Stub Networks

(problem statement)

https://tools.ietf.org/html/draft-lemon-stub-networks-ps-00
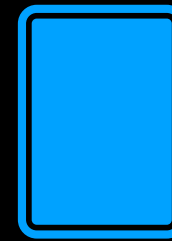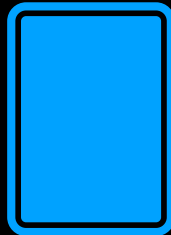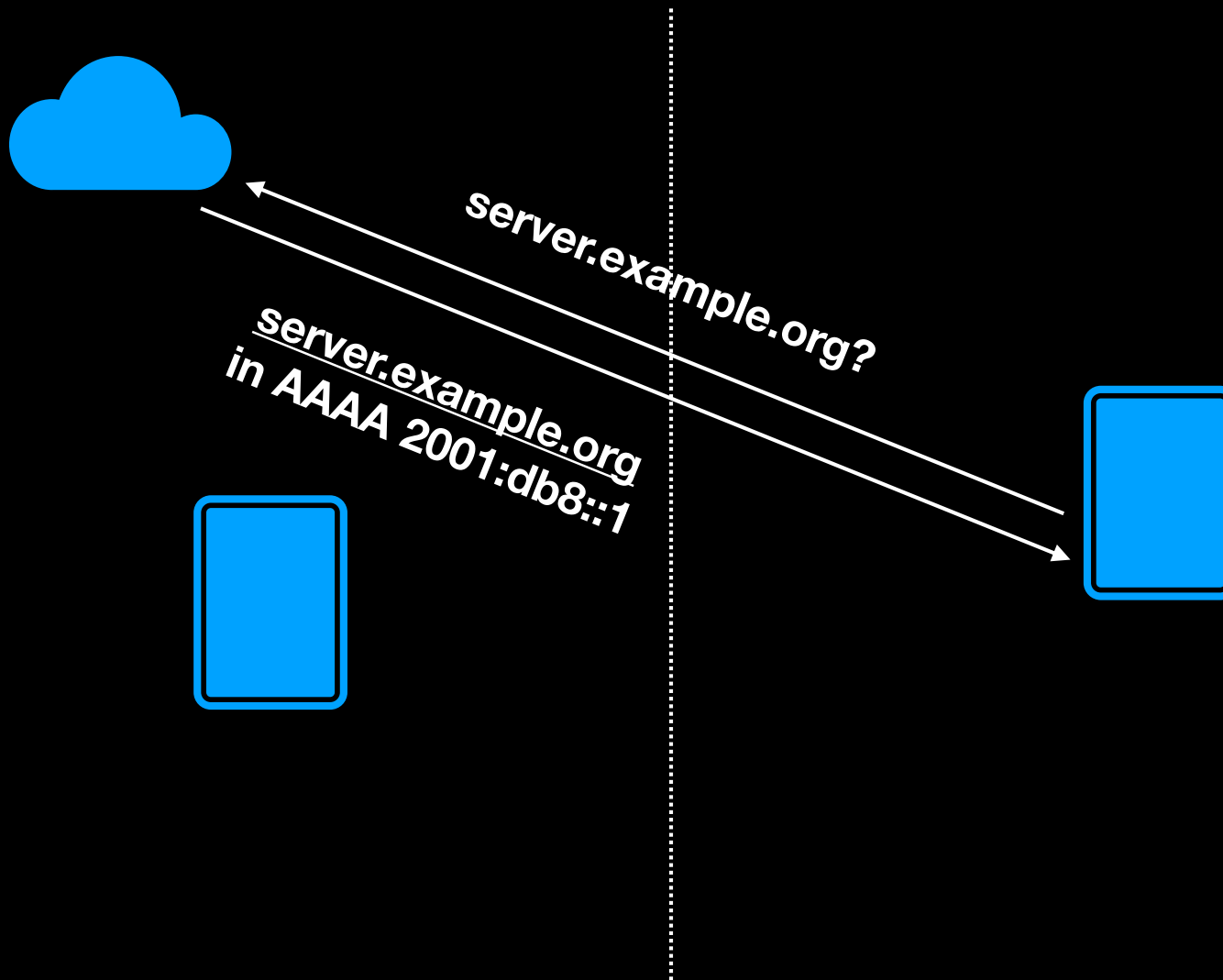
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Common flow:
host connects to
infrastructure network

