



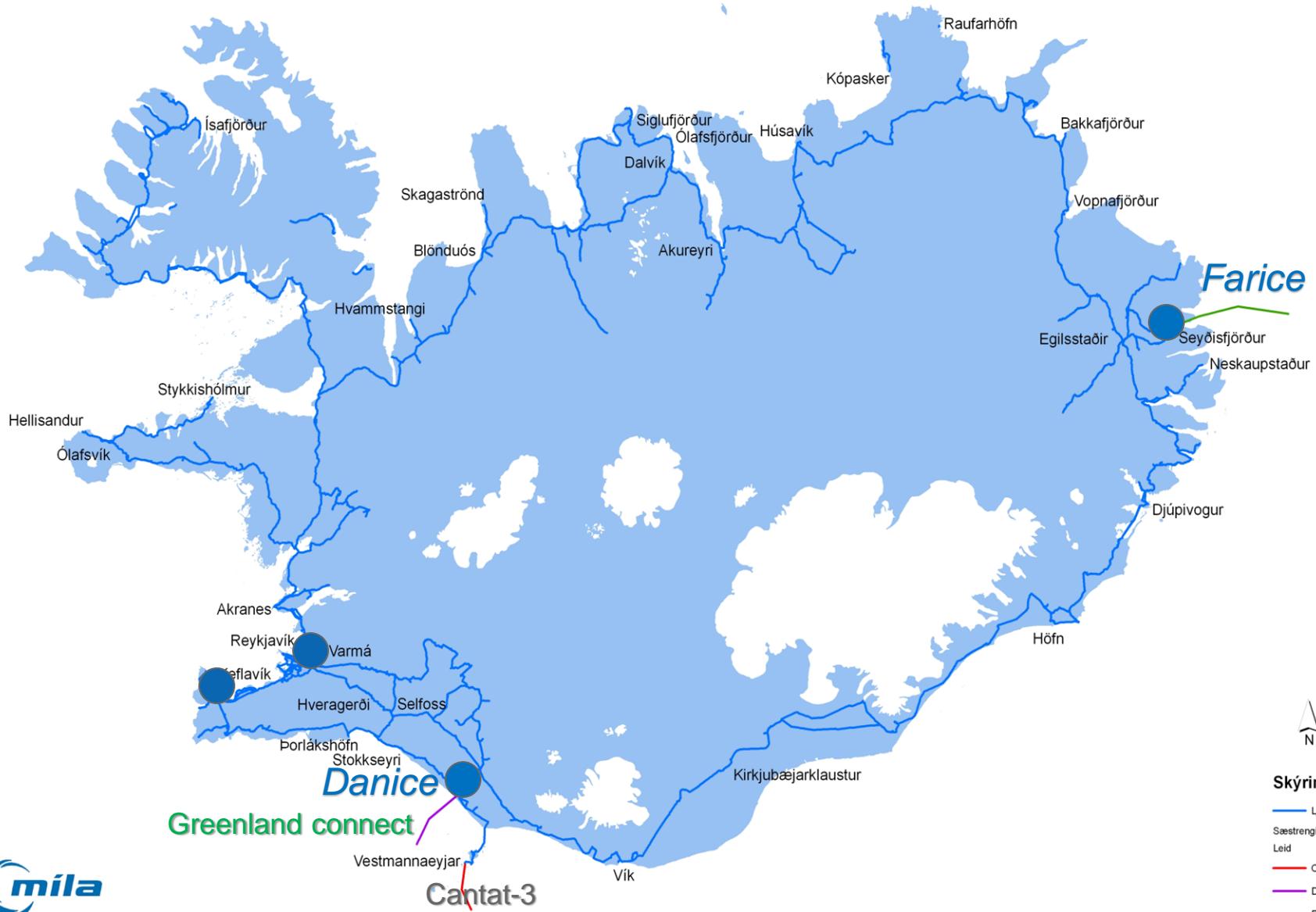
Tæknilegir innviðir fyrir fjarskipti á Íslandi Samanburður á nýtingu fjarskipta milli Íslands og Norðurlandanna

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Yfirlit

- Fjarskiptainnviðir á Íslandi
 - Ljósleiðarahringurinn
 - Innviðir í dreif- og þéttbýli
- Tengingar til útlanda
 - Farlce
 - Danlce
 - Greenland Connect
 - Emerald Atlantis – Emerald Express
- Innviðir fyrir þráðlaus fjarskipti
 - Útbreiðslukort Símans, Vodafone og Nova
- Samanburður við Norðurlöndin
 - Farsíma þjónusta
 - Fastanets þjónusta
 - Internet þjónusta
- Lokaorð

