

Efficient In-band Service Announcement Through IPv6 Address Encoding

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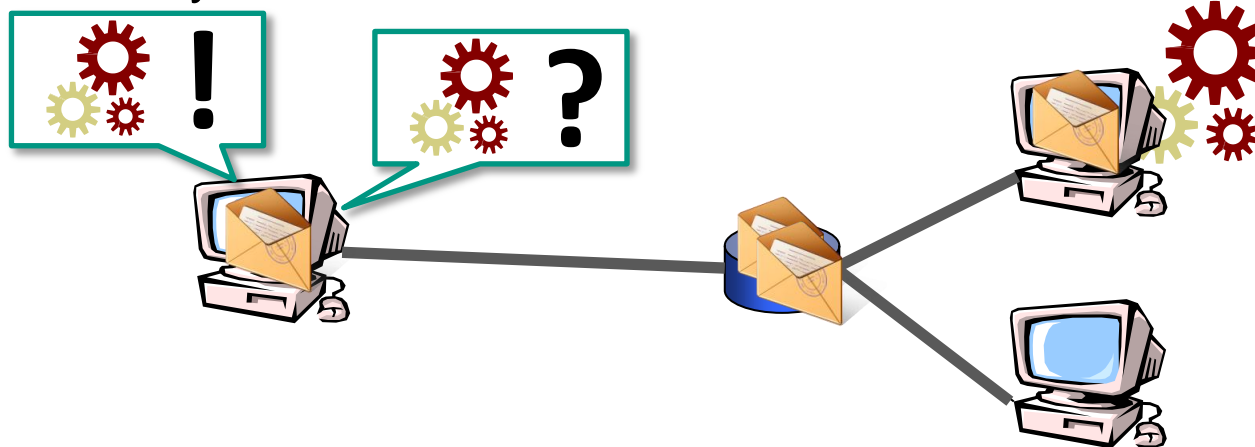


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Idea – Encoding Service Information

■ How to **find services** in a network?

→ today: dedicated service announcement/discovery mechanisms



■ explicit, additional overhead → **implicit** solution?

■ Idea: **Encode service information into IPv6 addresses**

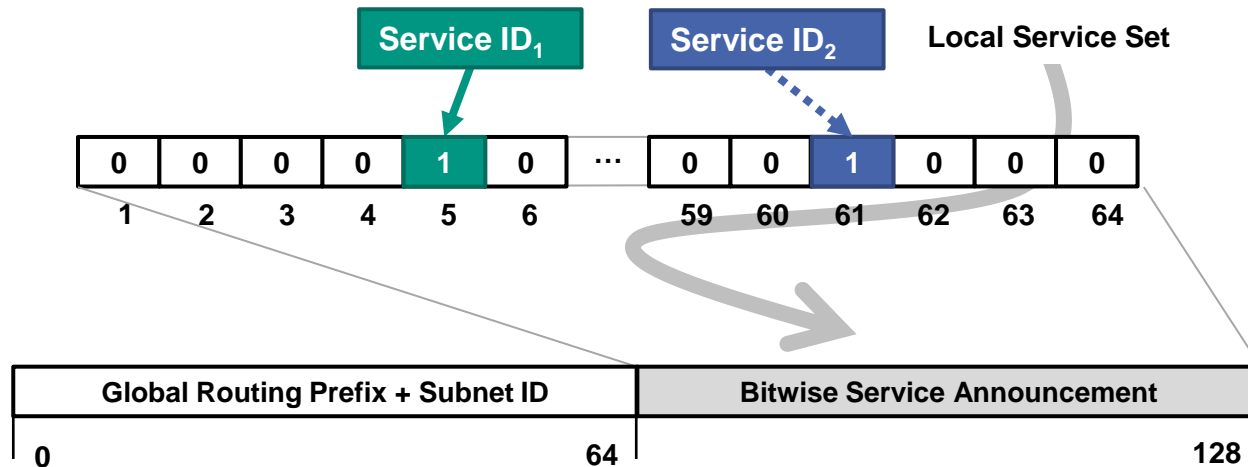
- encode services offered by system into its own IPv6 address
- infer information about provided services from IPv6 address
- lots of traffic to listen to → **collect service information!**