Common Flow:
Host connects to Network

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Host discovers internet server using DNS

server.example.org?

server.example.org
in AAAA 2001:db8::1

Host communicates with internet server

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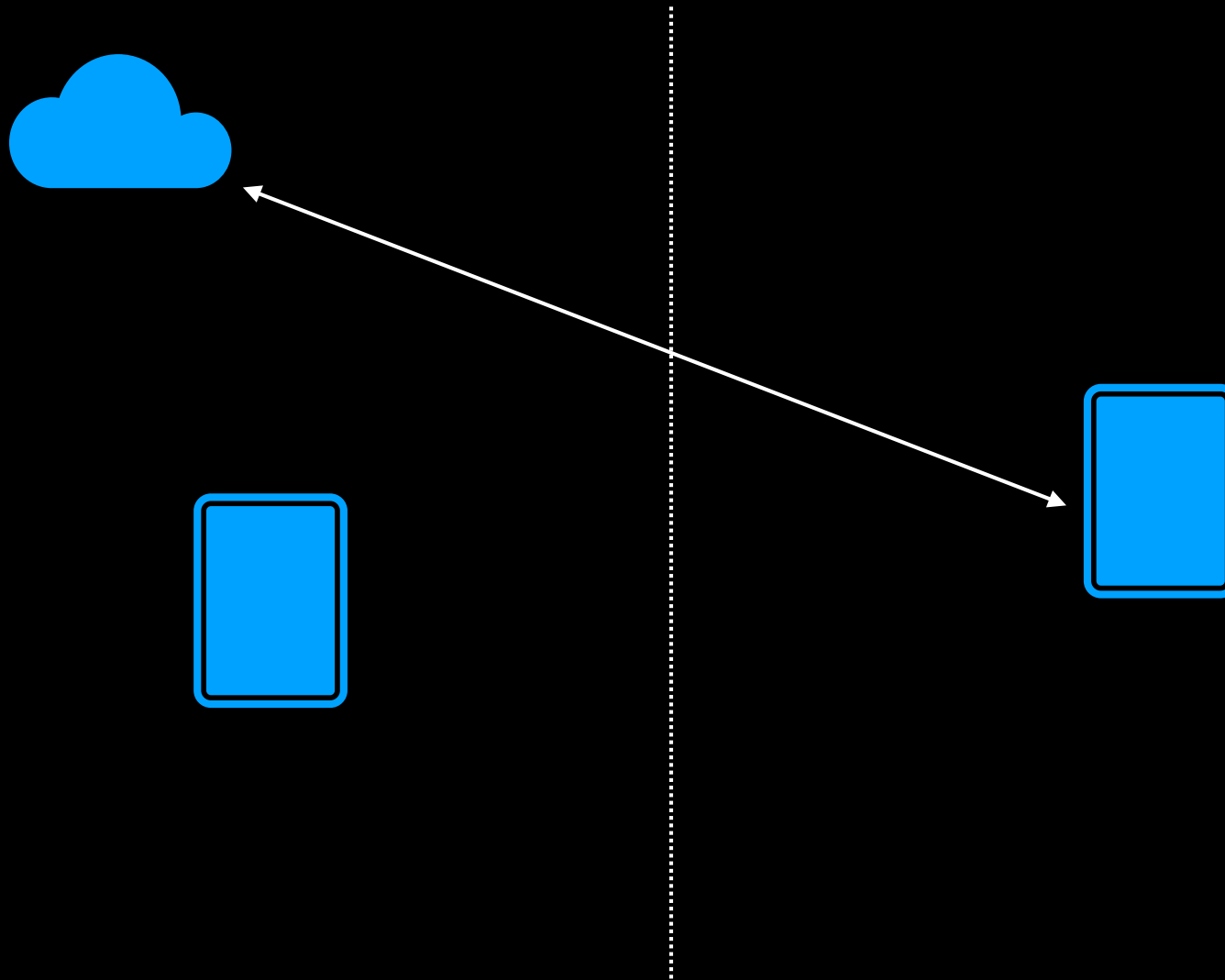
Host discovers local service using mDNS

