



# IPv6 deployment experiences from DNA Finland

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# What is DNA

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## DNA IN BRIEF

- **Cost-efficiency**
- **Streamlined**
- **Agile**
- **Innovative**

## OUR VALUES

### **FAST**

DNA provides good service

### **STRAIGHTFORWARD**

DNA listens

### **BOLD**

Bold advertising and surprises

## 3.5 M

More than 3.5 million mobile communications and fixed network customer subscriptions

## 833.5 M €

Net sales in 2014

## 1748

At the end of 2014, there were **1 748 employees** working with DNA

The most satisfied fixed broadband and television services customers\*

The most satisfied business customers in all B2B categories\*



\* EPSI Rating study, 2014

## TV

Finland's largest cable operator and the leading pay TV provider

## 27.6 M €

Operating profit in 2014



**Every third**

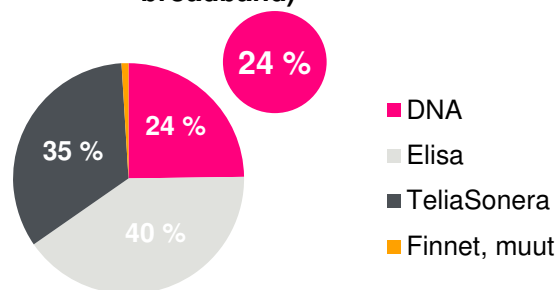
DNA employee works in customer service

**In a job satisfaction survey**, the personnel's satisfaction with DNA as an employer is at a record-breaking high level

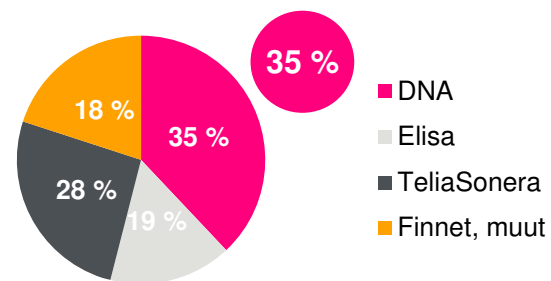


## MARKET SHARE

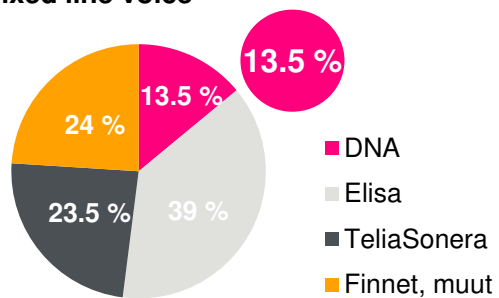
**Mobile communications (voice and broadband)**



