Hierarchical Routing Architecture draft-xu-rrg-hra-00

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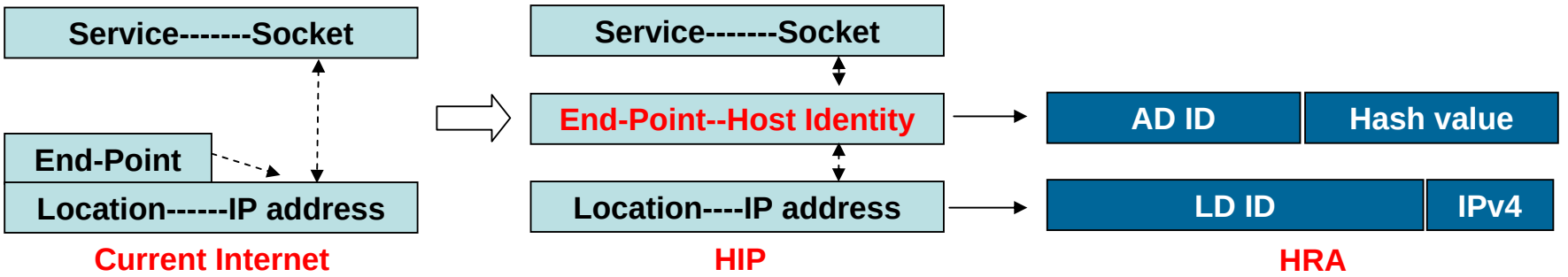
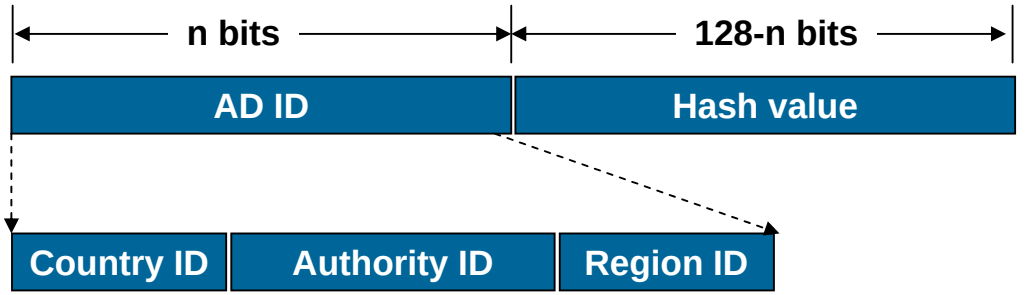
HRA Motivation

- **Solve the routing scalability issue**
  - Split ID and locator
- **Strengthen the security feature**
  - Cryptographic hash identifier
- **Solve the IPv4 address depletion issue**
  - Allow multiple IPv4 address spaces to coexist



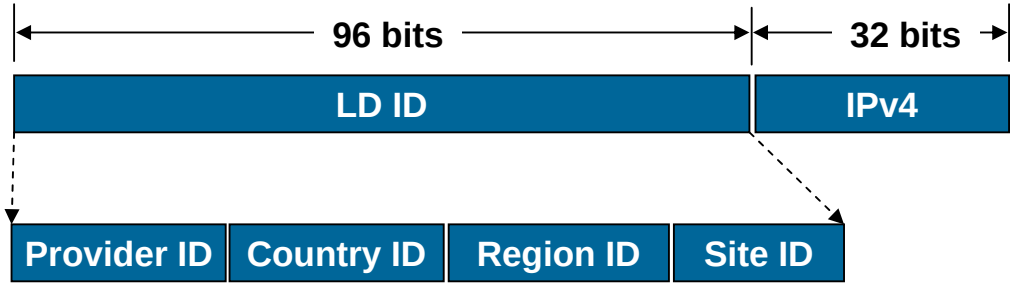
Hierarchical Identifier in HRA

- **128-bit identifier includes two parts:**
  - Administrative Domain (AD) ID with organizational affiliation embedded
    - – Enforce organization-level access control policy
    - – Economic&trust model in the id/locator mapping system
  - Hash value of the public key and the AD ID
    - – Intrinsic proofs of ownership
- **It's similar to, but not the same with CGA**



