# Stub Network AutoConfiguration

Problem Statement

- Hosts can connect to network infrastructure link automatically
  - infrastructure example: home WiFi network
- No similar way to connect a stub network to network infrastructure link, so that:
  - Hosts on stub network can reach hosts on infrastructure link
  - Hosts on infrastructure can reach hosts on stub net
  - Hosts on stub net can discover services on infrastructure link
  - Hosts on infrastructure can discover services on stub net
- Goal:
  - Connect a stub network to a network giving hosts on stub network the same experience as hosts on infrastructure

Popular non-solution

- The usual non-solution is to have a double NAT
- This has problems:
  - Devices on inner link can reach devices on outer link
  - Devices on outer link can't reach devices on inner link
  - Devices on inner link can't discover devices on outer link
  - Devices on outer link can't discover devices on inner link
  - Devices on both links can reach internet
  - So you're stuck with cloud-only solutions

Double-NAT topology

Home LAN

Double NAT LAN
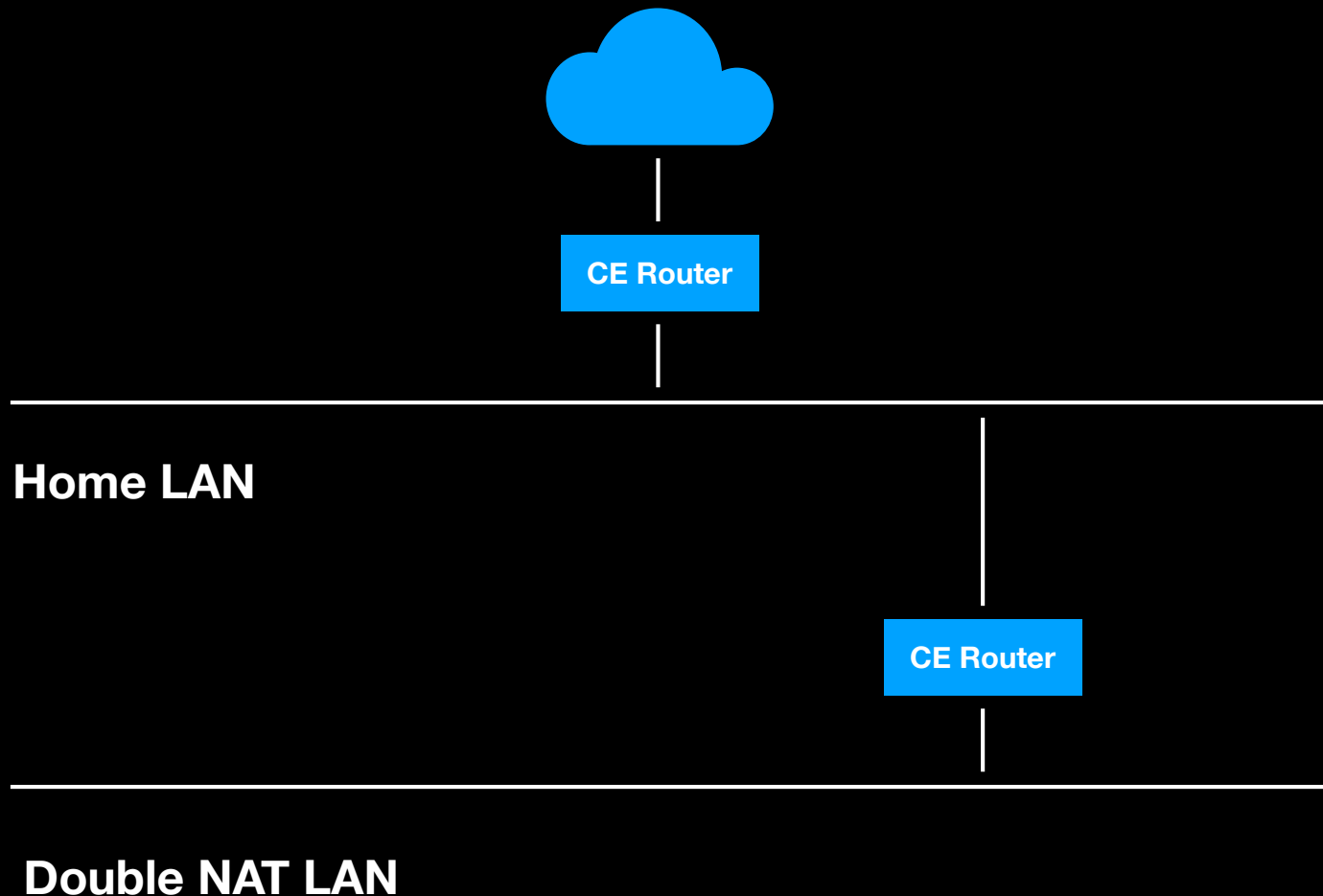
Goals

- Primary goals
  - Mutual reachability between stub hosts and infra hosts
  - Mutual discoverability between stub hosts and infra hosts
  - Stub hosts can reach services on the internet (firmware updates!)
- Stretch goals:
  - Hosts on stub networks can mutually communicate with hosts on non-adjacent links, within an administrative domain or the internet
  - Hosts on stub networks are discoverable on non-adjacent infrastructure links, or possibly on the internet
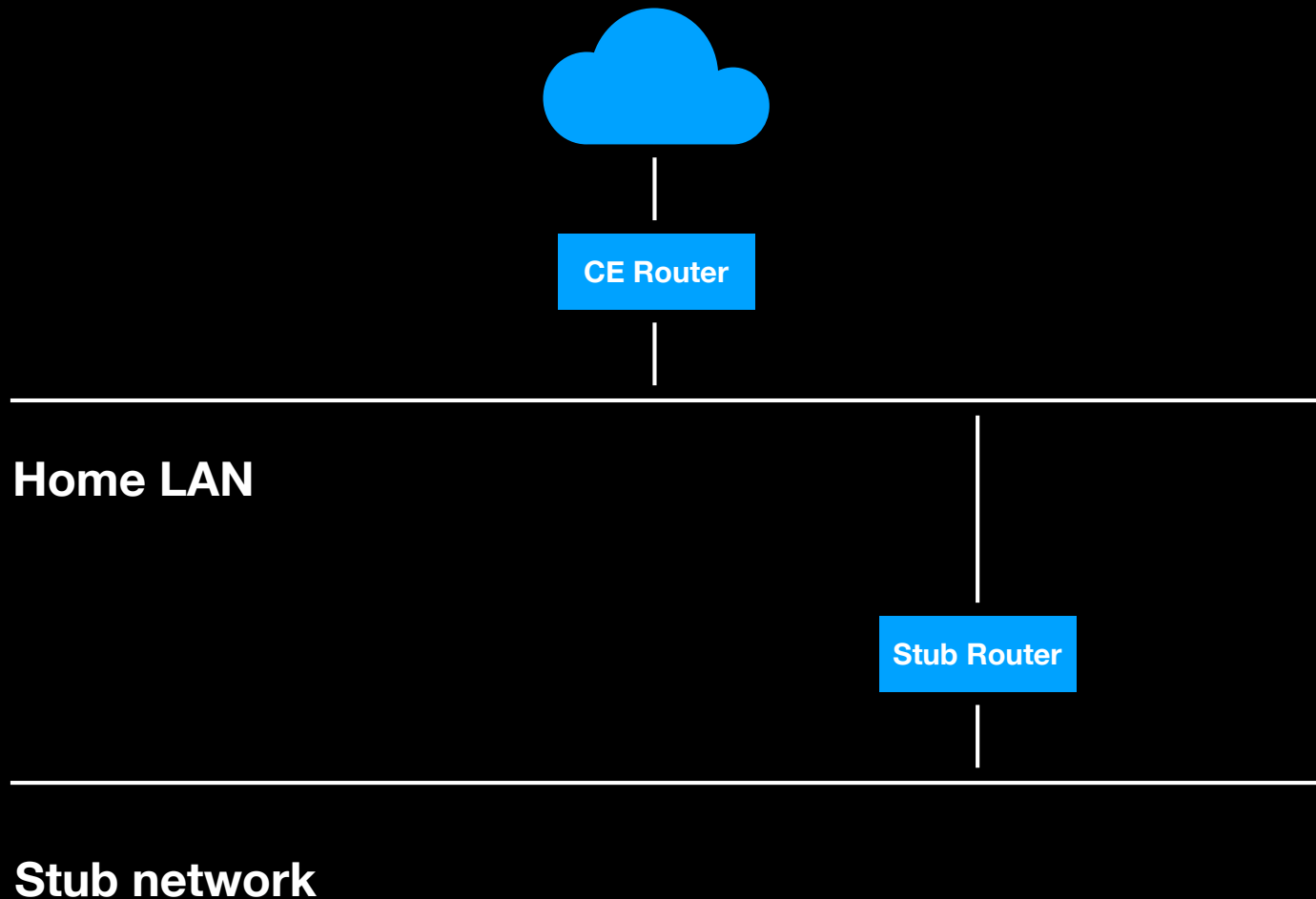
Constraints