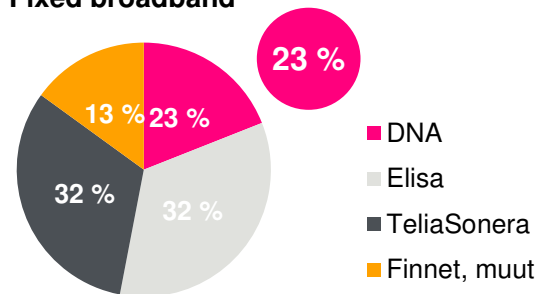
**Cable TV**



**Fixed line voice**



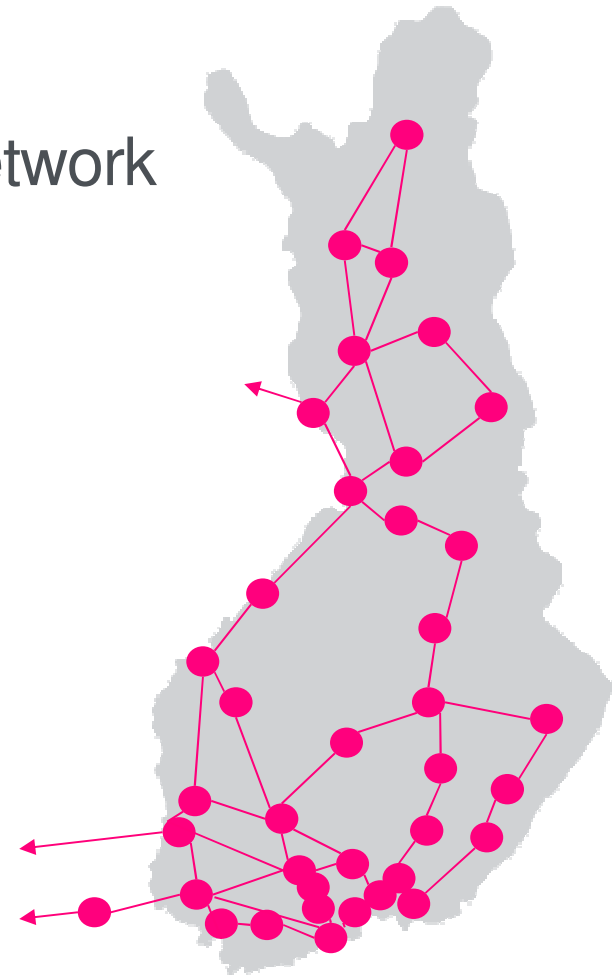
**Fixed broadband**



Sources: Interim reports from operators Q4/2014, FiCom, the Finnish Communications Regulatory Authority

## DNA has a nation-wide backbone network

- DNA has more than 25,000 kilometers of fiber network and 1500 POPs in Finland.
- We provide copper and fiber optic network services to corporate customers, carriers and integrators in the Nordic countries.



## DNA'S 4G COVERAGE IS EXPANDED CONTINUOUSLY

- At the end of June 2015, **DNA's 4G LTE network reached almost 5 million Finns** (3 million on 31 June 2014)
- In practice, a 99 % nationwide 4G population coverage will be reached already by the end of 2016
- This will be achieved with the fast rollout of DNA's own 4G network as well as the Joint Operations network rollout together with TeliaSonera Finland