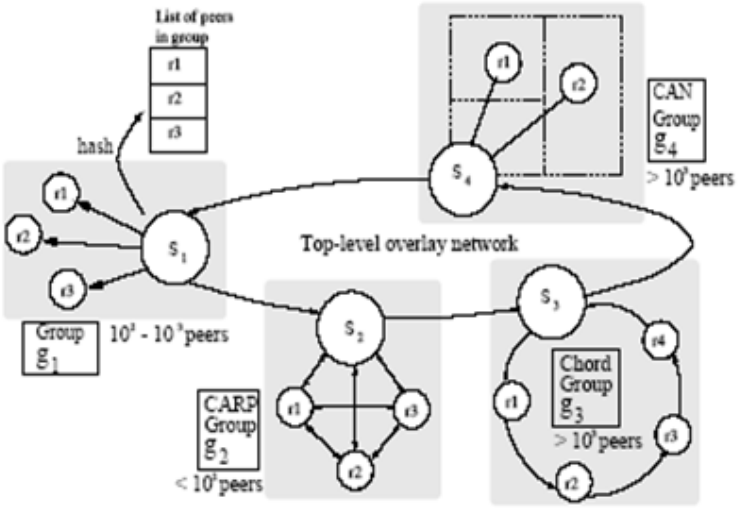
Hierarchical Locator in HRA

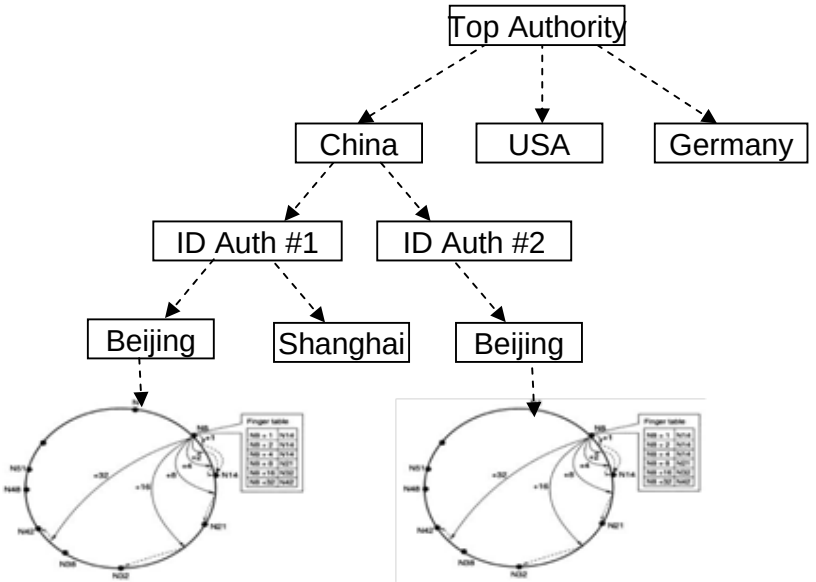
- **Global locator=LD ID(96 bits) + IPv4 address**
  - Allow multiple locator domains (LD) with independent IPv4 address space to coexist
    - Maximize the reuse of the existing IPv4 networks.
    - Site internal address portable.
  - Each LD has a globally unique ID
    - Topologically aggregatable, like provider-aggregatable address.
    - Geographical location awareness.
- **It can be looked as a special IPv6 address**



Hierarchical ID/locator Mapping System

- **Two options of the mapping system**
  - Hierarchical DHT
    - The former part (AD ID) of host ID used for routing on top-level DHT rings, the remaining part (hash value) used for routing on bottom-level DHT rings
  - Integrating DNS with DHT
    - DNS for the former part, AD ID
    - DHT for the latter part, the hash value

