

SCNP: A protocol for automatic, decentralized and scalable IP network configuration

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Outline

- 1 Motivation
 - Problem statement
 - Related Work
- 2 Our Solution
 - Main Results
 - Evaluation

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Network configuration in home networks

Home network model

- Hybrid form of ad-hoc and enterprise networks
- Mobile and relatively stable parts
- Different subnets (different networking hardware)
- Self-configured protocol is necessary

Problem

- **No currently existing network configuration protocol can handle these kind of home networks**

Network configuration: Functional requirements

Functional Requirements

- Initial Autoconfiguration
- Routing
- Address Uniqueness Guarantee

Network configuration: Non-Functional requirements

Functional Requirements

- Scalability (in a subnet, between subnets)
- Decentralization
- Self-configuration

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Link-local network configuration

Link-local network configuration

- Fully automatic protocols exist (AutoIP, Zeroconf-stack, IPv6 Stateless Autoconfiguration)
- No scalability between subnets
- No routing

Scalable network configuration

Scalable network configuration

- DHCP, IPv6 Stateless Autoconfiguration
- No self-configuration
- + Extra routing protocol

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IPv6 Address Configuration

```
FFC0:FFFF:100:F101:210:A4FF:FEE3:9566
```

Address-Type

Subnet Identifier

Interface Identifier

- Subnet identifier uniqueness (between routers)
- Interface identifier uniqueness (link-local)

Routing

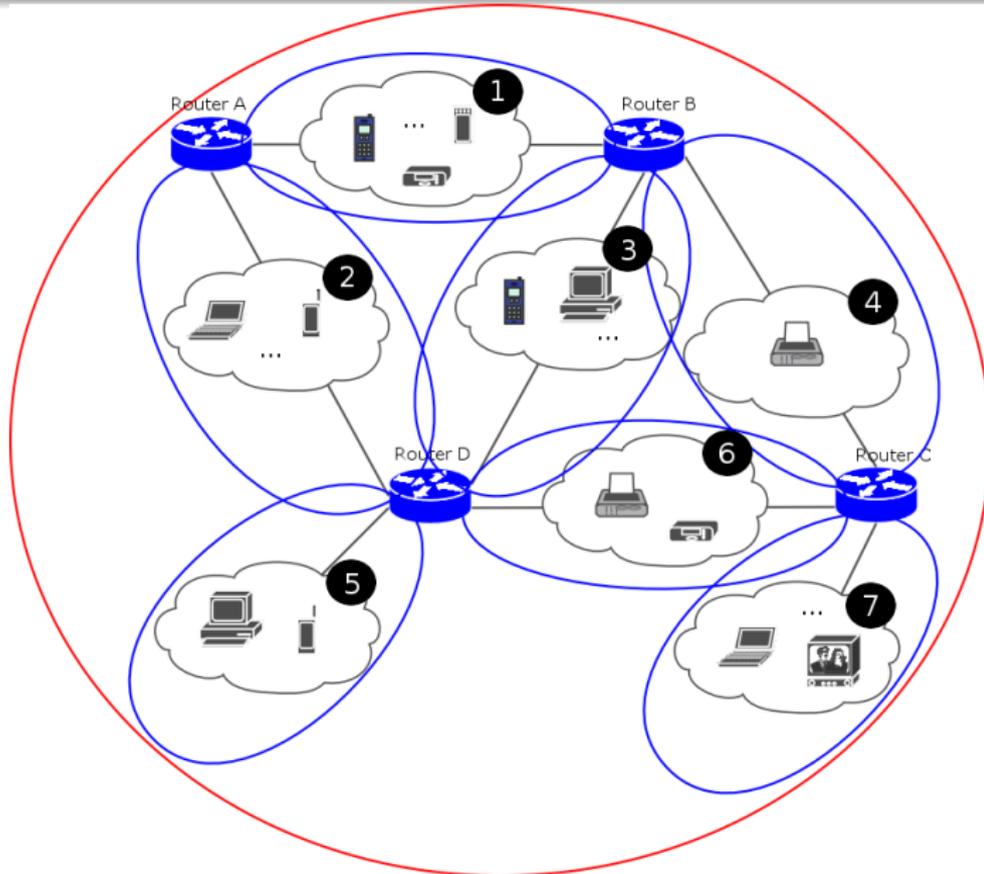
Routing

- Routing Protocol: OSPFv3
- All parameters can be automatically generated

Duplicate Detection

Duplicate Detection

- Interface identifier: IPv6 Stateless Autoconfiguration protocol
- Subnet identifier: Trigger from Routing algorithm
 - Old subnet identifiers are discarded
 - Process of initial network configuration is repeated



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Evaluation

Functional Requirements

- Initial autoconfiguration: IPv6 Stateless Autoconfiguration protocol + messages for generating unique subnet identifiers
- Routing: OSPFv3
- Address Uniqueness Guarantee: hook in routing algorithm + collision message

Evaluation

Non-functional requirements

- Scalability: Upper limit of routing algorithm
- Decentralization: All routers keep information about all other subnets
- Self-configuration: subnet and interface identifiers are automatically generated + validated, routing algorithm is dynamic

Summary

- Glue between IPv6 Stateless Autoconfiguration protocol and routing algorithm
- Added value
 - Generation of unique subnet identifiers
 - Collision reporting