P between a v6 hosts in a v5B address site and a bistandard host in a v4 site





E2E Path 5 : v4 E2E connection via a v6 ISP infrastructure at one end only





E2E Path 6 : v4 E2E connection via v6 ISP infrastructures at both ends