PLnog, Warsaw 2012

Mobile broadband and IPv6 in Slovenia, DSMIP6-TLS and GEN6 project

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About me (in a glance)

- Founder and CEO of Slovenian Go6 Institute
- Determined IPv6 advocate, mercenary and fundamentalist
- IPv6 consultant for many Slovenian operators and enterprises
- Working in Internet operations for 21 years
- 12 years ago touched IPv6
- Active and contributing member of RIPE and IETF community
- Primary co-author of RIPE-501 IPv6 procurement doc
- Co-author of RFC 6346 (A+P approach to IPv4 depletion)
- Frequent IPv6 Flyer (Google IPv6 implementors conference, OECD meeting, RIPE, different government meetings, etc…)

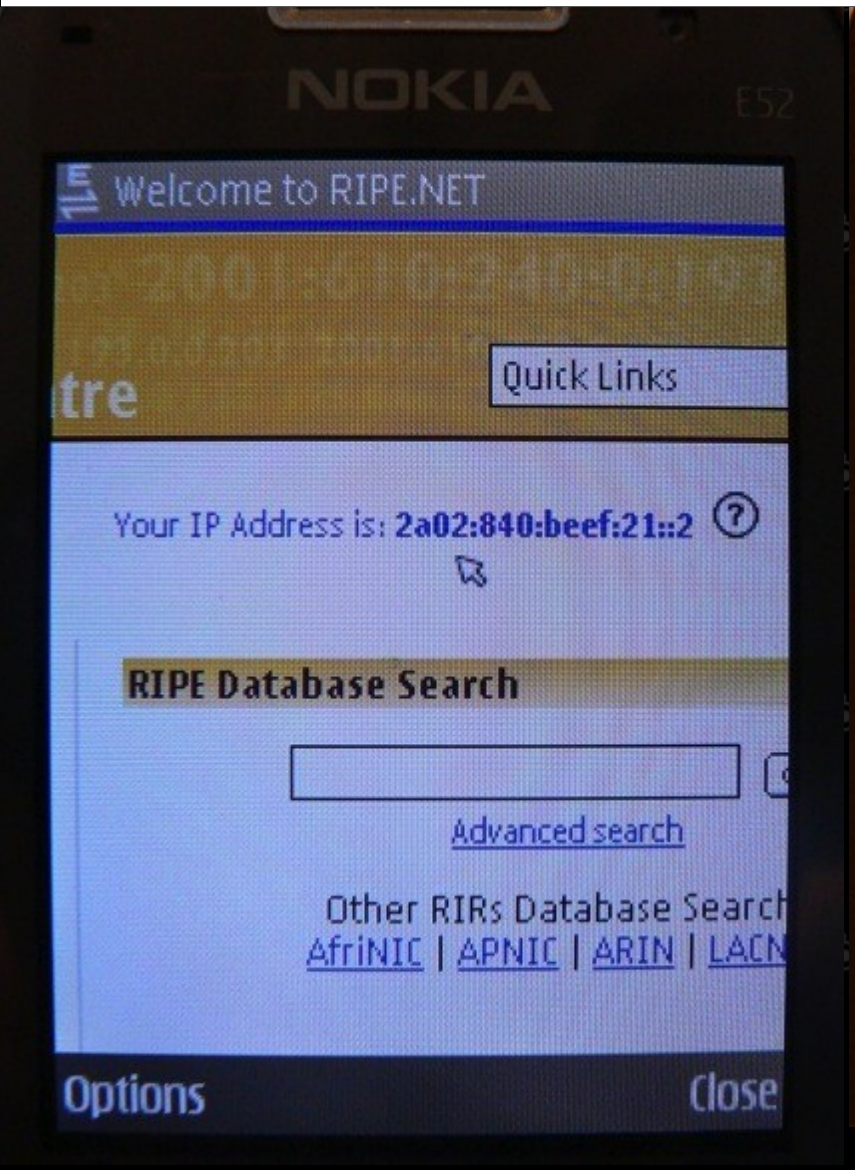
Cooperation work: Go6 as a catalyst

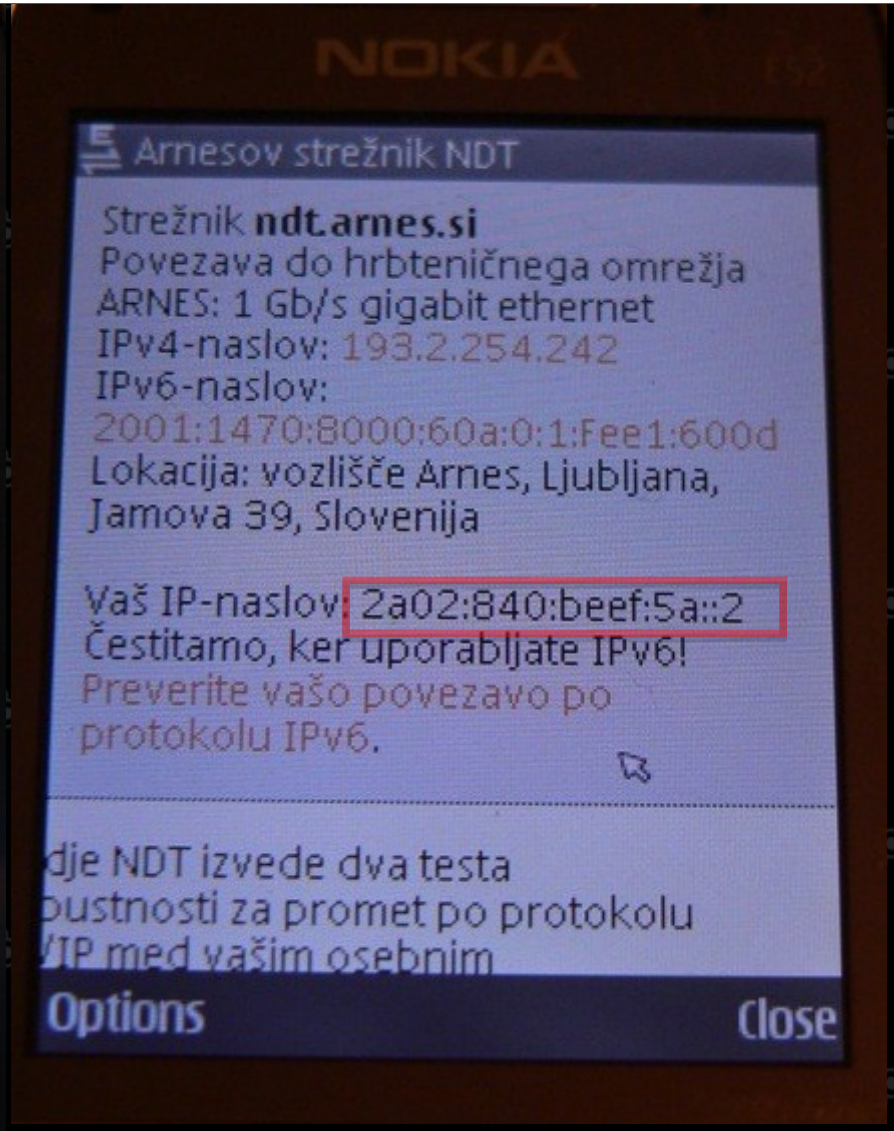
Disclaimer:

IPv6 in Slovenia is being promoted by the Go6 institute, this is an industry body (important mesagge here: self regulation can work!!!) and here is one of our succes stories.

Go6 as an IPv6 catalyst got 2 mobile operators together deploying IPv6 on 3GPP at the same time and here is how they did it.