_xmpp._tcp.local IN PTR?
alice._xmpp._tcp.local IN SRV?
alice.local IN AAAA?

_xmpp._tcp.local IN PTR alice._xmpp._tcp.local
alice._xmpp._tcp.local IN SRV 0 0 42061 alice.local
alice.local in AAAA fd20:01db:800::1

Host communicates with local service

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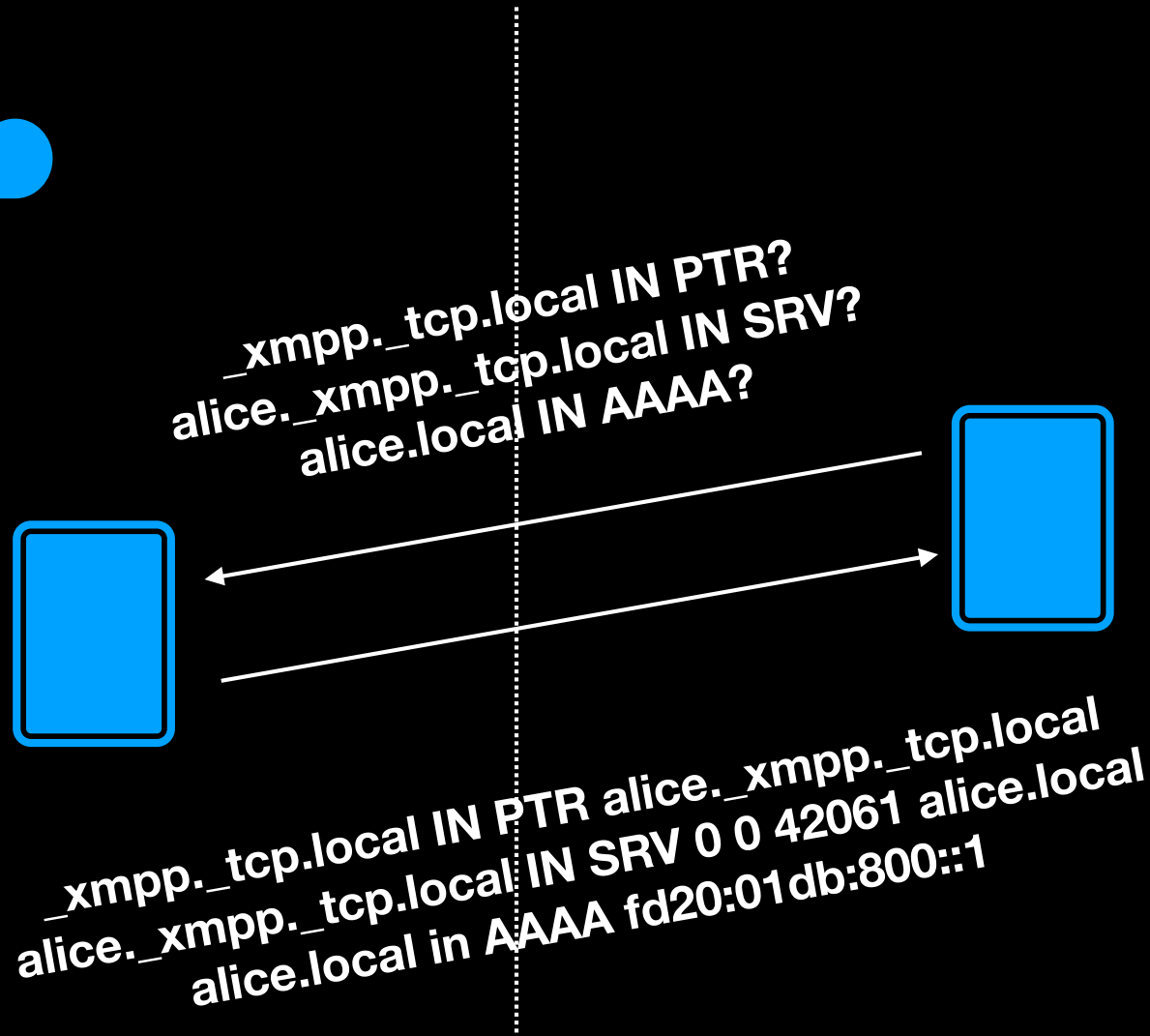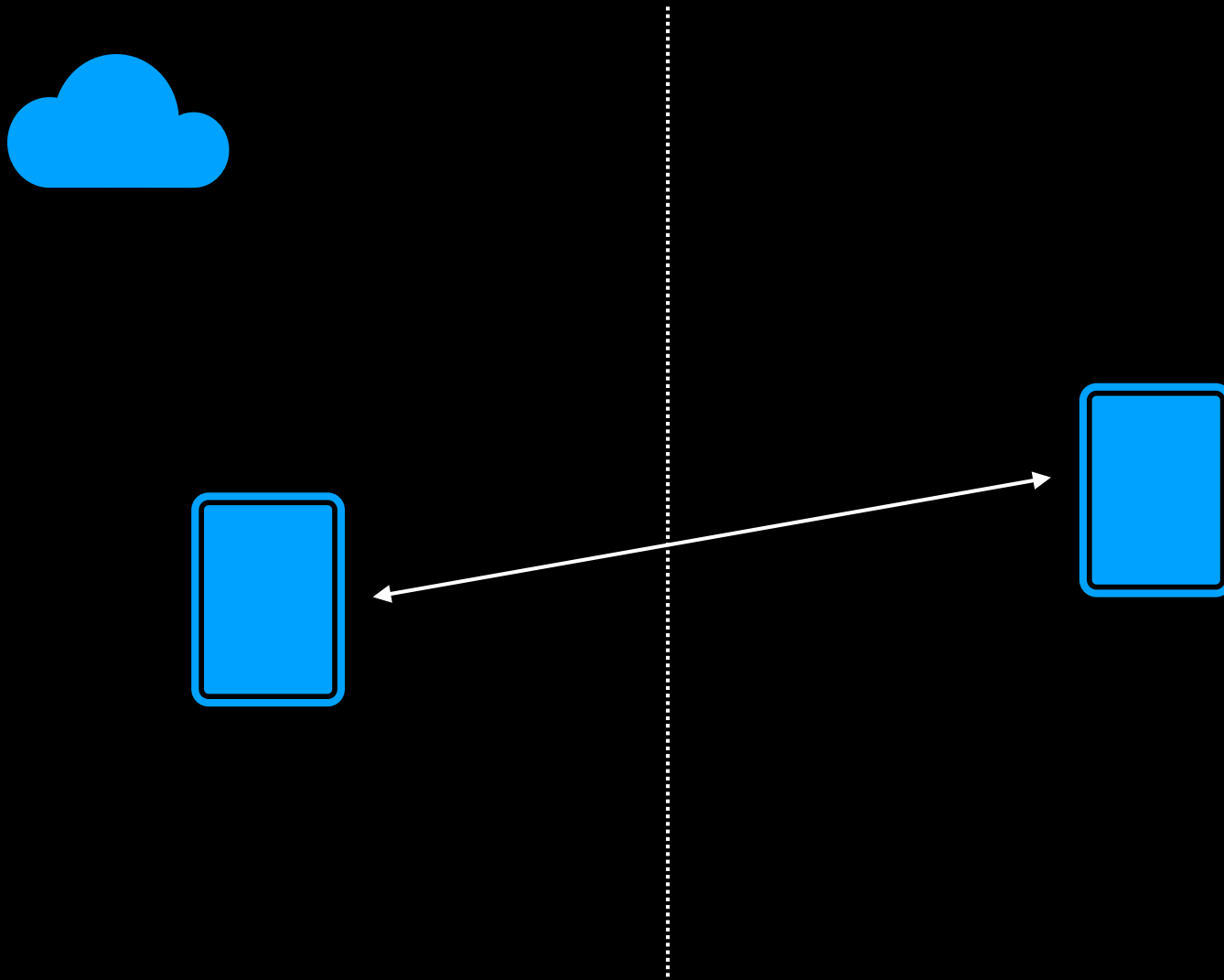
Local host discovers service on device using mDNS