- This has to work with existing networks:
  - We can't require changes to people's home routers, for example
  - We can't require changes to infrastructure hosts
- Stub networks might be green-field or ordinary
  - Green-field example: constrained network that doesn't currently provide IP routing
    - In this case we can require changes to hosts
  - Ordinary example: like the double NAT, but without the limitations
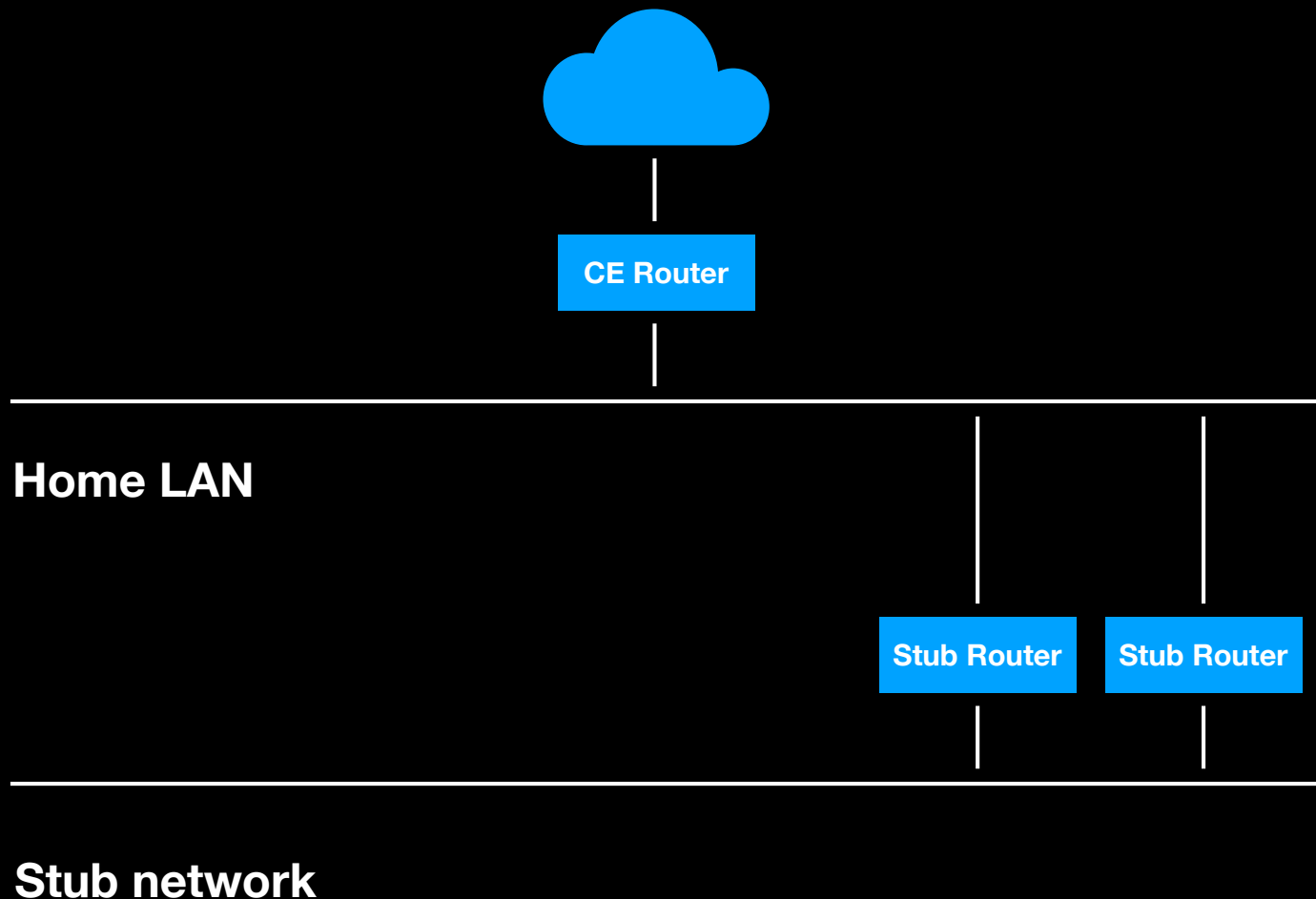   - In this case, we can't require changes to hosts