LJÓSLEIÐARI 2008

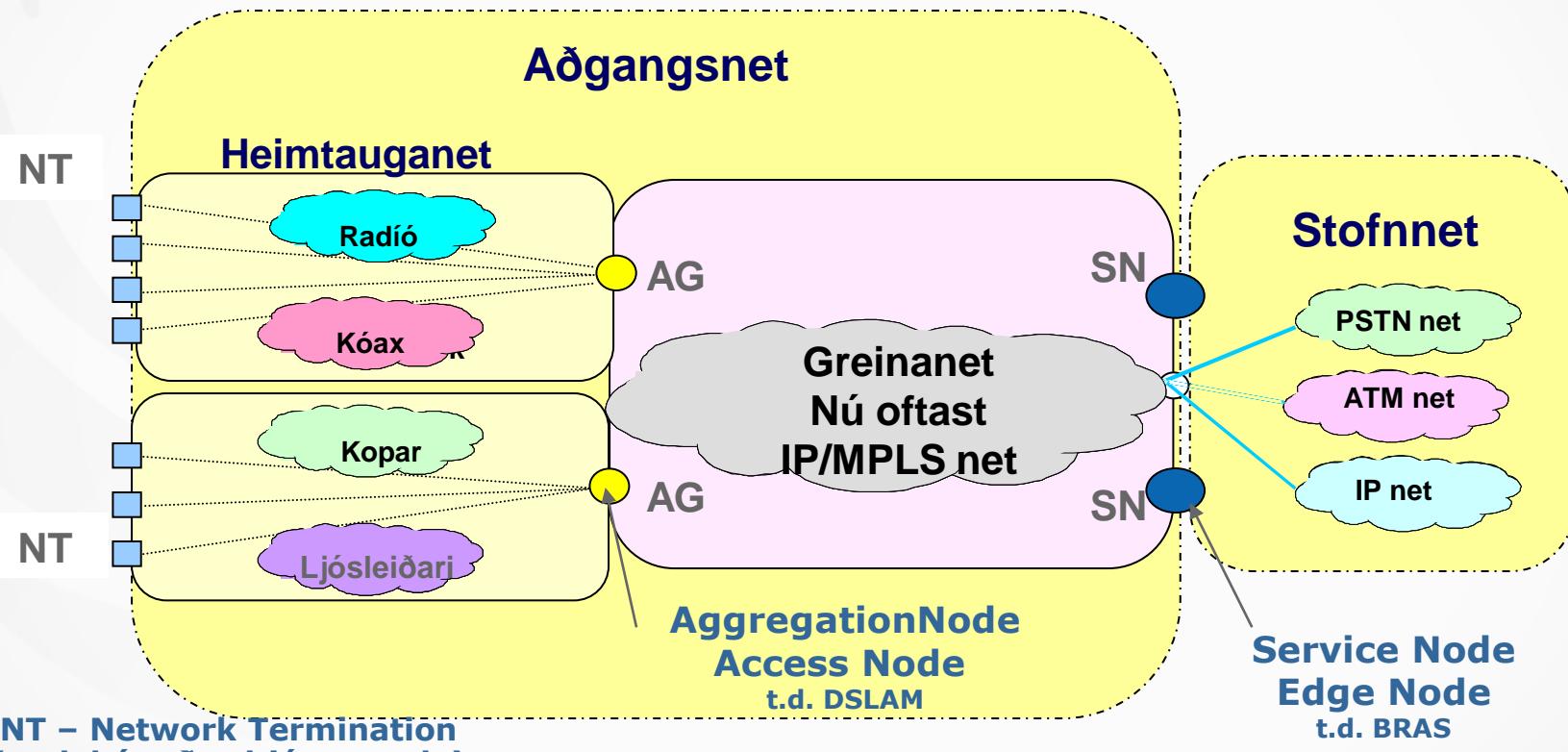


Framþróun ljósleiðarahringsins

- Núverandi flutningsgeta
 - 40 bylgjulengdir fyrir hvern þráð
 - „Carrier Ethernet“ tækni
 - 10 Gb/s flutningshraði/bylgjulengd (COTS-tækni)
 - 400 Gb/s
 - Núverandi tæknistig leyfir flutning
 - 100 Gb/s eftir hverjum lit
 - 4000 Gb/s = 4 Tb/s
 - 500 þús. HD-rásir @ 8 Mb/s
 - 62,5 milljónir símarása @ 64 kb/s
- Hlutar hringsins allt að 20 ára gamlir
 - Lætur ekki á sjá
- Ný tækni
 - OTN
 - MPLS-TP

