Provisioning Domains

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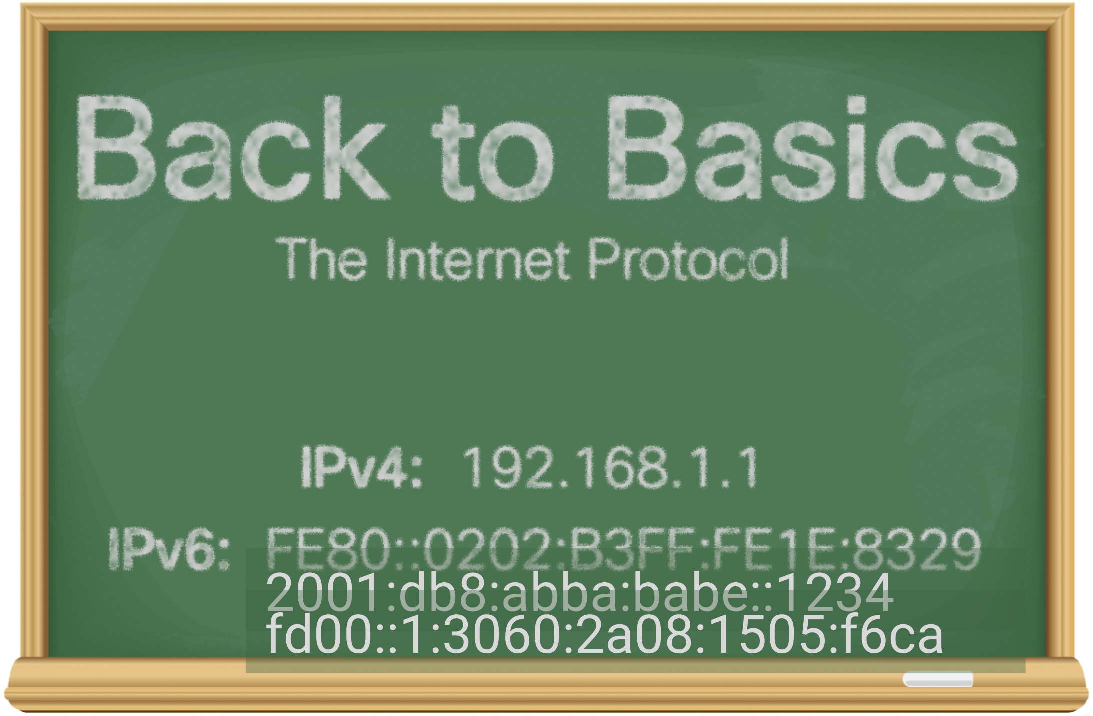
IETF 98, March 2017
Chicago, US

WHAT ARE WE TRYING TO SOLVE?