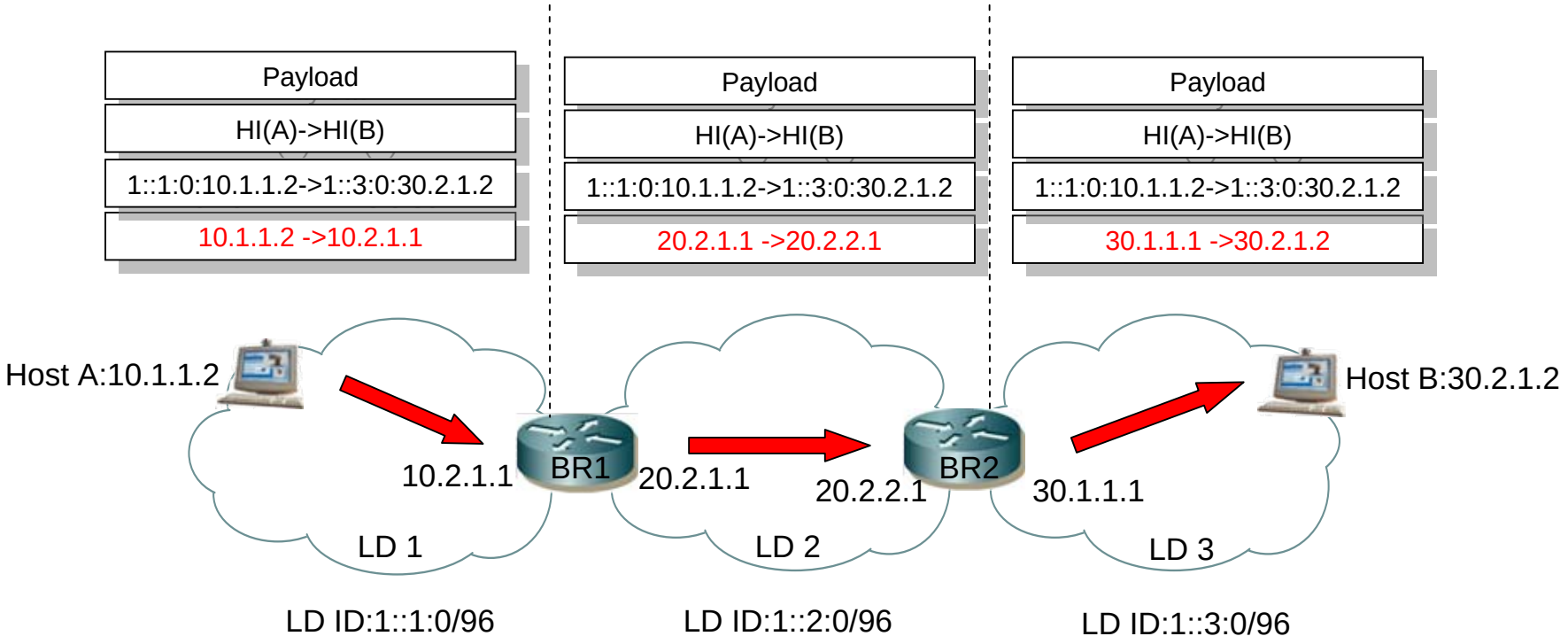




Routing Mechanism

Two-level routing mechanism

- LD ID based routing for inter-LD routing
  - LD ID can be aggregated into LD prefix, like IPv6 prefix.
- IPv4 address based routing for intra-LD routing
  - IPv4 address is now used as tunnel header among LDBRs