Tušmobil - 2a02:840::/32AS41828





Tušmobil - 2a02:840::/32AS41828

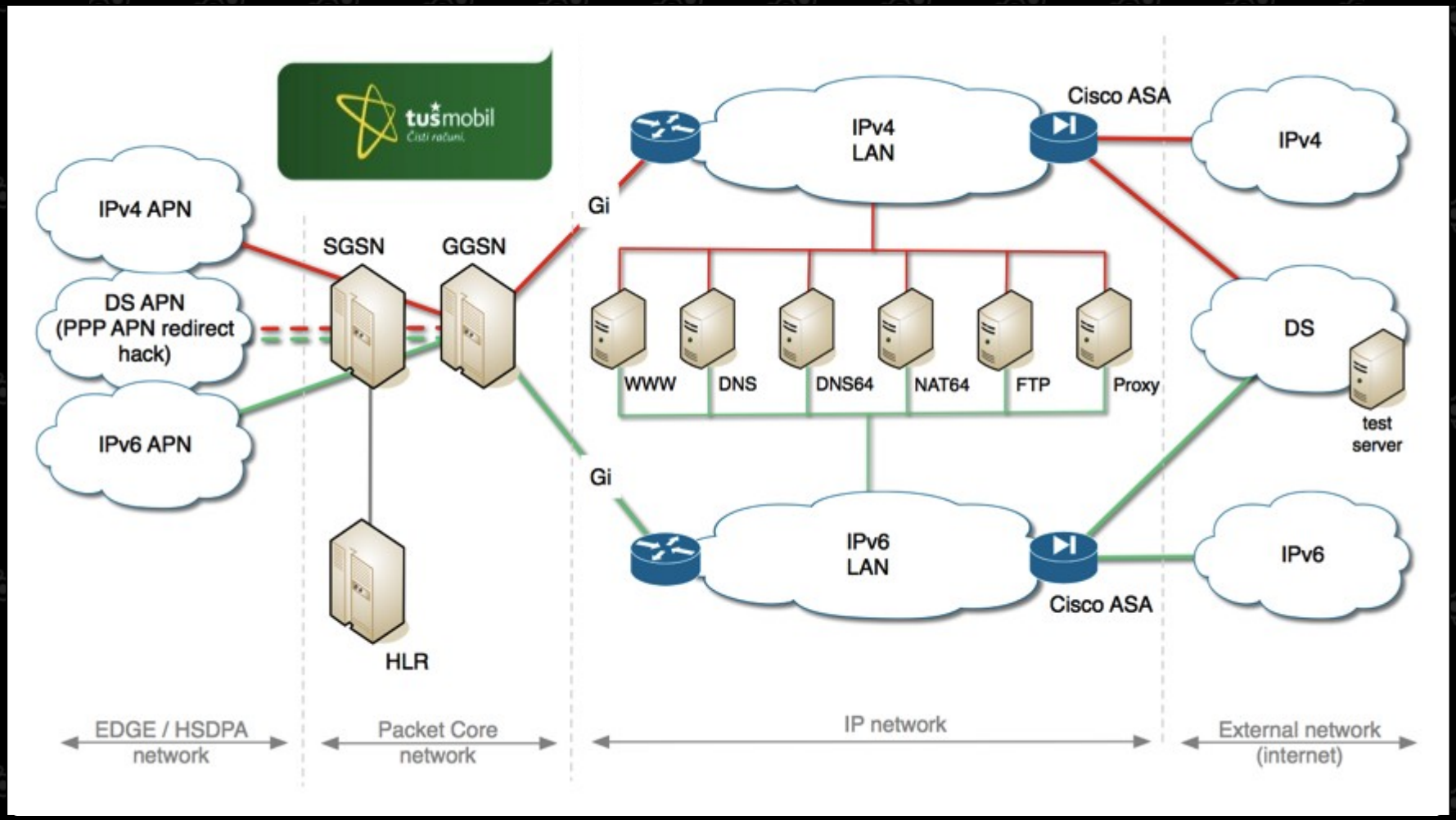
IMAP login log record:

```
Mar 5 12:07:47 go6lab dovecot: imap-
login: Login: user=, method=PLAIN,
rip=2a02:840:beef:4c::2,
lip=2a02:e8:0:1::babe:face, TLS
```

SMTP log record (sending mail):

```
Mar 5 12:18:32 go6lab
postfix/smtpd[24374]: 4AB9F2378666:
client=unknown[2a02:840:beef:47::2],
sasl_method=LOGIN, sasl_username=jan
```