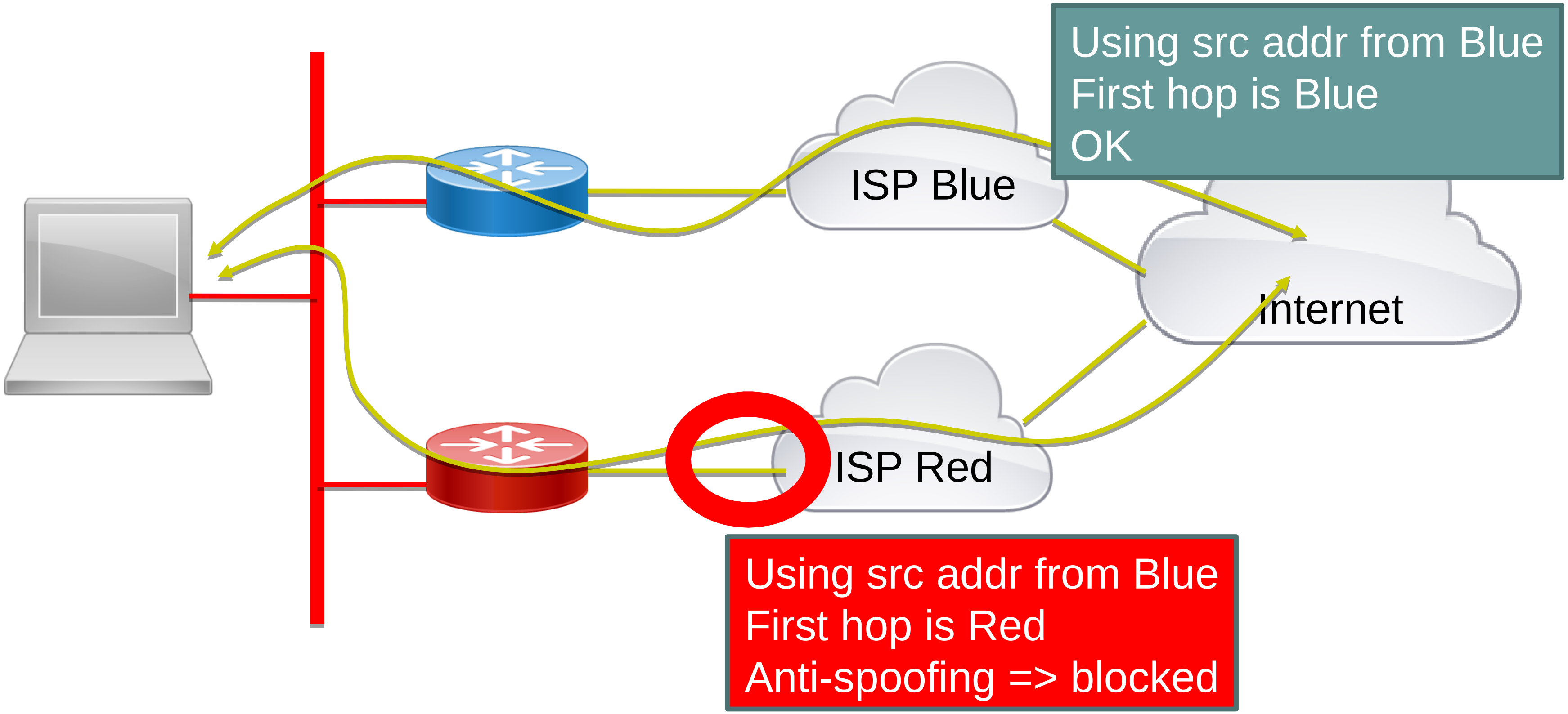


2001:db8:abba:babe::1234
fd00::1:3060:2a08:1505:f6ca

IPv6 Nodes have Multiple Addresses

- Each IPv6 nodes can have multiple addresses
  - 1 Link-Local Address
  - Several Global Addresses
    - Through DHCPv6 which can give multiple addresses
    - Through Stateless Address Auto Configuration (SLAAC)
      1. Based on several distinct Router Advertisements from each adjacent IPv6 routers
      2. Each Router Advertisements can include multiple /64 prefixes
      3. Nodes then generate 1, 2, ... Addresses per prefixes

Issue with Multi-Homing (Resiliency)