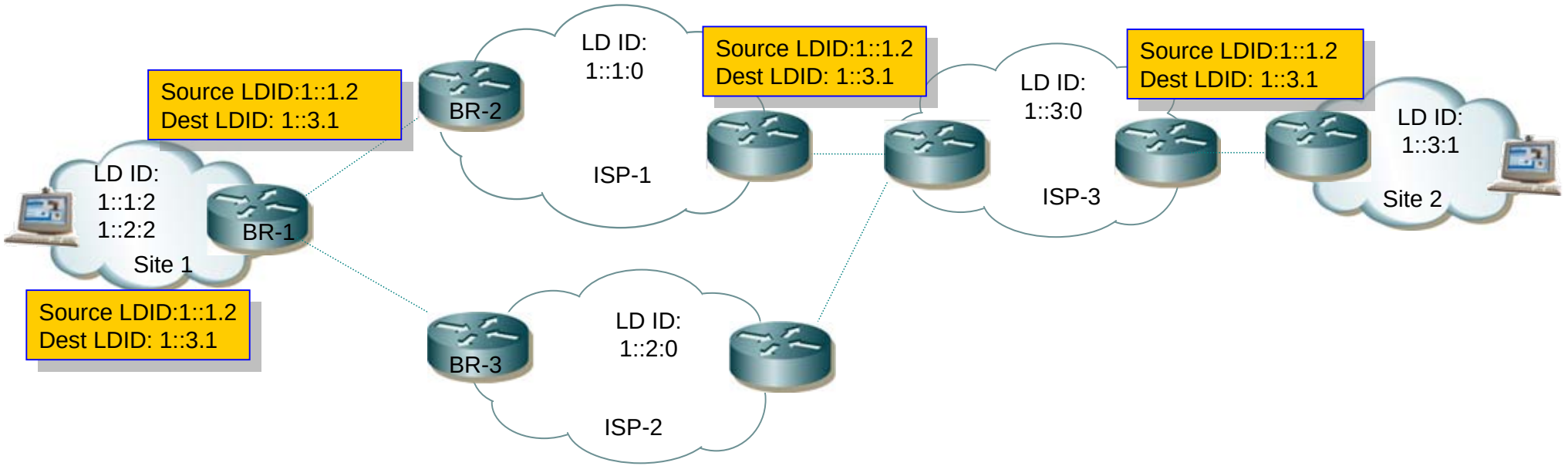
Multi-homing and Traffic-engineering

Multiple LD IDs allocated for the multi-homed LD

- One LD ID allocated from per ISP
- These LD ID are Provider-Aggregatable

Site-controlled traffic-engineering

- Site border router rewrites the source LD ID and enforces source-based policy-route on outgoing packets.



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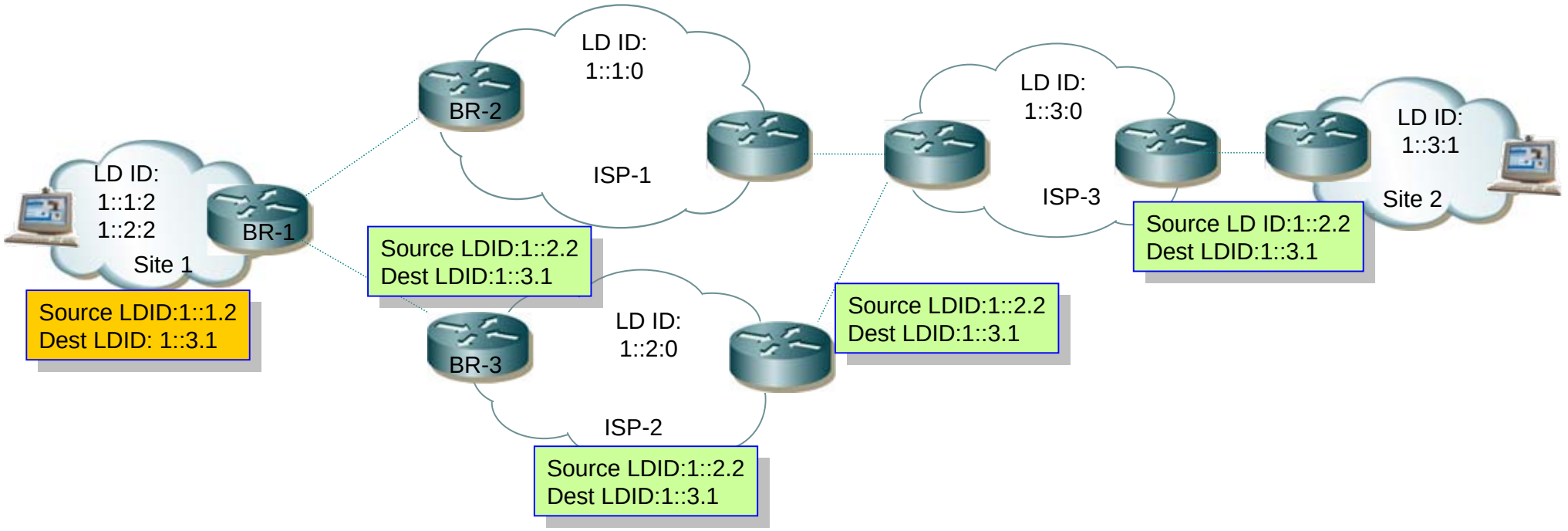

Conclusion

- Routing scalability and route stability improved
- IPv4 address depletion issue solved
- Built-in security in host identifier
- Geographic location awareness in LD ID
- Business and trust model in mapping system