Tušmobil - 2a02:840::/32AS41828

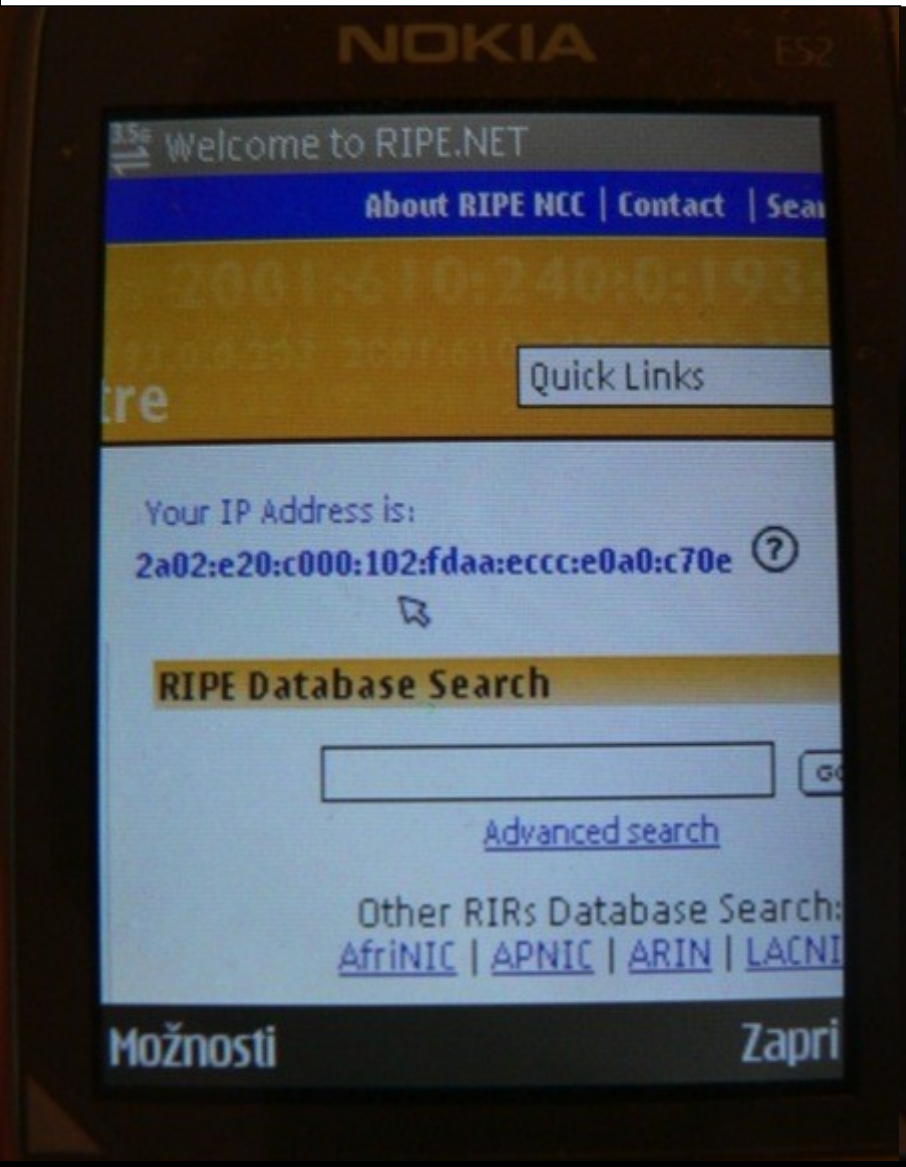


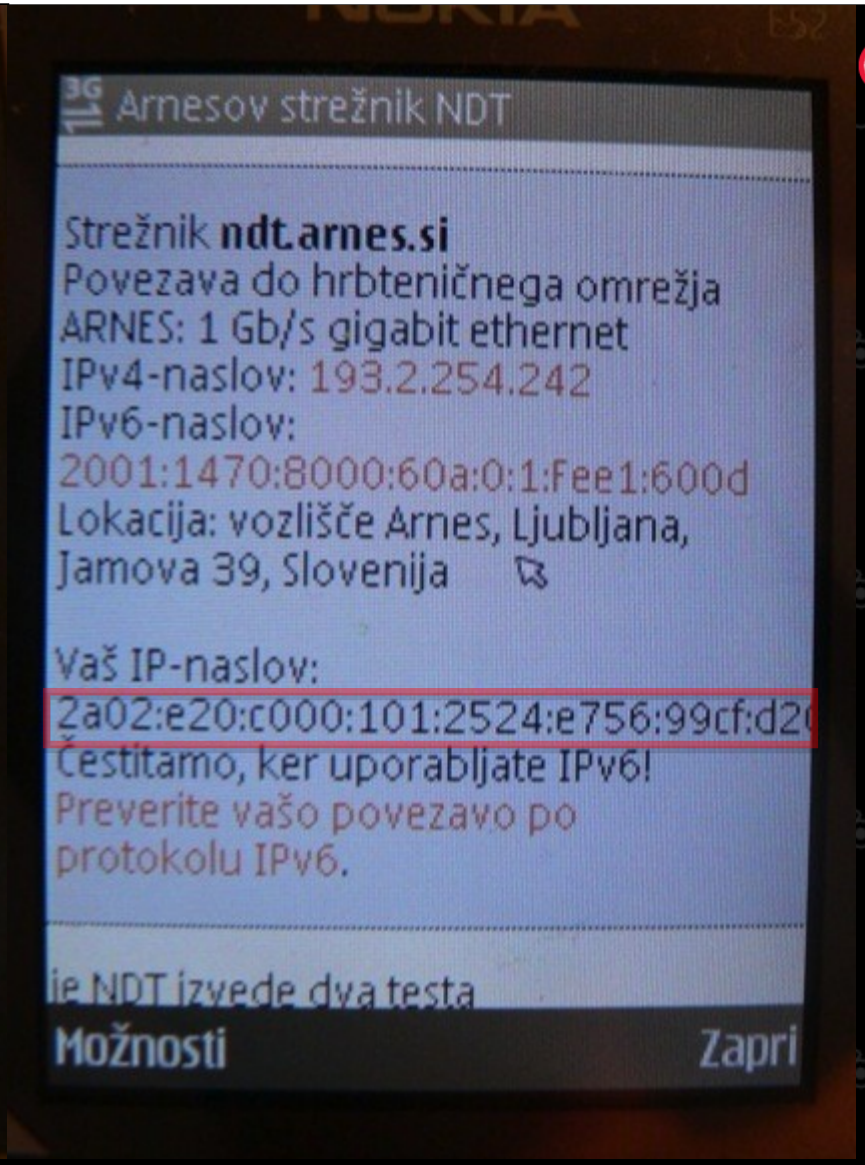
Tušmobil - 2a02:840::/32AS41828

Versions of software used:

- SGSN NSN, SG6
- GGSN NSN, FlexiISN v 3.2 CD7
- Firewall Cisco ASA v7.2
- DNS64 totd 1.5.1
- NAT64 ecdysis-nf-nat64-20100226 @gentoo 2.6.3
- Mobile Nokia e52

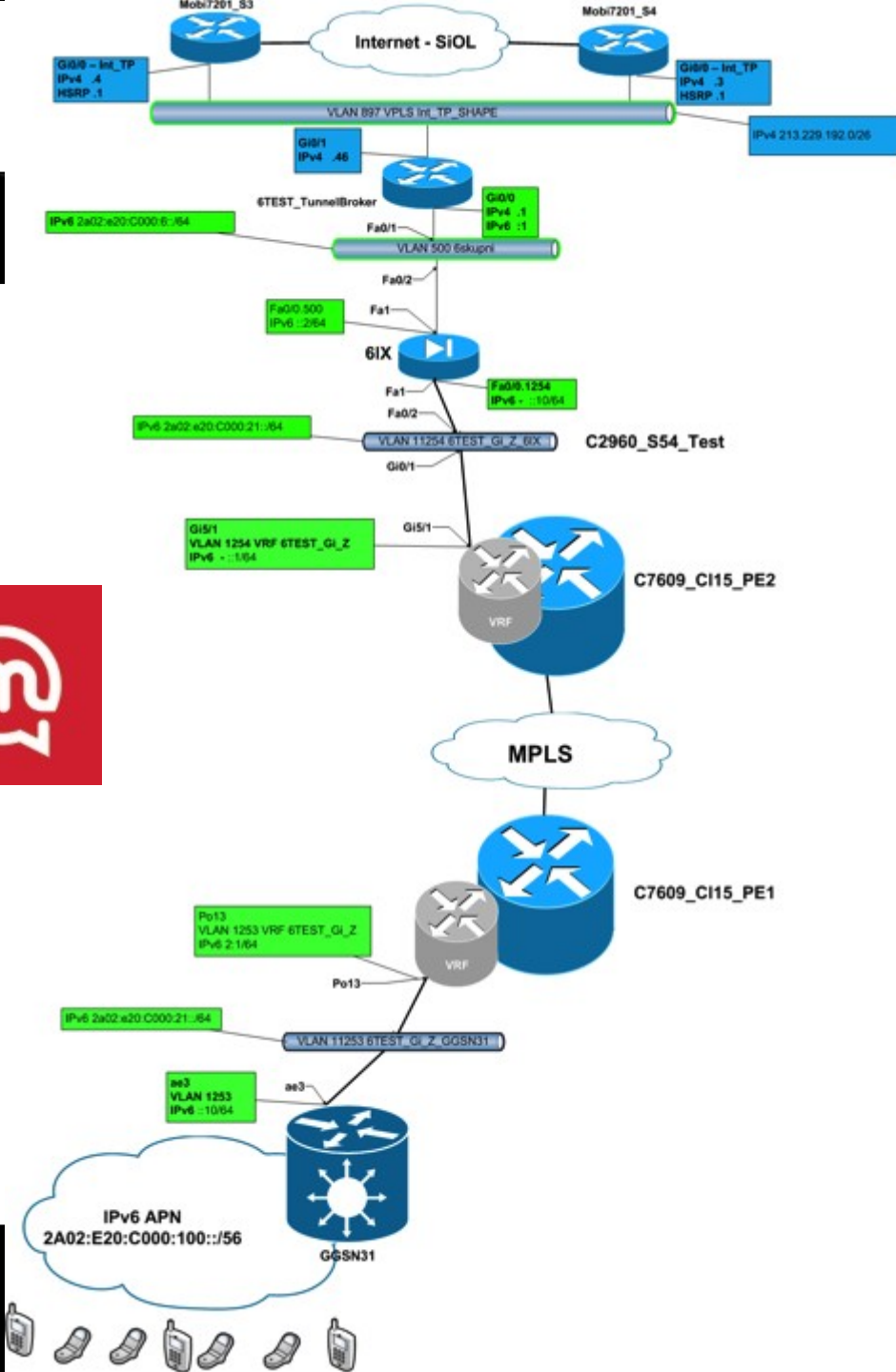
Mobitel - 2a02:e20::/32AS29276





Mobitel and IPv6

- Packet core is IPv6 ready
- IPv6 only PDP context
  - IPv4 and IPv6 in same PDP context not supported jet
- 6VPE over MBICORE
  - Static routing



Terminals

- Each terminal gets /64
- Problems with IPv6 PPP and DNS
  - Manual config
- Limited terminal support
  - Nokia E and N series → OK
  - Window mobile 6.1 → No support
  - Data cards → Natively no support

Jan Žorž <jan@go6.si>

Mobitel - 2a02:e20::/32AS29276

Versions of software used:

- SGSN Ericsson Mk IV 2008B Dual Access
- GGSN Ericsson/Juniper J120 2009A
- MPLS Cisco 7609 Version 12.2(33)SRC2

Show stoppers...