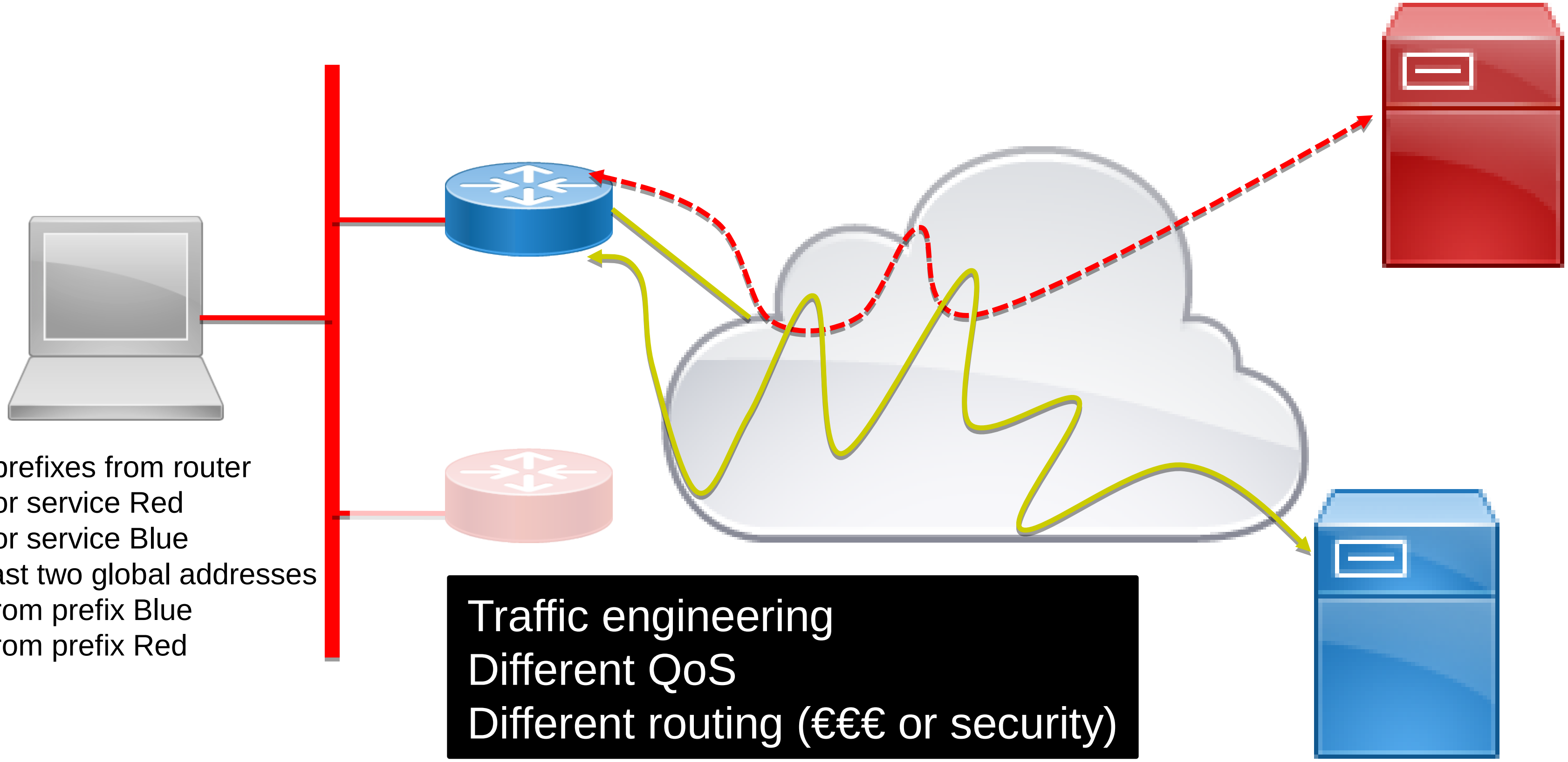
Using src addr from Blue
First hop is Blue
OK

Using src addr from Blue
First hop is Red
Anti-spoofing => blocked

Solving the First Hop Issue

- Need to associate a prefix with first hop
- Mainly a host issue (IETF work in progress)
- More complex (provisioning domain)
  - DNS servers from different ISP can have a different view (wwwin.cisco.com does not exist in global DNS)
  - **Provisioning domain** (PvD)
  - Need support in multi-interface router, IETF work in progress (Cisco, Apple, Google)
- Could have multiple layers of routers
  - **Destination / source routing** (IETF work in progress, aka source address dependent routing SADR) easier that Policy Based Routing