### Coverage 2014

- ~85% population
- ~ 20% geographic

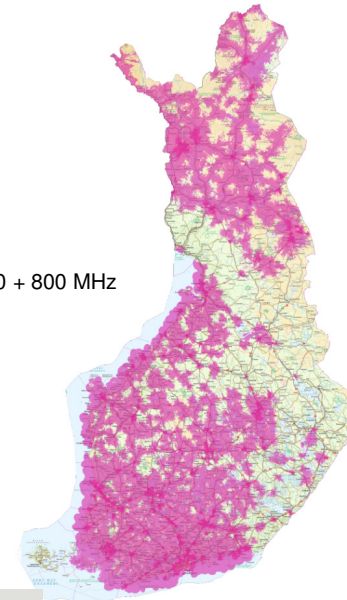
### PREDICTION OF 2016

### Coverage 2016

- >99% population
- >90% geographic

### 4G LTE

LTE1800 + 800 MHz





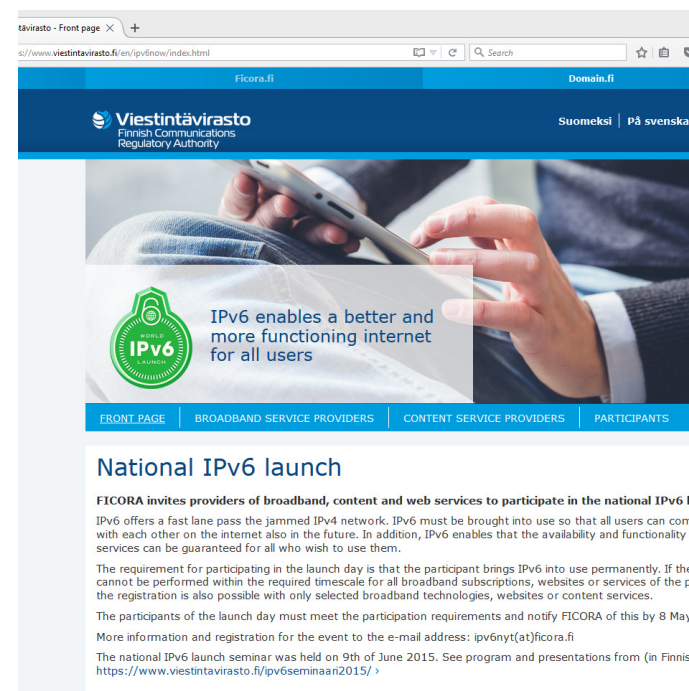
# IPv6 Launch

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## National IPv6 launch 9th of June 2015

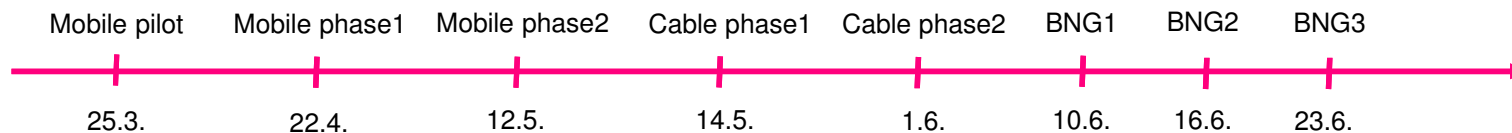
- FICORA had announced Finnish national IPv6 launch date
- DNA decided to participate and enable IPv6 to all consumer products that support IPv6





## Slow start

- At first IPv6 Dual-Stack was enabled to DNA technical personnel for testing purposes
- After internal testing IPv6 was enabled to customers one product at a time
- IPv6 was first enabled to mobile product that had smaller amount of users then to other mobile users
- IPv6 to cable was also enabled in two stages, first to smaller group of users and then to all the rest
- IPv6 was enabled to Ethernet and DSL one BNG pair at a time (3 different sites)



## Mobile devices with IPv6 Dual-Stack

- IPv6 on by default
  - Samsung Galaxy S6 and S6 edge
  - Apple iPhone 5, iPad 4 and newer devices
  - DNA mobile home router 4G+ (MiFi)
  - New phones from Samsung, Huawei, LG, Sony and Microsoft
- IPv6 needs to be turned on from the device settings
  - Older Microsoft Lumia phones
  - Older Android phones
  - DNA mobile home router 4G (MiFi)



## Address distribution to users

- Mobile broadband users get /64 per connected mobile device or router
- Cable broadband users /56 with prefix delegation or /64 if they use bridged connection
  - Cable modems are by default configured to routed mode
- Ethernet and DSL users get /56 with prefix delegation and /64 with bridged connection
  - New home routers/modems sold by DNA are by default in routed mode



## Customer service

- We made instructions to our technical customer service based on RIPE-631 document IPv6 Troubleshooting for Residential ISP Helpdesks
- We also participated in making Finnish translation of test-ipv6.com

Test IPv6

### Test your IPv6 connectivity.

Summary | Tests Run | Share Results / Contact | Other IPv6 Sites | For the Help Desk

- Your IPv4 address on the public Internet appears to be 87.95.33.128
- Your IPv6 address on the public Internet appears to be 2001:14bb:110:1ae0:208e:2f0c:56b2:cd86
- Your Internet Service Provider (ISP) appears to be DNA DNA Oy,FI
- Since you have IPv6, we are including a tab that shows how well you can reach other IPv6 sites. [\[more info\]](#)
- Good news!** Your current configuration will continue to work as web sites enable IPv6.
- Your DNS server (possibly [Testaa IPv6](#) | [Usein kysytyt kysymykset](#) | [Pelit](#))

10/10 for your IPv6

### Testaa IPv6 yhteytesi.

Yhteenveto | Suoritetut testit | Jaa tuloksia / Yhteystietoja | Muita IPv6-sivustoja | Asiakaspalvelulle