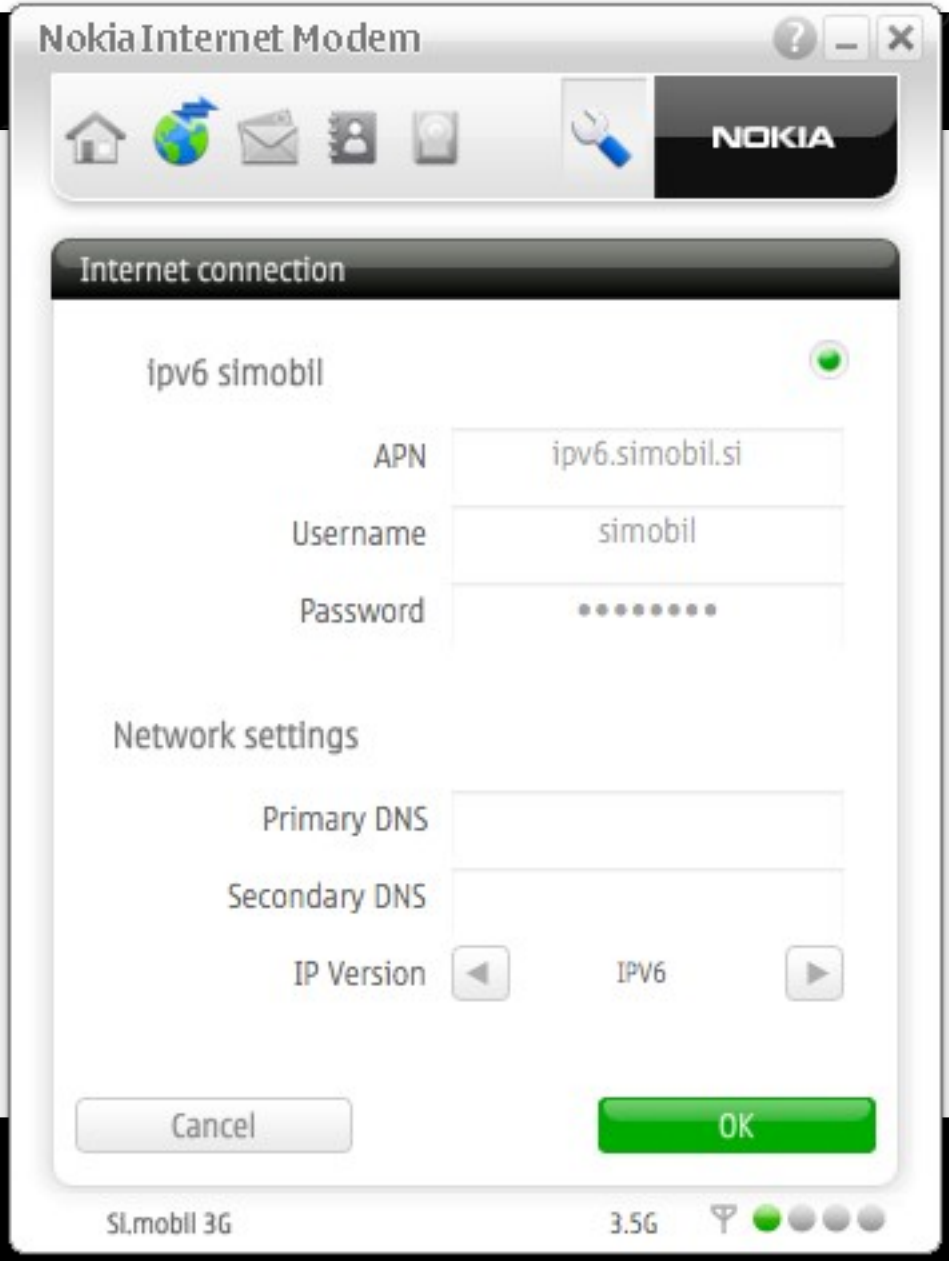
What is still missing?

- No wide support in mobile terminals (Symbian, Meego and Android 4)
- Content based charging – not existent
- Limited or no support for dual-stack in terminals

Simobil network

- Test IPv6 enabled APN was fully functional in December 2011
- Dual-stacked (IPv4 and IPv6 PDP connections possible)
- Cisco GGSN will support PDPv4v6 in Q1 2012

Simobil network



Simobil network

```
en2: flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST> mtu 1500
        ether 02:94:72:dc:0b:8a
        inet6 fe80::94:72ff:fedc:b8a%en2 prefixlen 64 scopeid 0x8
        inet6 2a00:1a20:2000:79:94:72ff:fedc:b8a prefixlen 64 autoconf
        inet6 2a00:1a20:2000:79:9096:d8c7:286a:6168 prefixlen 64 autoconf temporary
        media: autoselect (10baseT/UTP <full-duplex>)
        status: active
```

```
jan-mac:~ janzorz$ ping6 go6.si
PING6(56=40+8+8 bytes) 2a00:1a20:2000:79:9096:d8c7:286a:6168 --> 2a02:e8:0:1::babe:face
16 bytes from 2a02:e8:0:1::babe:face, icmp_seq=0 hlim=57 time=265.979 ms
16 bytes from 2a02:e8:0:1::babe:face, icmp_seq=1 hlim=57 time=645.656 ms
16 bytes from 2a02:e8:0:1::babe:face, icmp_seq=2 hlim=57 time=1036.864 ms
16 bytes from 2a02:e8:0:1::babe:face, icmp_seq=3 hlim=57 time=357.058 ms
16 bytes from 2a02:e8:0:1::babe:face, icmp_seq=4 hlim=57 time=296.313 ms
16 bytes from 2a02:e8:0:1::babe:face, icmp_seq=5 hlim=57 time=277.160 ms
16 bytes from 2a02:e8:0:1::babe:face, icmp_seq=6 hlim=57 time=267.538 ms
```

Simobil network

This page shows your IPv6 and/or IPv4 address

You are connecting with an IPv6 Address of:

2a00:1a20:2000:79:9096:d8c7:286a:6168

IPv4 only Test Normal Test IPv6 only Test

If the IPv6 only test shows "The page cannot be displayed" (Internet Explorer), "Server not found" (Firefox), any error or search page then you do not have working IPv6 connectivity. "Normal Test" shows which protocol your browser preferrs when you have both IPv4 and IPv6 connectivity. This page should work even on computers with IPv6 only connectivity.

Simobil network

This page shows your IPv6 and/or IPv4 address

You are connecting with an IPv4 Address of:

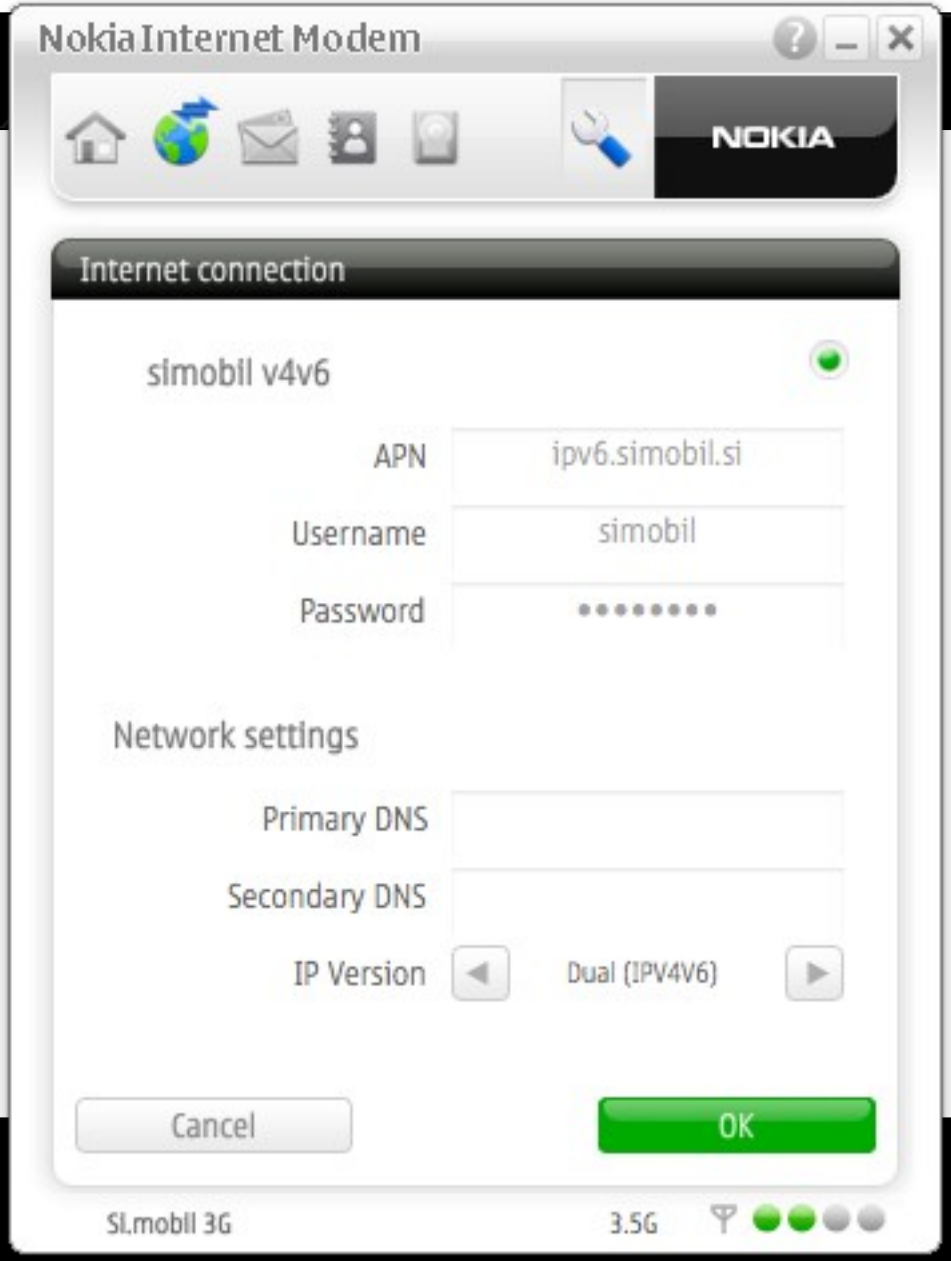
109.239.178.7

IPv4 only Test Normal Test IPv6 only Test

If the IPv6 only test shows "The page cannot be displayed" (Internet Explorer), "Server not found" (Firefox), any error or search page then you do not have working IPv6 connectivity. "Normal Test" shows which protocol your browser preferrs when you have both IPv4 and IPv6 connectivity. This page should work even on computers with IPv6 only connectivity.

You can access this page with any of these easy to remember url's:

Simobil network



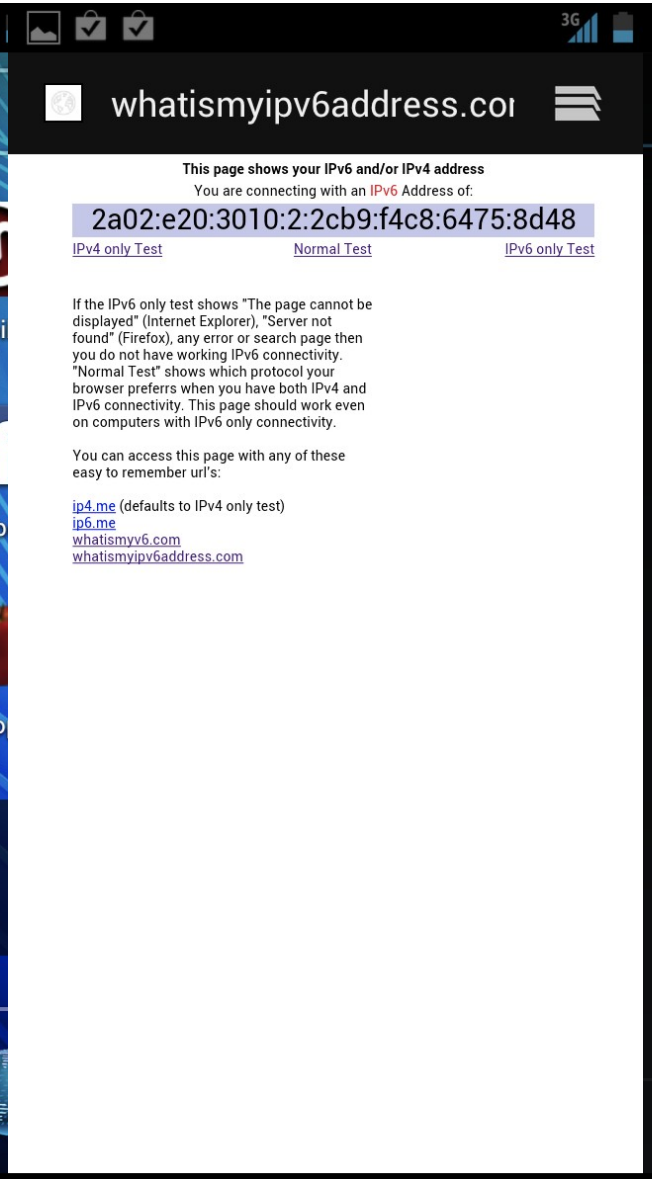
Simobil network

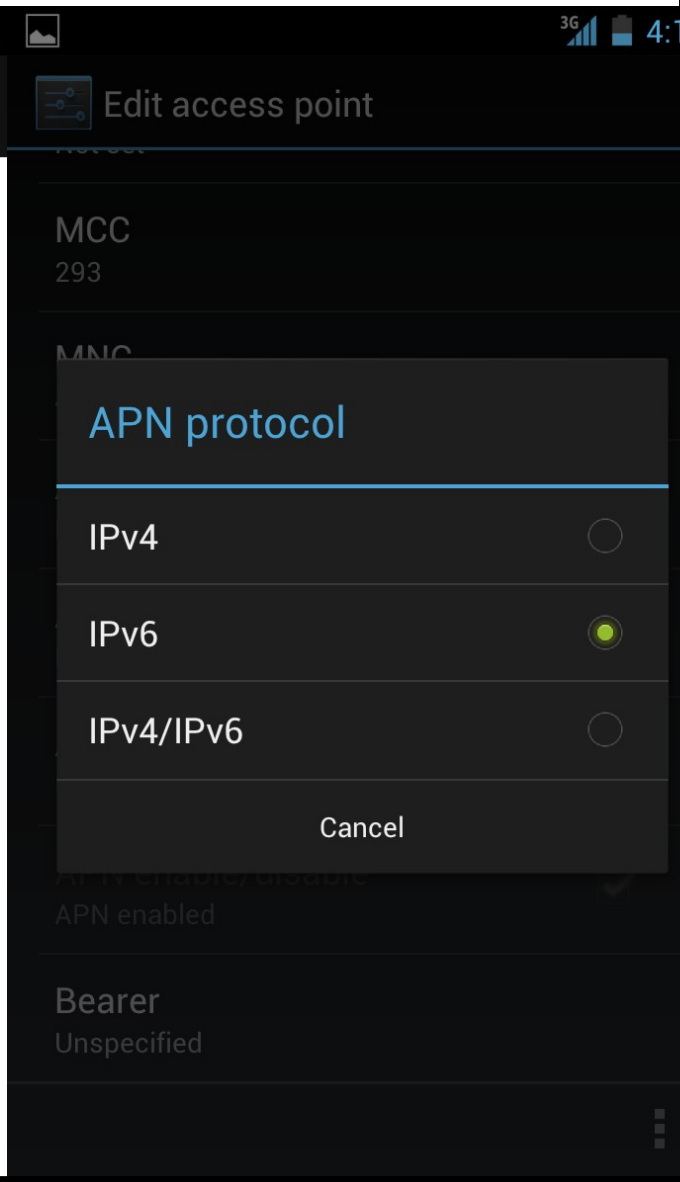
Two PDP contexts also works in parallel PDPv4 and PDPv6.

```
        status: inactive
en2: flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST> mtu 1500
        ether 02:94:72:dc:0b:8a
        inet6 fe80::94:72ff:fedc:b8a%en2 prefixlen 64 scopeid 0x8
        inet6 2a00:1a20:2000:7b:94:72ff:fedc:b8a prefixlen 64 autoconf
        inet6 2a00:1a20:2000:7b:d5e0:4fd3:5e34:dddc prefixlen 64 autoconf temporary
        inet 46.122.127.196 netmask 0xffffff00 broadcast 46.122.127.255
        media: autoselect (10baseT/UTP <full-duplex>)
        status: active
```