Use case 3: Service Selection



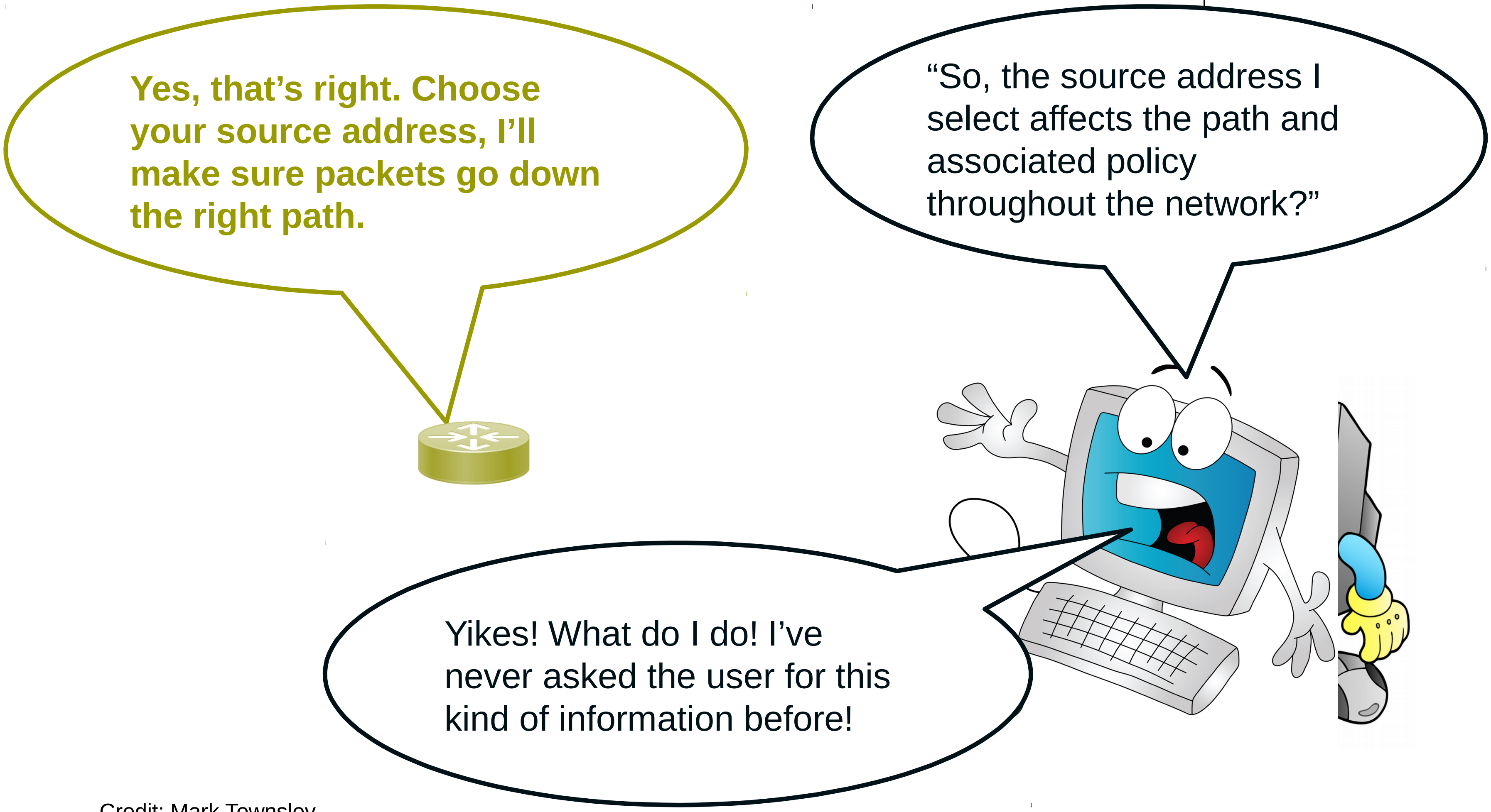
Two prefixes from router

1. For service Red
2. For service Blue

At least two global addresses

3. From prefix Blue
4. From prefix Red

Traffic engineering
Different QoS
Different routing (€€€ or security)