Innviðir í þétt- og dreifbýli

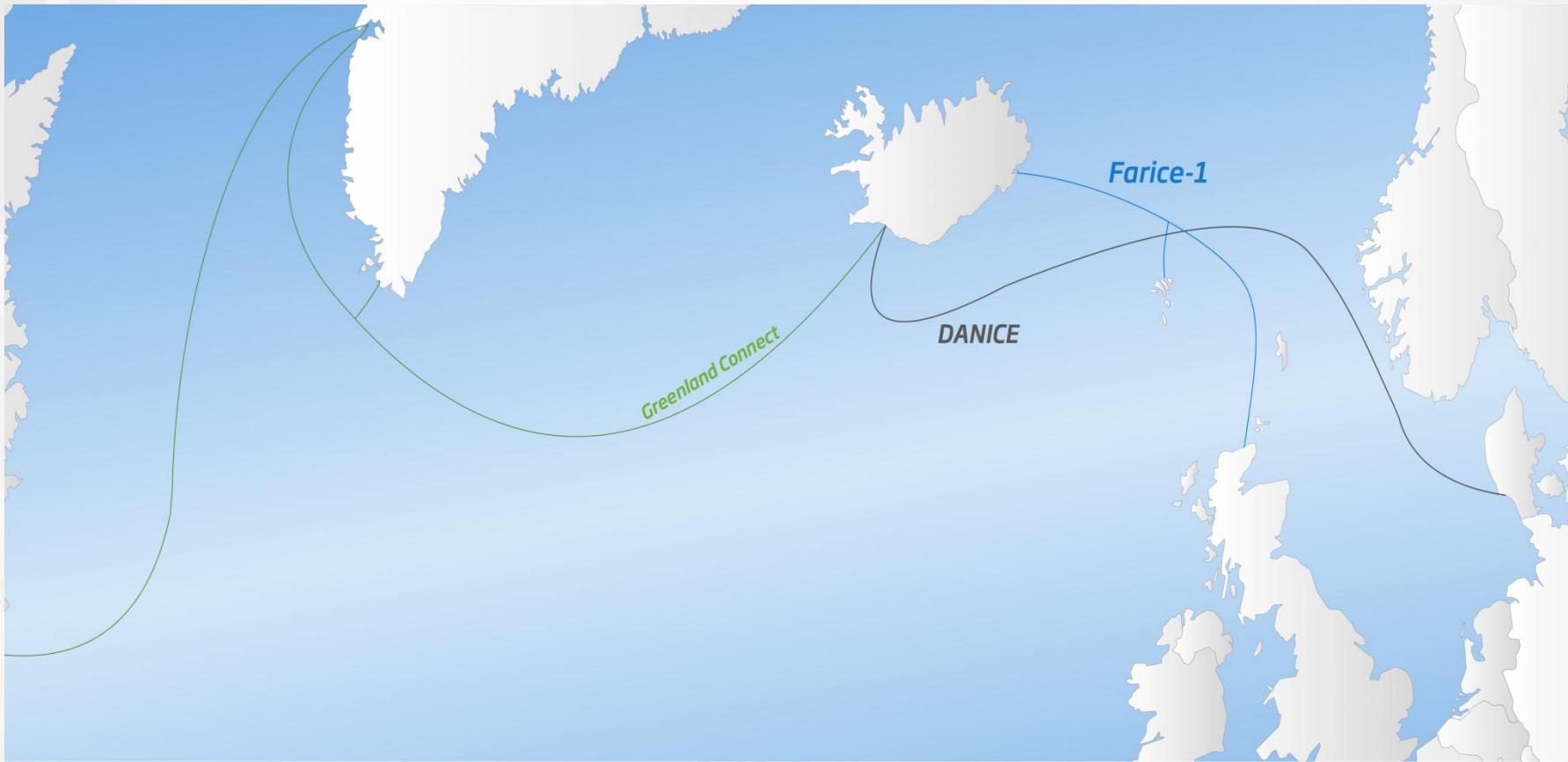
Samkvæmt skilgreiningu ITU



Innviðir í þétt- og dreifbýli

- Stofnnet
 - Nærri alls staðar ljósleiðaranet
 - Þó einnig örbylgjusambönd á stöku stað í dreifbýli
 - Tækni
 - DWDM – 40 lita kerfi, hægt að fara í 80 liti
 - SDH - 2,5 Gb/s
 - “Carrier Ethernet” - 1 Gb/s og 10 Gb/s
 - OTN, MPLS-TP – 40 Gb/s eða 100 Gb/s
- Greinanet
 - eingöngu ljósleiðari í þéttbýli
 - ljósleiðari og örbylgjusambönd í dreifbýli
- Heimtauganet
 - Kopar, ljós og radíó í þéttbýli
 - Mest Kopar og radíó í þéttbýli
 - ADSL, ADSL2+, VDSL2
 - GPON, Virkt Ethernet