Nokia is ahead with IPv6 on mobile devices (21M-02)

Samsung Galaxy Nexus (Android 4) - IPv6 on 3G capable





Recommended reading – RFC 6459

art.tools.ietf.org/html/rfc6459

Internet Engineering Task Force (IETF)
Request for Comments: 6459
Category: Informational
ISSN: 2070-1721

J. Korhonen, Ed.
Nokia Siemens Networks
J. Soininen
Renesas Mobile
B. Patil
T. Savolainen
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Renesas Mobile

January 2012

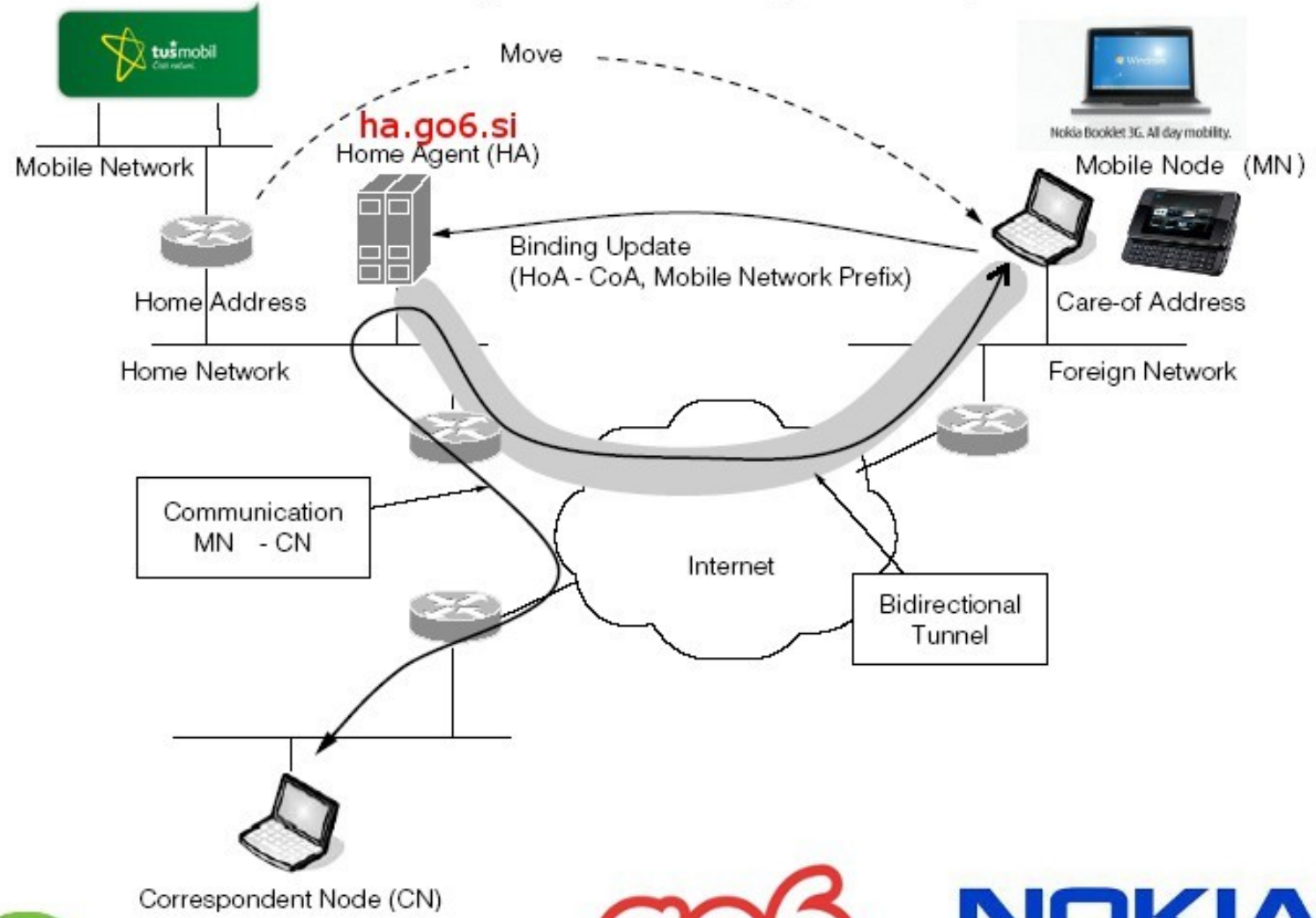
**IPv6 in 3rd Generation Partnership Project (3GPP)
Evolved Packet System (EPS)**

Abstract

The use of cellular broadband for accessing the Internet and other data services via smartphones, tablets, and notebook/netbook computers has increased rapidly as a result of high-speed packet data networks such as HSPA, HSPA+, and now Long-Term Evolution (LTE) being deployed. Operators that have deployed networks based on 3rd Generation Partnership Project (3GPP) network architectures are facing IPv4 address shortages at the Internet registries and are feeling pressure to migrate to IPv6. This document describes the support for IPv6 in 3GPP network architectures.

Dual Stack Mobile IPv6

DSMIPv6-TLS Home Agent server setup, hosted by Tušmobil



Nokia Research Center

NOKIA
CONNECTING PEOPLE

GEN6 facts

- GEN6 – Governments ENabled with IPv6
  - Project time frame
    - 1.1.2012 – 30.6.2014
  - 19 EU partners
  - EC reference
    - http://ec.europa.eu/information_society/apps/projects/factsheet/index.cfm?project_re
- Slovenian pilot
  - IPv6 enabled self organizing systems for emergency response environments