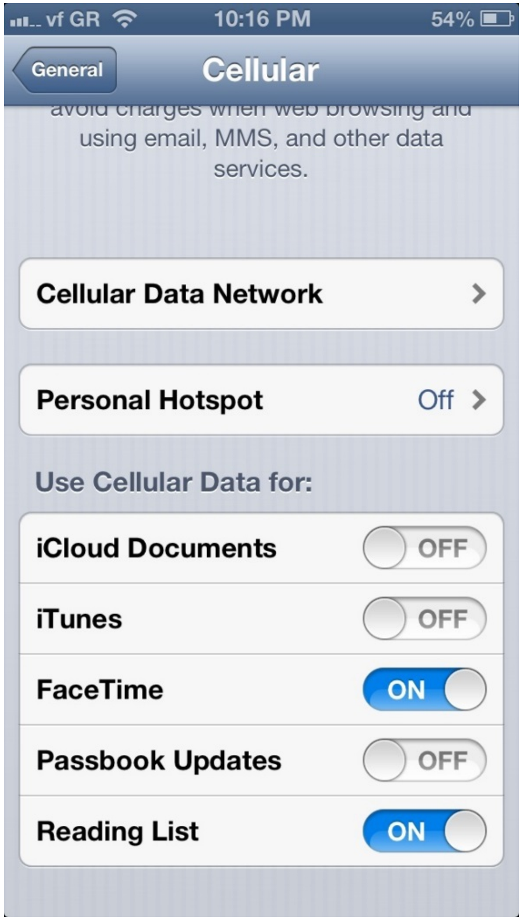


“So, the source address I select affects the path and associated policy throughout the network?”

Yes, that’s right. Choose your source address, I’ll make sure packets go down the right path.

Yikes! What do I do! I’ve never asked the user for this kind of information before!

Credit: Mark Townsley



Cellular

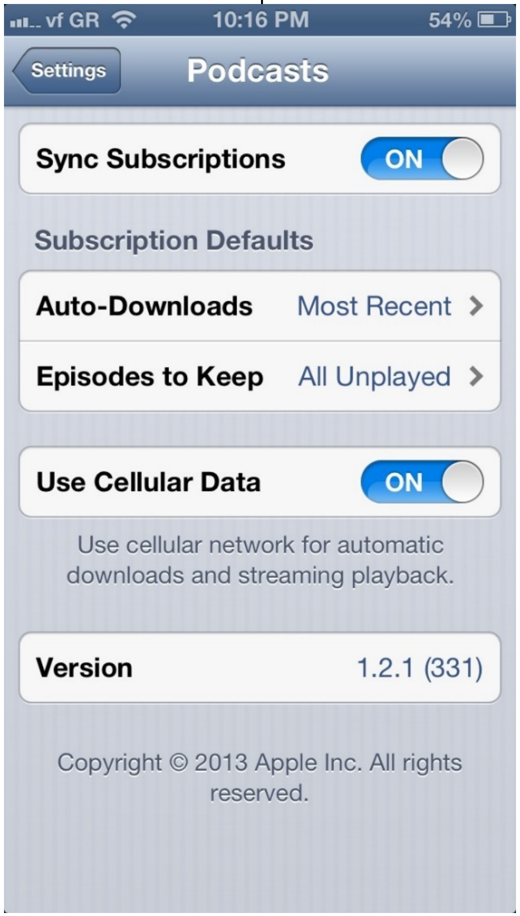
avoid charges when web browsing and using email, MMS, and other data services.

Cellular Data Network >

Personal Hotspot Off >

Use Cellular Data for:

iCloud Documents	OFF
iTunes	OFF
FaceTime	ON
Passbook Updates	OFF
Reading List	ON



Podcasts

Sync Subscriptions ON

Subscription Defaults

Auto-Downloads	Most Recent >
Episodes to Keep	All Unplayed >

Use Cellular Data ON

Use cellular network for automatic downloads and streaming playback.

Version 1.2.1 (331)

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PROVISIONING DOMAINS (PVD)

Provisioning Domain (PvD)

- Configuration items for a node to access a network
  - PvD ID (similar to FQDN) to tag all PvD information
    - can be used to remove PvD information when PvD is expired/removed/..
  - Human readable (localized) name
  - Prefix, next-Hop router
  - Internet access is possible
  - Captive portal is present
  - Recursive DNS server, DNS search list
  - Maximum Throughput, latency
  - Financial cost structure
  - Time validity/refresh period of the PvD
  - Security
  - Quality of Service for the first hop

Bootstrap PvD

- Bootstrap PvD information added to IPv6 Router Advertisement
  - PvD applies to all Prefix Information Options (PIO)
    - Use multiple RA if the PvD is not to be shared among PIO
  - Main information is PvD ID: a FQDN
  - Optional information as a string
    - “nl10n=Connexion à Internet;mp6=2001:db8::/32;cp=1”
  - Bootstrap PvD ID may be used to retrieve additional PvD information (next slide)

2nd Stage PvD

- A JSON file can be fetched via https://<PvDID>/v1.json
- All HTTP headers MUST be enforced
  - Accept-Language
  - Expiration
- The “masterIpv6Prefix” key is used to check whether the RA PIO is correct

What kind of information?