Sæstengir til Íslands



- Farice-1 720 Gb/s
- DanIce 5,1 Tb/s
- Greenland Connect 1,9 Tb/s

Emerald Atlantis



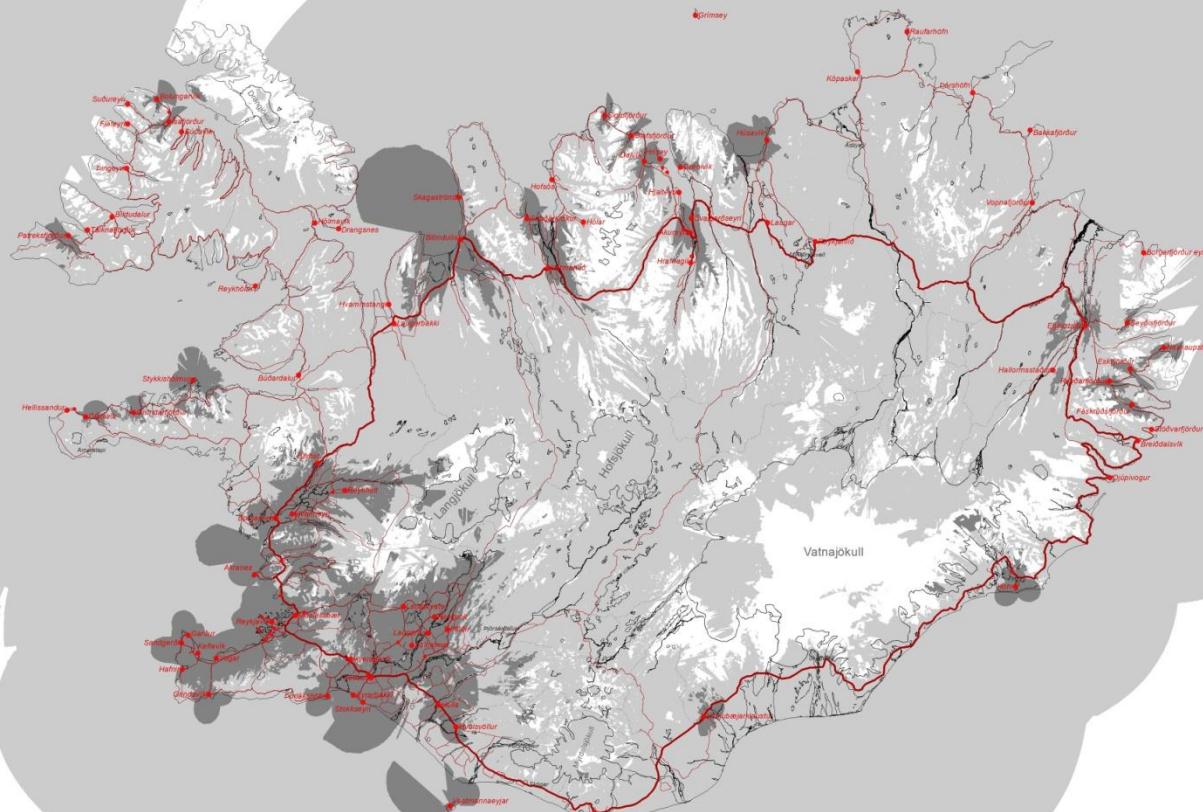
Emerald Atlantis – Emerald express

- Af Vefsíðu Emerald Atlantis, www.emeraldatlantis.com:
 - EMERALD EXPRESS
 - Connecting North America, Northern Europe & Iceland
 - Six Fiber Pairs at 100 x 100Gbps Each
 - Lowest Latency Trans-Atlantic System
- 100 litir @100 Gb/s → 10 Tb/s fyrir hvern lit
- Flutningsgeta 60 Tb/s
- Núverandi notkun Íslendinga
 - Áætluð undir 50 Gb/s
 - Þrefoldun á u.p.b. tveggja ára fresti
 - Tæki u.p.b. 5 ár að fylla Farlce
 - Líklega hægt að fjórfalda eða tífalda getu Farlce með litlum tilkostnaði
 - 2,5 – 4 ár bætast þá við → Farlce fyllist á 7 – 9 árum