- Julkinen IPv4-osoitteesi näyttäisi olevan 87.95.33.128
- Julkinen IPv6-osoitteesi näyttäisi olevan 2001:14bb:110:1ae0:208e:2f0c:56b2:cd86
- Internet-palveluntarjoaja (ISP) näyttäisi olevan DNA DNA Oy,FI
- Sinulla on IPv6-osoite. Näytämme sen takia myös välilehden, joka kertoo kuinka hyvin saatavat muiden IPv6 sivustoja. [\[lisätietoja\]](#)
- Hyviä uutisia!** Nykyinen kokoonpanosi jatkaa toimimistaan kun sivusto julkaisee IPv6-osoitteilla.
- Käyttämälläsi nimipalvelulla (mahdollisesti palveluntarjoajan) näyttäisi olevan pääsy IPv6 Internetiin.

**Valmiuspisteesi**

10/10 IPv6 vakauden ja valmiuden aste, kun palvelut julkaistaan vain IPv6-osoitteilla

Klikkaa nähdäksesi [testitulokset](#)

(Päivitetty IPv6 valmiutta kuvaavat tilastot)

Translators and proof readers welcome. [Info](#); and our [CrowdIn](#) project page.

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This is a mirror of test-ipv6.com. The views expressed here may or may not reflect the views of the mirror owner.

## Challenges in IPv6 deployment

- Three different IP terminating systems
  - Mobile
  - Cable
  - Ethernet/DSL
- IPv6 to mobile accounting system
- Updating systems to handle IPv6 addresses
  - i.e. IP to user mapping needs to support IPv6
- Getting mobile dongles and home routers to support IPv6
- Some DSLAM-equipment drops all IPv6 traffic
  - ~70% of DNA DSLAM's

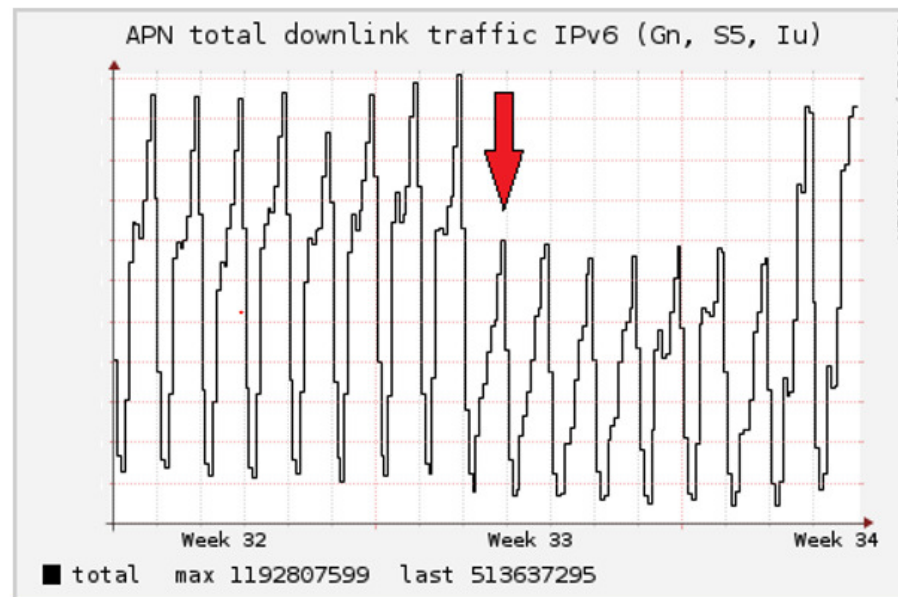


## Problems

- No major problems
  - Only couple of contacts to customer service related to IPv6
  - Most of the customers problems have been related to users own routers or modems that are not IPv6 compatible or do not have correct configuration or software
  - IPv4 works even tough IPv6 would be broken, in most cases customers don't notice if only IPv6 is broken
  - Google blacklisted twice one of our resolvers
    - No AAAA results for users using that resolver
- [http://www.google.com/intl/en\\_ALL/ipv6/statistics/data/no\\_aaaa.txt](http://www.google.com/intl/en_ALL/ipv6/statistics/data/no_aaaa.txt)