Encoding Schemes

- How to encode this information?
 - *62 bits of IPv6 address can be used for encoding services*

- **Bitwise** Encoding

- predefined bit for every service

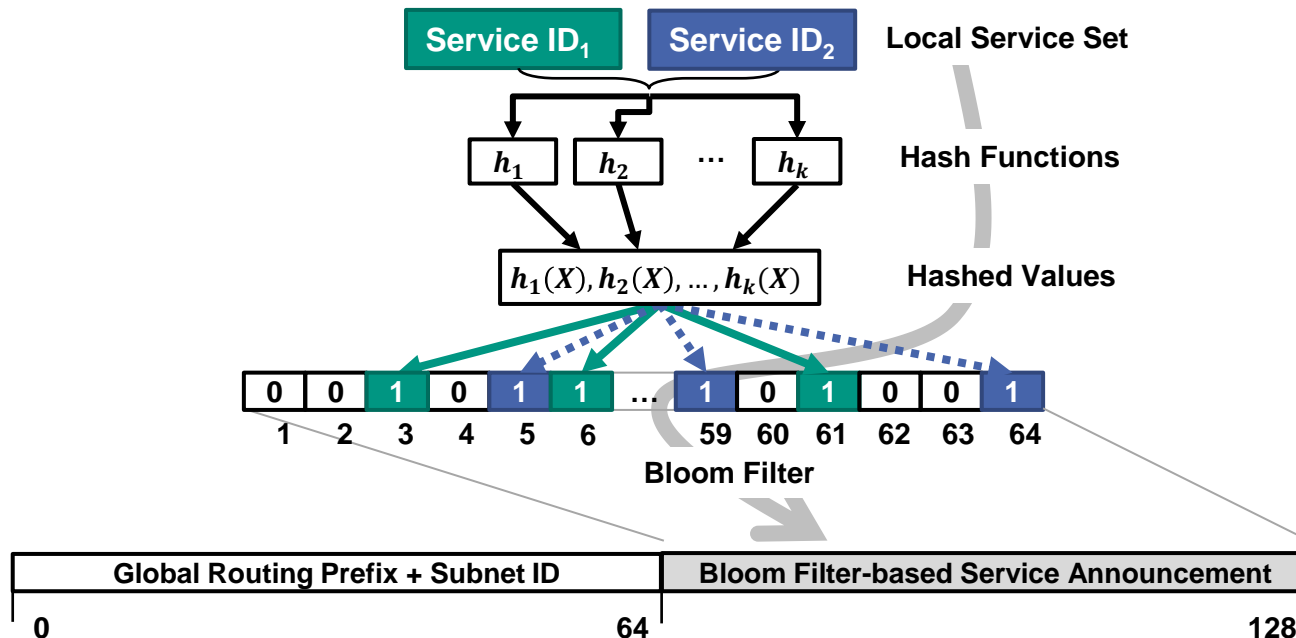


- *pro*: simple
 - *con*: fixed maximum number of services, service definition must be possible, requires homogeneous network (encoding performed by all systems)

Encoding Schemes

■ Bloom Filter Encoding

- probabilistic data structure that allows insert and query operations through multiple hash functions, no false negatives, false positives



- *pro*: number of services potentially huge and dynamically extensible
- *con*: false positives, limited number of concurrently encoded services
 - encoding of max ~10 services possible in one IPv6 address with 5% false positive probability

■ Pro-active service caching in LANs

- system can learn about available services “on-the-fly”
- restrict service decoding to LAN segment or authorized systems
 - use MAC address or secret key to seed the Bloom filter

■ Sensor network service discovery

- strong resource constraints
- overhead through dedicated discovery protocols

■ Peer-sampling in overlay networks

- encode useful information to improve peer sampling

Conclusion and Open Issues

■ Systematic use of free bits in IPv6 addresses

- no additional traffic → **inband**
- support existing service announcement/discovery mechanisms
- two exemplary encoding schemes: bitwise, Bloom filter based

■ Open Issues

- handling identical service sets on different systems
 - e.g. encode system's MAC address into Bloom filter
- handling Bloom filter false positives
 - e.g. hash a service indicating magic number into interface ID
- proof of concept implementation

Thank you for your attention! Questions?

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