Innviðir fyrir þráðlaus fjarskipti

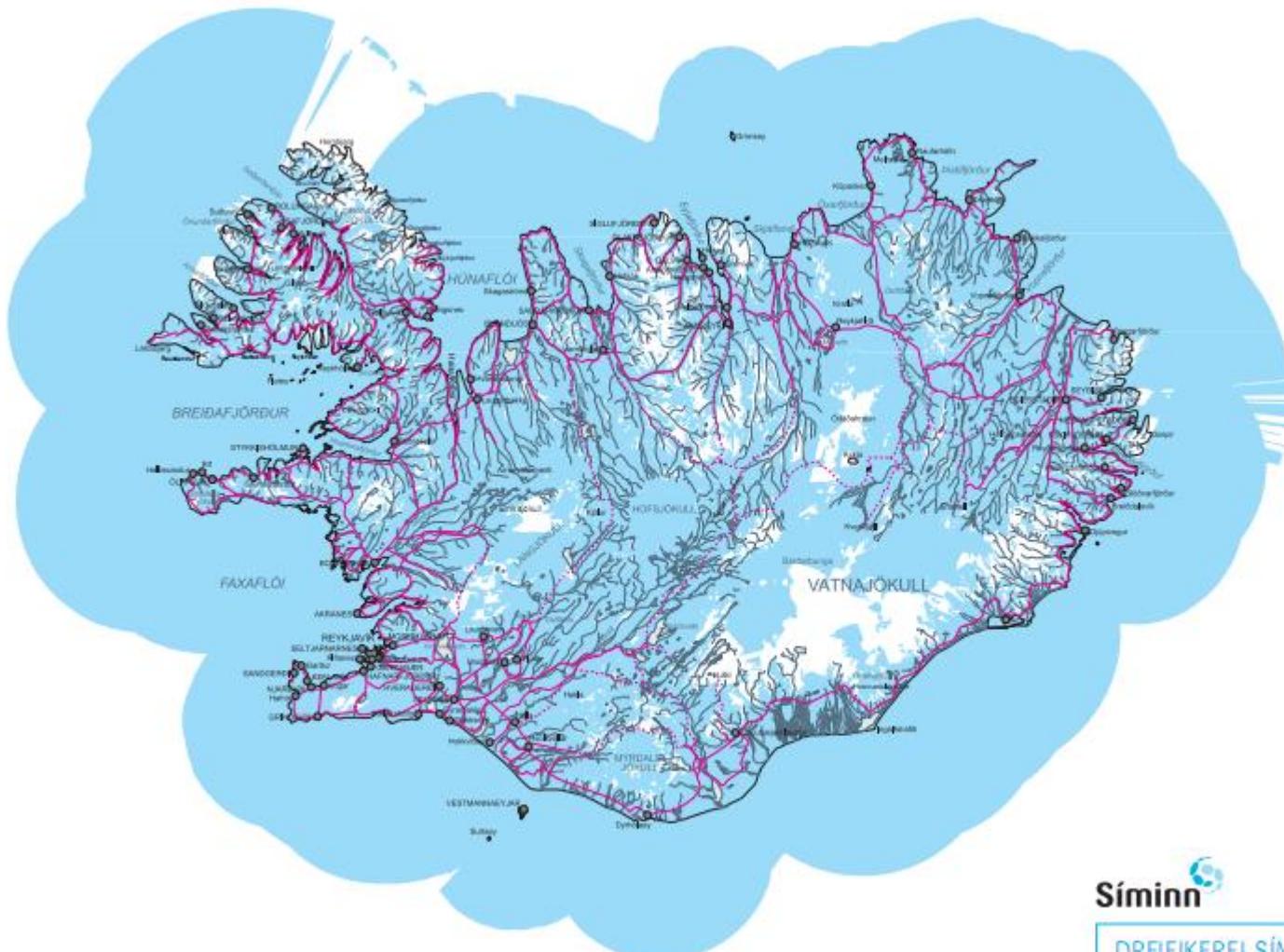
- Síminn, Vodafone og Nova reka öll eigin innviði
- GSM (2G)
 - GPRS (2,5G, 115 kb/s)
 - EDGE (2,75G, 384 kb/s)
- UMTS (3G)
 - HSDPA, HSUPA, HSPA (3,5G) (14 Mb/s nú algengast)
- Uppbygging LTE (Long Term Evolution) ekki enn hafin hér á landi
 - Byrjuð í nokkrum nágrannalöndum
 - LTE á að veita 100 Mb/s þjónustu