Slovenian Stakeholders

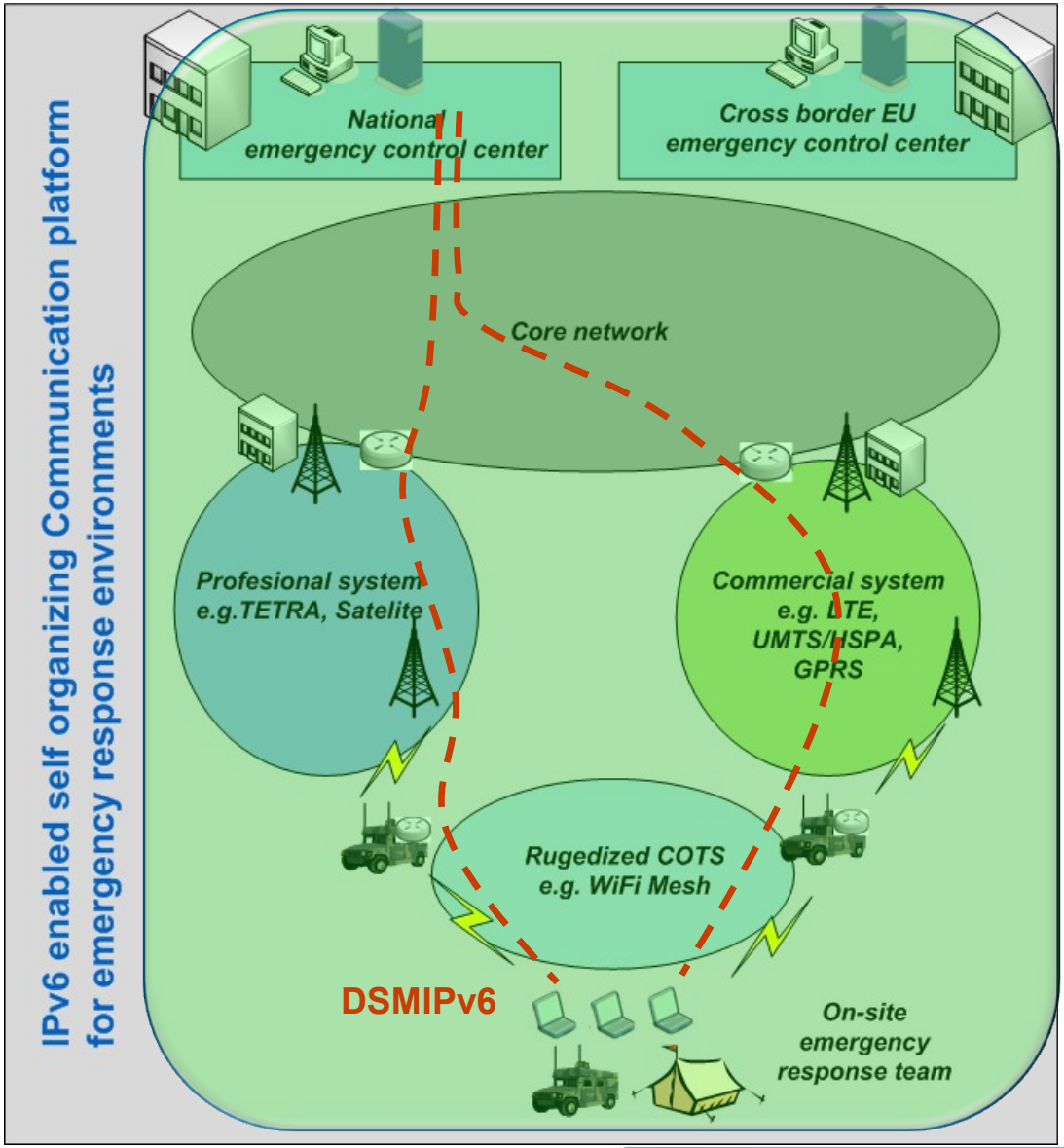
- **Official GEN6 partner**
  - Laboratory for Telecommunications, Faculty of Electrical engineering, University of Ljubljana (www.ltfe.org)
    - system development and integration
    - pilot deployment and testing
- **Technical partners – non beneficial**
  - Go6 institute (go6.si)
    - Federating and consultancy role
  - Ministry for higher education, science and technology (www.mvzt.si)
    - Integration of project in Slovenian government
  - Fire department – Municipal of Ljubljana (www.gasilskazveza-lj.si)
    - Pilot system requirements and pilot testing
  - Cisco System Slovenia (www.cisco.si)
    - Networking equipment support
  - EION Wireless (www.eionwireless.com)
    - Wireless solution support

Slovenian pilot

- **Project will clearly demonstrate state-of-the-art IPv6 enabled features for emergency response environments**
  - Seamless connectivity from targeted/affected areas across heterogeneous technologies and cross border and public
    - e.g. UMTS/HSPA, LTE, Satellite, DMR, TETRA, ruggedized COTS - WiFi
  - Automatic network/system planning and deployment
  - Node and host auto configuration, self organizing and healing network features
  - Secure and QoS enabled transmission of data, voice and multimedia rich services supported system
  - Overlay network for data transport and service functionalities will be done on DSMIP6 (dual stack mobile IPv6)

- **Pilot system deployment in live environment**
  - Testing and demonstration of smart IPv6 network features

High level system view

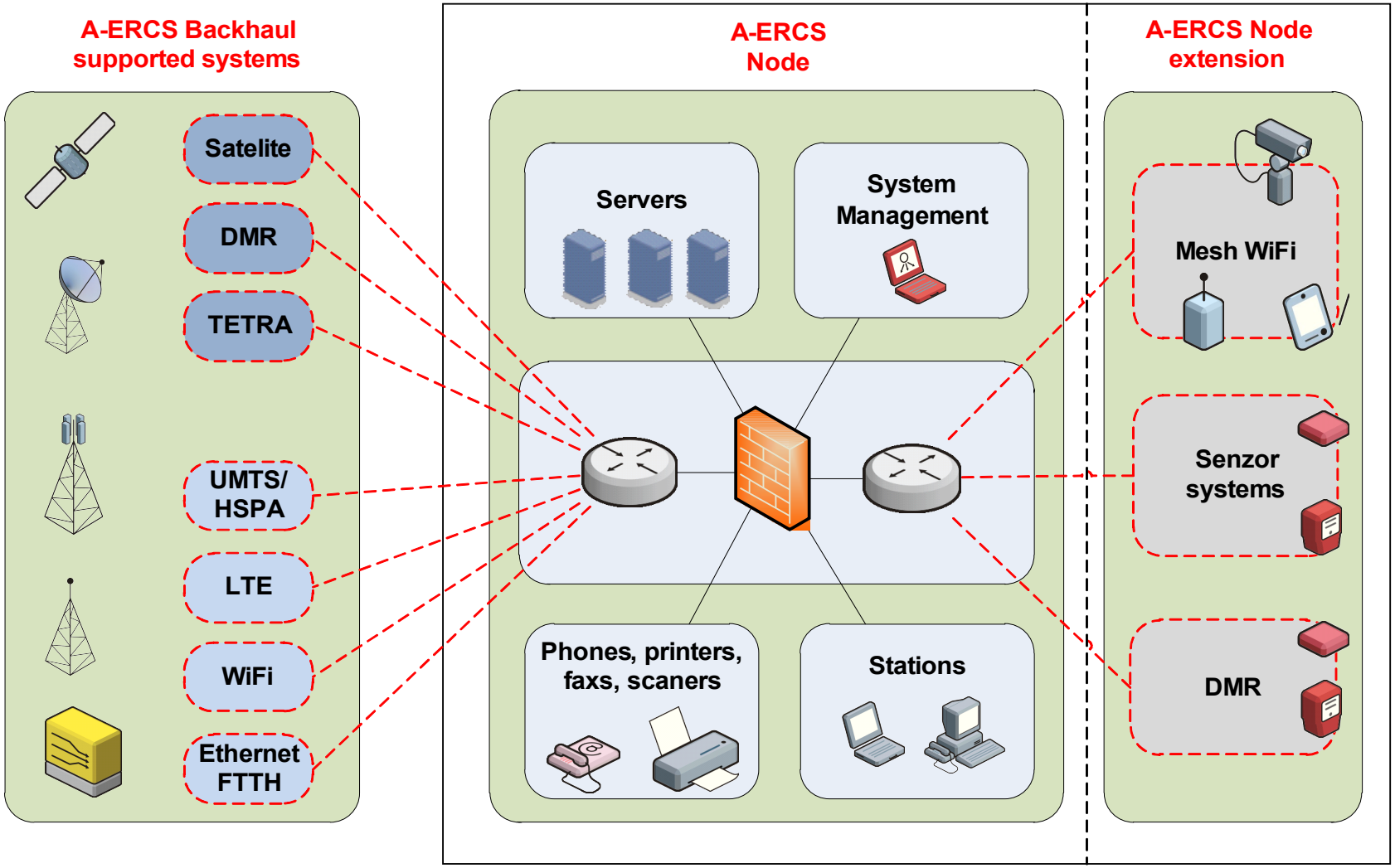


Target domain – Fire department

- On site mobile command center
- Operation support vehicle
  - Current system capabilities
    - DMR radio – backhaul & on site
    - LAN/WiFi environment in vehicle
    - UMTS – internet access (IPv4)
    - P2T radio
  - Supported services
    - Voice – 1. priority
    - Messages – 2. priority
    - Internet