## Effects of Google's AAAA resolver blacklisting graph shows ~35% drop in IPv6 traffic for this APN

(services were not affected because IPv4 addresses were resolved normally)





## How it flows

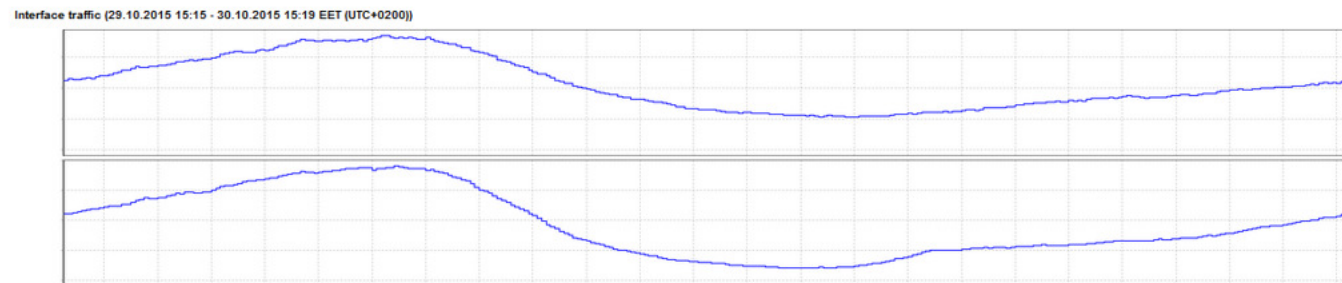
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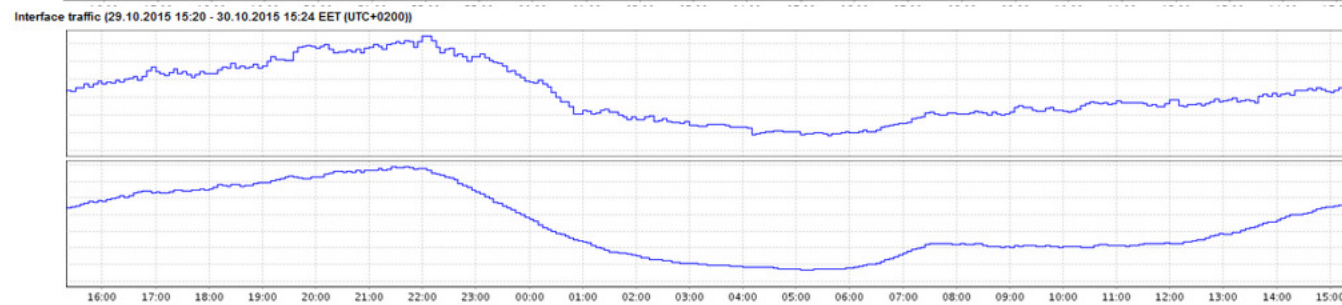