Útbreiðslusvæði Vodafone

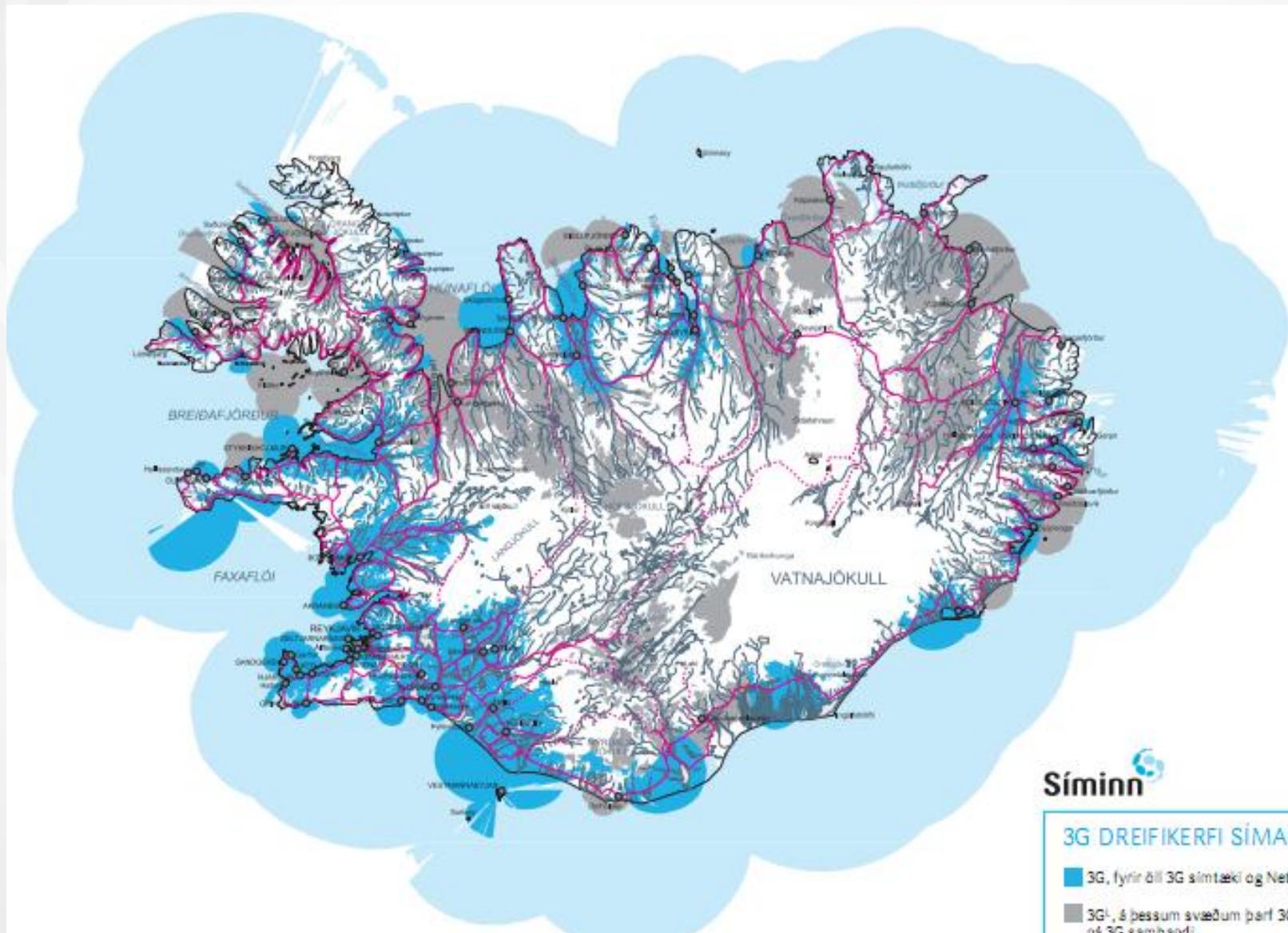


GSM (langdrægt)
3G (UMTS/HSDPA)