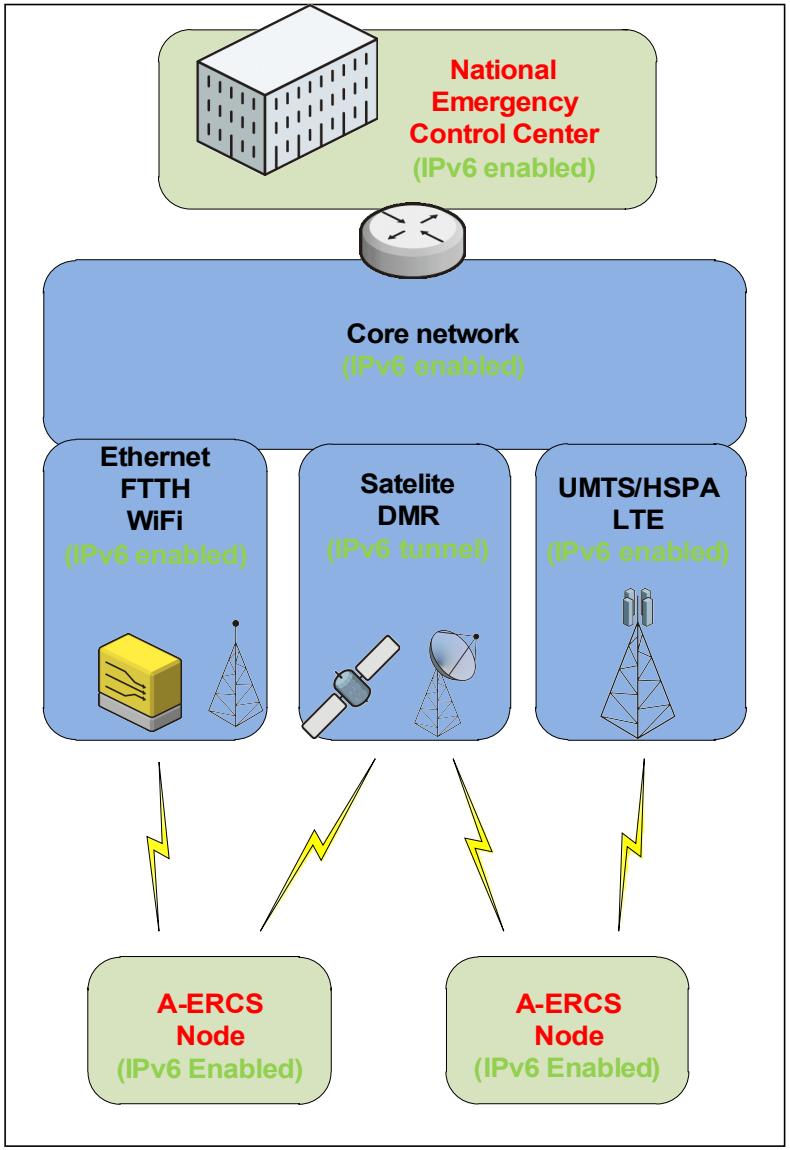
A-ERCS Node – draft proposal

- On site mobile command center as A-ERCS Node



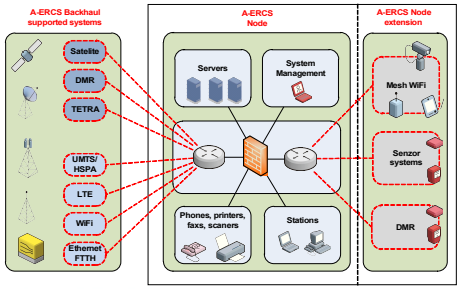
A-ERCS system – draft proposal

- A-ERCS system
  - A-ERCS Node connectivity options



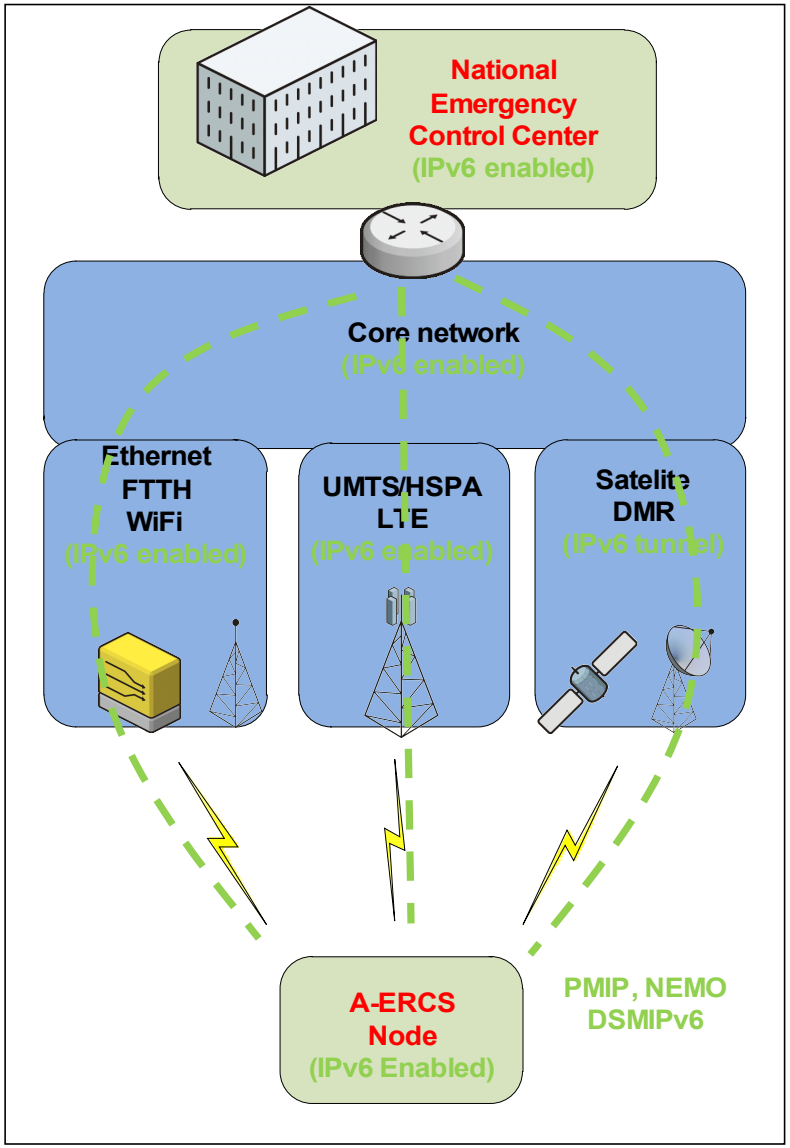
Pilot target 1

- Demonstrating IPv6 network enable features in A-ERCS
  - Hosts and network nodes auto configuration
    - SLAAC, DHCPv6
  - Seamless/ad-hoc routing and self organizing network
    - demonstrating high availability and self healing system features with OSPFv3
  - Mobility support
    - DSMIPv6, Proxy Mobile IPv6 for nodes and network mobility (NEMO)
  - Multicast transmition
    - Scope identifier for limiting multimedia/live content reachability
    - MLDv2/PIM-SSM for live multimedia streaming locally and globally
  - Quality of service support with DiffServ and Flow label enablement in local and global network environment



Pilot target 2

- IPv6 seamless host mobility and universal host/network connectivity between
  - mobile node reachability
    - Ability to connect to mobile node from operations center
    - Connect to any service directly (e.g. VOIP call to SIP client, check the temperature on fireman's clothes sensor, engage GPS on MN
- heterogeneous networks/technologies support
  - commercial (e.g. UMTS/HSPA, LTE)
  - professional (e.g. DMR, Satellite)
  - alternative ruggedized COTS networking systems (e.g. mesh enabled wifi 802.11a/g/n)



Contacts...

- Questions regarding go6 institute, platform and Slo IPv6 initiative: jan@go6.si
- Questions regarding IPv6 in Tušmobil: miha.petkovsek@tusmobil.si
- Questions regarding IPv6 in Mobitel: primoz.jenko@mobitel.si
- Questions regarding IPv6 in Simobil: petra.verlic@simobil.si

Questions?

- Thank you.

http://go6.si/