## CMTS IPv6 traffic is ~ 18 % of total traffic

IPv4



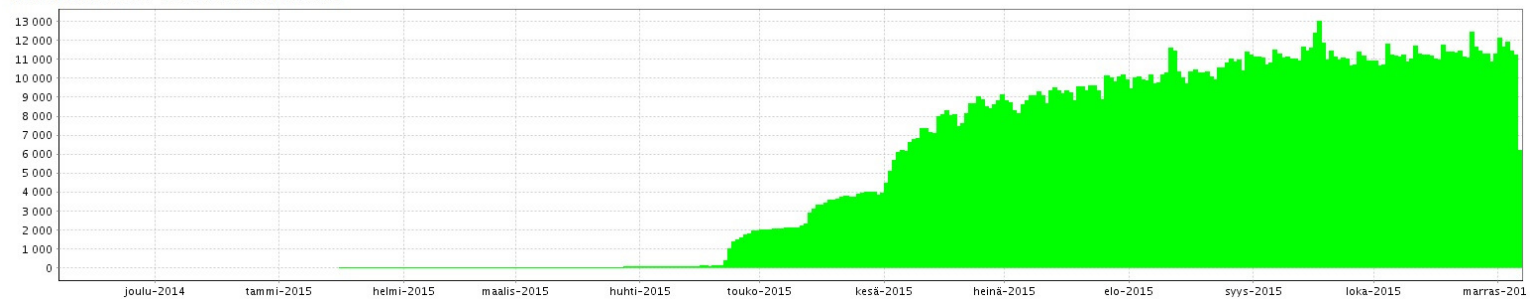
IPv6





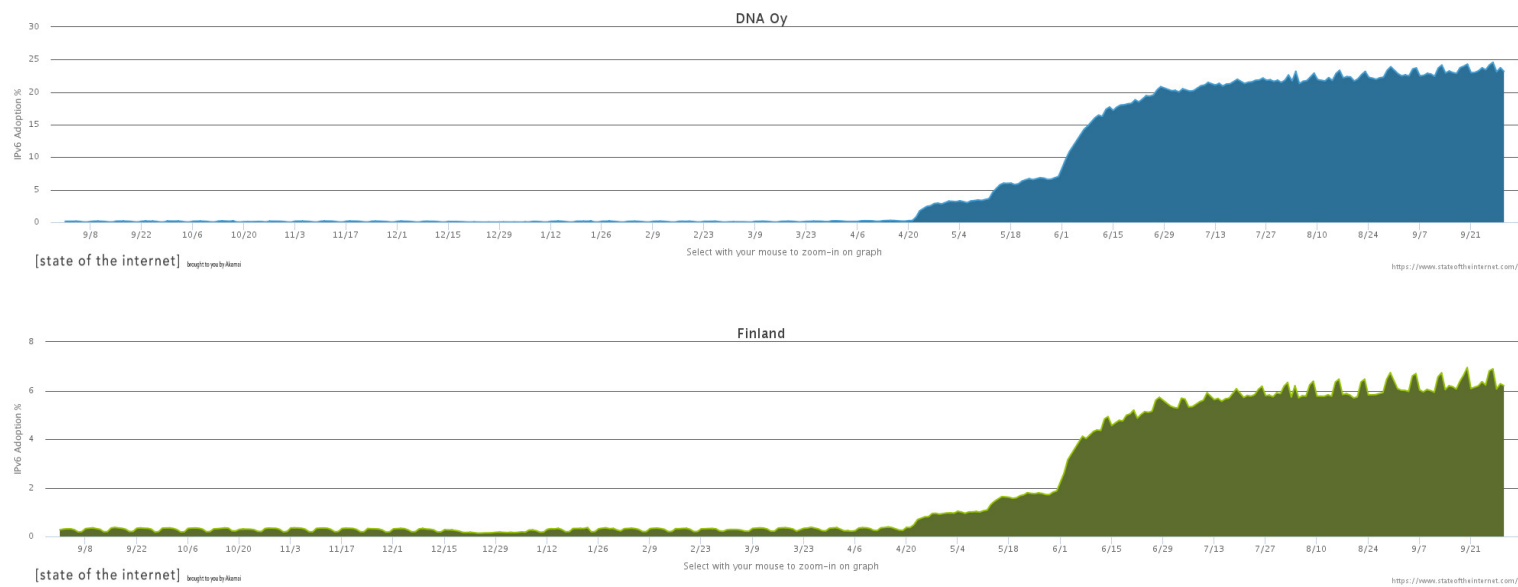
## IPv6 DNS query growth

Summary (7.11.2014 0:00 - 6.11.2015 23:59 EET (UTC+0200))





# Akamai's view of IPv6 launch by DNA and Finland





**Thank You!**  
**Questions?**