_xmpp._tcp.local IN PTR?
bob._xmpp._tcp.local IN SRV?
bob.local IN AAAA?

_xmpp._tcp.local IN PTR bob._xmpp._tcp.local
bob._xmpp._tcp.local IN SRV 0 0 42061 bob.local
bob.local in AAAA fd20:01db:800::1
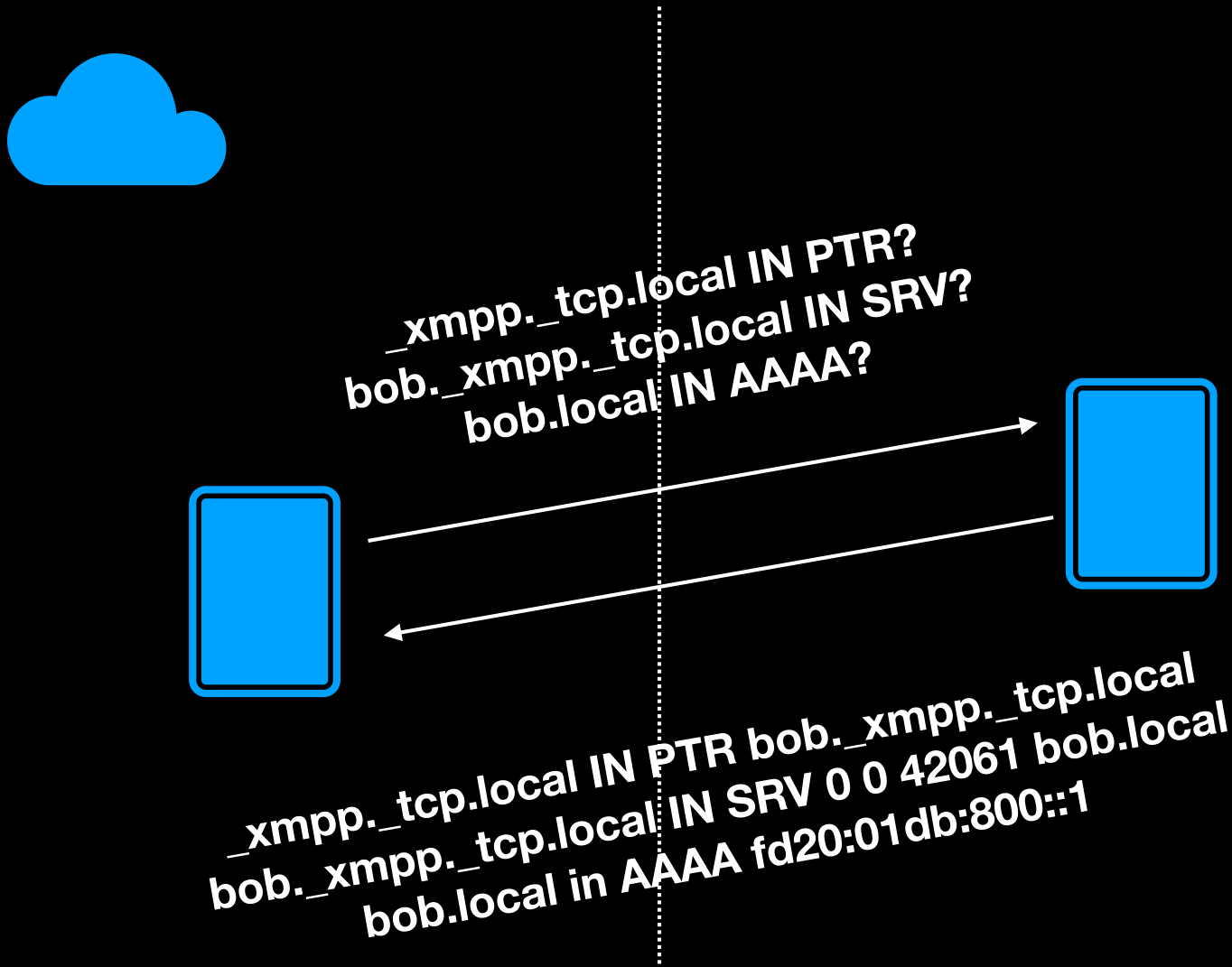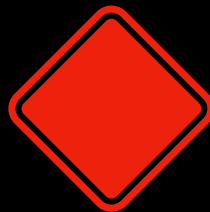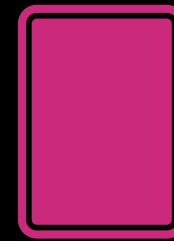
Host communicates with local service
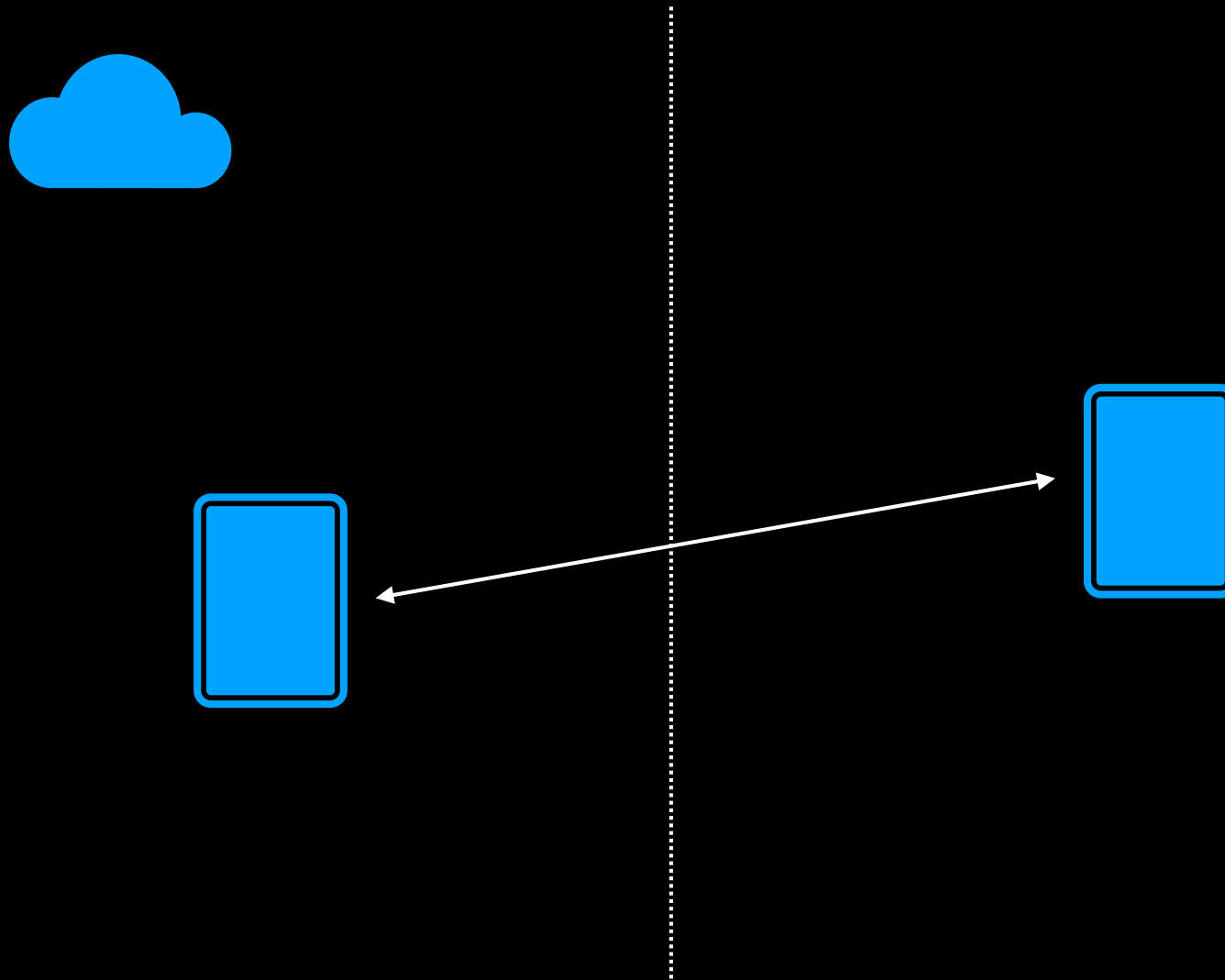
New flow:
stub network connects to
infrastructure network