- DNS information including search domains
- Reachable prefixes
- Internet access or walled garden
- Captive portal is present
- IPv4 NAT ㅘ presence, time-outs
- Segment Routing Header value
- Cost structure

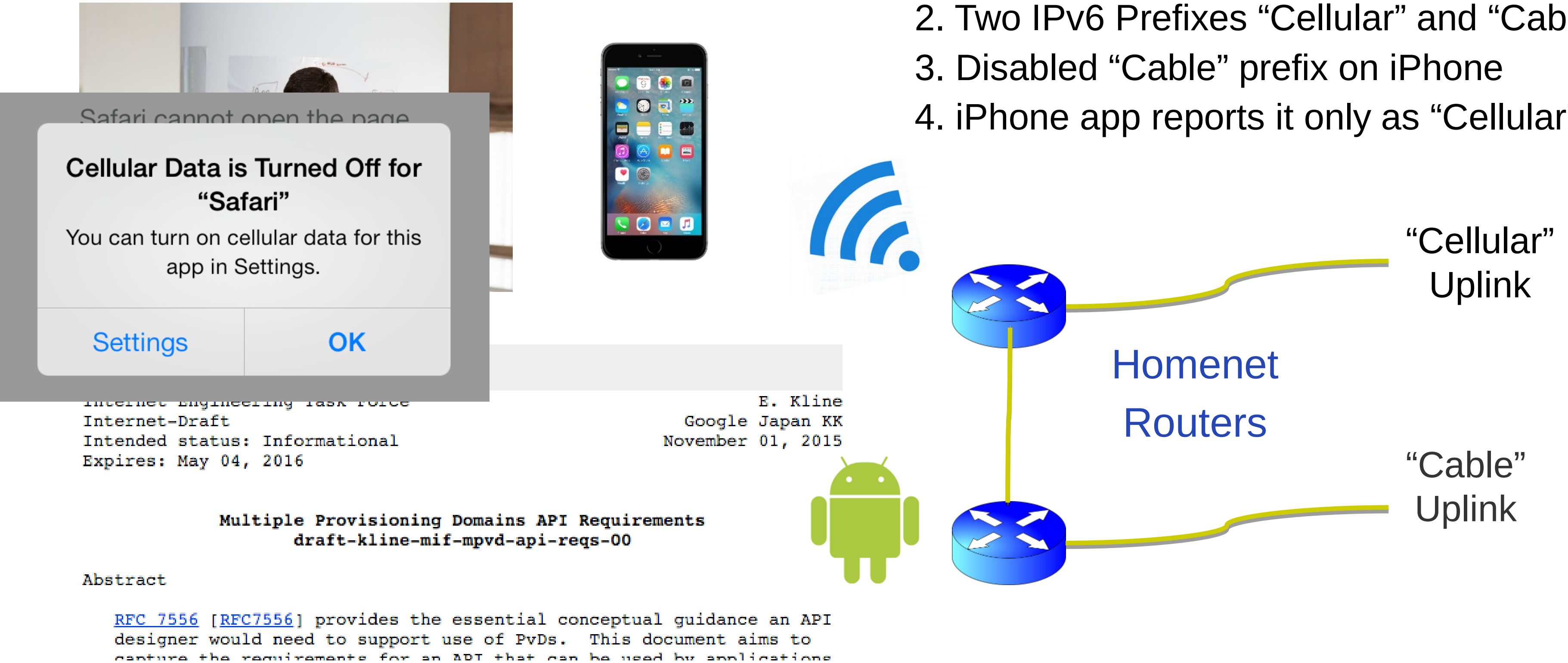
Link to IPv4 Information

- PvD obtained by IPv6 could be linked to IPv4
  - IPv4 prefix included in bootstrap/2nd-stage PvD ?
  - Link via the source MAC address of the RA w/ DHCPv4 message
  - Interface ID (such as 3GPP link) when not ambiguous
  - DNS search list of DHCPv4 and IPv6 PvD

RUNNING CODE

IPv6 Multiprefix @ IETF 94 Hackathon - Test

1. One Homenet SSID
2. Two IPv6 Prefixes “Cellular” and “Cable”
3. Disabled “Cable” prefix on iPhone
4. iPhone app reports it only as “Cellular”



Safari cannot open the page

Cellular Data is Turned Off for “Safari”

You can turn on cellular data for this app in Settings.