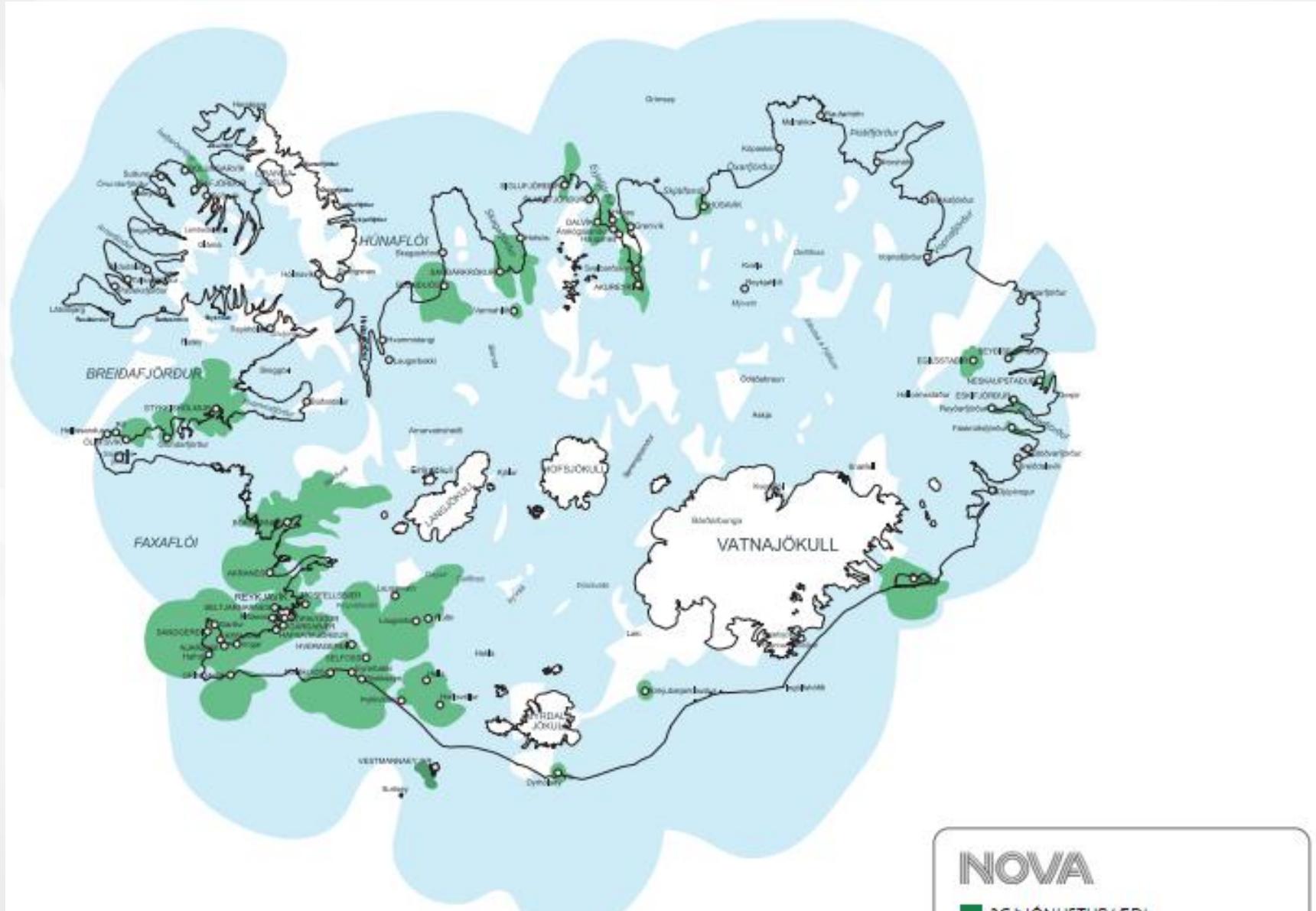
Útbreiðslusvæði Símans GSM



Útbreiðslusvæði Símans 3G



Útbreiðslusvæði Nova



Notkun fjarskiptabjónustu og samanburður við Norðurlöndin

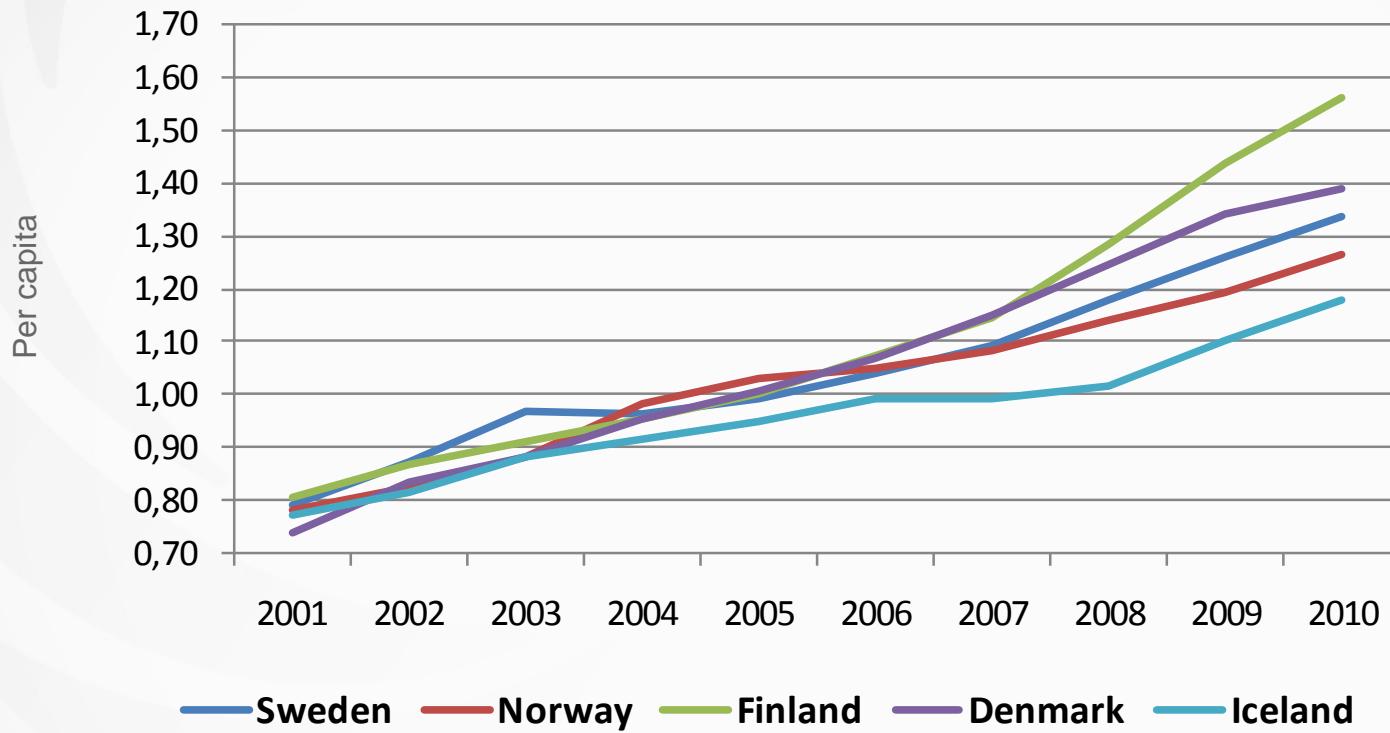


- Gögn fengin frá norrænum póst- og fjarskiptastofnunum
- Dagsett 31.12. 2010
- Gröf sýna bæði fyrirtækja- og einkanotkun