New Flow:
Stub network connects to Network

Stub Router

Stub Device

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The Problem

We know how to:
- Automatically connect individual devices to infrastructure
- Discover internet services from device
- Connect to internet services from device
- Discover local services from device
- Connect to local services from device
- Advertise services on device
- Receive connections from infrastructure-attached devices

The Problem

We don't know how (without NAT) to:
- Automatically connect stub network to infrastructure
- Connect to internet services from stub device
- Discover infrastructure services from stub device
- Connect to infrastructure services from stub device
- Advertise services on device on infrastructure
- Receive connections from infrastructure-attached devices

Use cases (e.g.)

Portable device with IP addressable devices (PAN)
- Single stub router

Constrained stub networks (e.g. 802.15.4)
- Possible multiple stub routers

Target environment

Existing IPv4 networks

Existing IPv6 networks

Home

Commercial

What can we assume is present?

On an IPv4 network, we have no IPv6 service

On an IPv6 network, we do have IPv6 service
- We may or may not have DHCPv6 PD

If stub network is greenfield, we can specify new behavior

Otherwise, we have to depend on existing behavior

Solutions (reachability)

Use IPv4 RFC 1918 addressing on stub network
- Doesn't work for 6lowpan
- Connecting in is hard

Use IPv6 NAT
- Connecting in is hard

Use existing IPv6 prefix
- ULA on stub
- advertise reachability to ULA on infrastructure
- Can't connect to cloud

Use DHCPv6 PD to get prefix for stub
- Advertise reachability to PD prefix on infrastructure, or
- on managed networks,

Probably need some combination of these, discard the ones that don't add value (e.g. IPv6 NAT)

Solutions (discoverability)

Discoverability on infrastructure:
- Stub devices advertise with DNSSD Service registration
- DNSSD Advertising Proxy to discover stub devices from infrastructure
- DNSSD Discovery Proxy to discover infrastructure services from stub devices
- On managed networks, can use DNSSD Discovery Proxy for discovering stub devices

Thoughts?

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