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Internet Engineering Task Force                                E. Kline
Internet-Draft                                         Google Japan KK
Intended status: Informational                        November 01, 2015
Expires: May 04, 2016


                Multiple Provisioning Domains API Requirements
                      draft-kline-mif-mpvd-api-reqs-00

Abstract

   RFC 7556 [RFC7556] provides the essential conceptual guidance an API
   designer would need to support use of PvDs.  This document aims to
   capture the requirements for an API that can be used by applications
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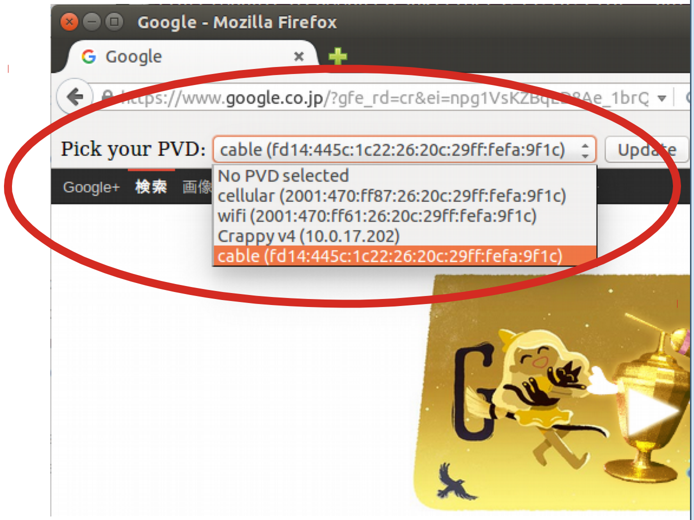
IPv6 Multiprefix Application Integration