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Topology constraints

- Stub networks are not transit networks:
  - we don't want or need routing across stub networks
- Stub networks may be multiply connected:
  - more than one stub network router connected to same stub network
  - stub routers connected to one stub network may be connected to different infrastructure links
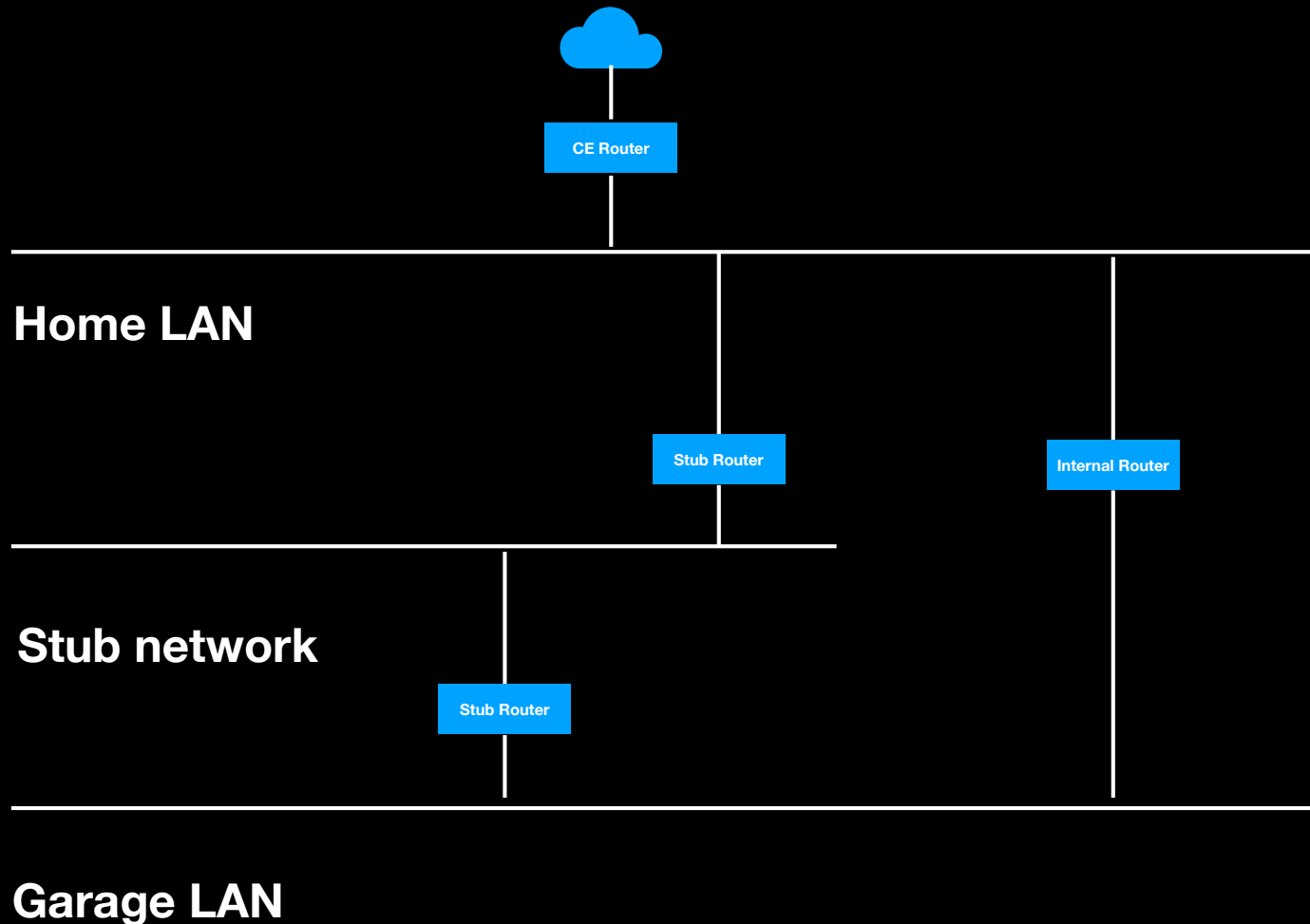   - Not clear we can support this, and if so how we would support it

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Simple Stub topology

Home LAN

Stub network

Multi-router Stub topology

CE Router

Home LAN

Stub Router **Stub Router**

Stub network

Multi-link topology

Home LAN

Stub network

Garage LAN

Assumptions

- Based on analysis in draft-lemon-stub-networks-ps
  - Use IPv6
  - Use routing
  - Use DNS Service Discovery
- Are these assumptions controversial?

Service Discovery

- Current home networks use multicast DNS for service discovery
- This is widely deployed, and widely supported:
  - Linux
  - Android
  - Apple iOS, MacOS, etc.
  - Windows
- Other alternatives?

Deliverables

- A document that describes how to address the initial goals
  - e.g., draft-lemon-stub-networks
- Additional documents required to address stretch goals, e.g.
  - DHCPv6 PD to acquire stub network on-link prefix
  - How to include stub network DNSSD in an infrastructure-provided DNSSD service