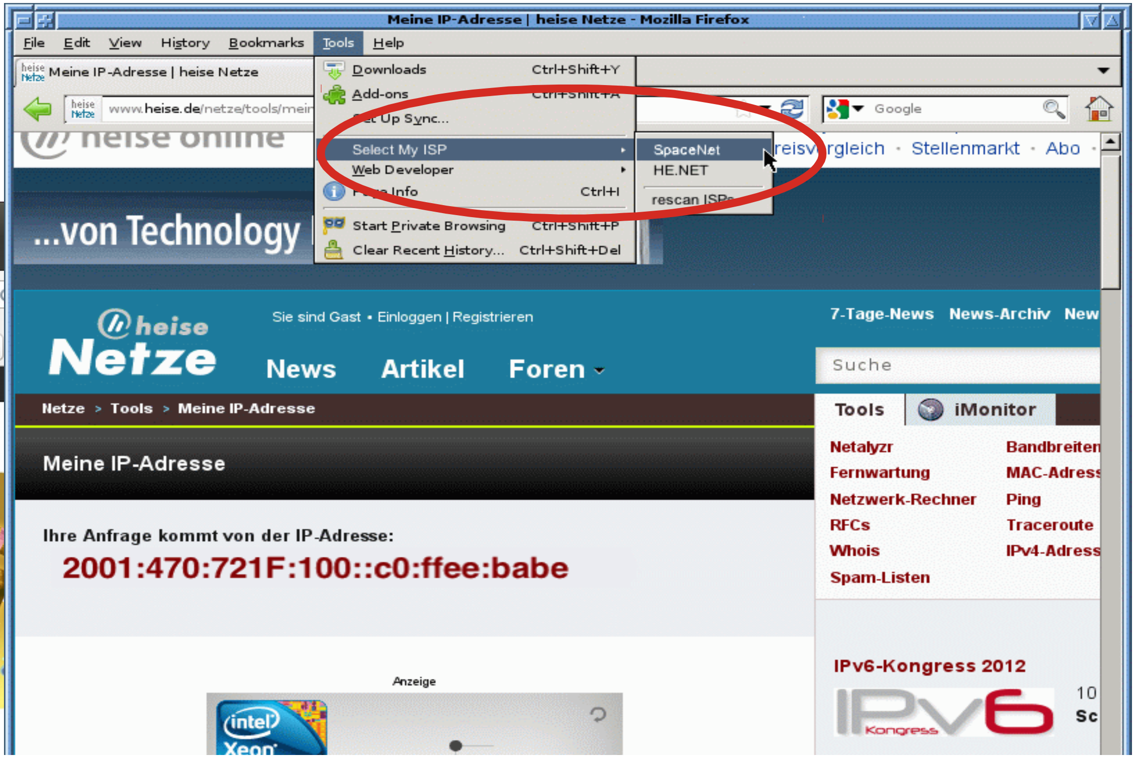


Google - Mozilla Firefox

https://www.google.co.jp/?gfe_rd=cr&ei=npg1VsKZBq...8Ae_1brQ

Pick your PVD: cable (fd14:445c:1c22:26:20c:29ff:fefa:9f1c)

No PVD selected
cellular (2001:470:ff87:26:20c:29ff:fefa:9f1c)
wifi (2001:470:ff61:26:20c:29ff:fefa:9f1c)
Crappy v4 (10.0.17.202)
cable (fd14:445c:1c22:26:20c:29ff:fefa:9f1c)



Meine IP-Adresse | heise Netze - Mozilla Firefox

www.heise.de/netze/tools/mein...

Ihre Anfrage kommt von der IP-Adresse:

2001:470:721F:100::c0:ffee:babe

Credit: Gert Doering, SpaceNet AG, Munich, Germany

neat

A New, Evolutive API and Transport-Layer Architecture for the Internet: https://www.neat-project.org/

European H-2020 project

10 partners (Cisco, Mozilla, EMC, Celerway…)

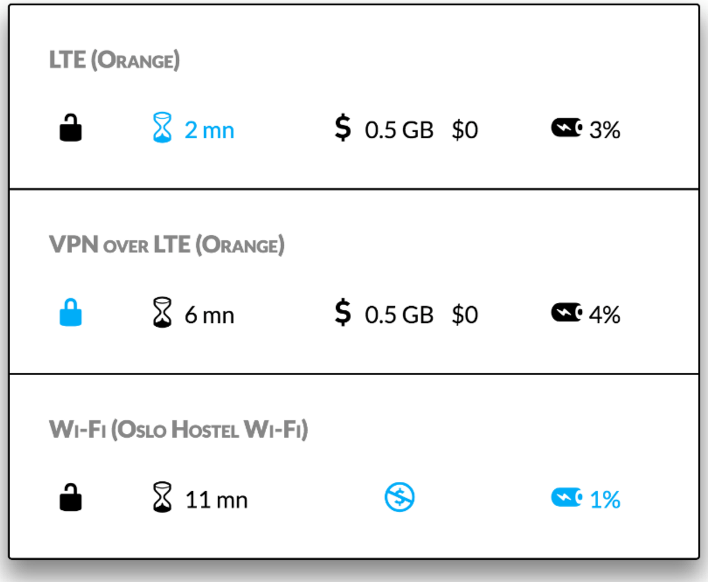
Provisioning Domain (information about a prefix) **via DNS** draft-stenberg-mif-mpvd-dns-00 (old)

Integration to NEAT code: https://github.com/NEAT-project/neat/pull/80

Wednesday, June 29 2016: plenary session in Oslo

IPv6 Multiprefix NEAT Integration

Asking the user to choose with relevant criteria and simple UI



LTE (Orange)

🔒 ⌛ 2 mn $ 0.5 GB $0 3%

VPN over LTE (Orange)

🔒 ⌛ 6 mn $ 0.5 GB $0 4%

Wi-Fi (Oslo Hostel Wi-Fi)

🔒 ⌛ 11 mn 1%