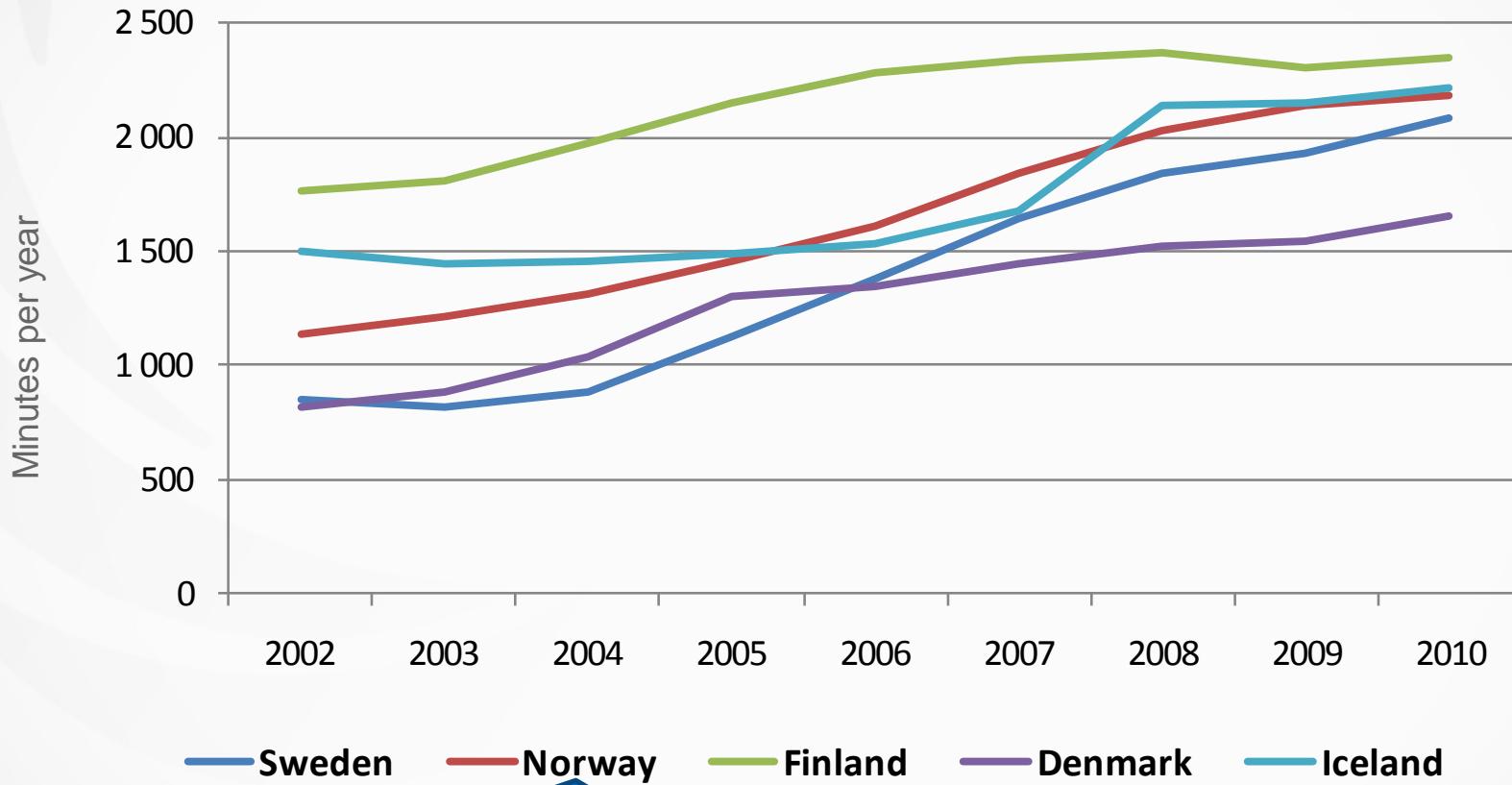
Þjónusta í farsímanetinu

Farsímaáskriftir¹ á mann



Number of mobile subscriptions is still growing smoothly in every Nordic country. The increase in difference between the countries can be explained by the development of mobile broadband subscriptions. Iceland was adopting mobile broadband later than other Nordic countries.

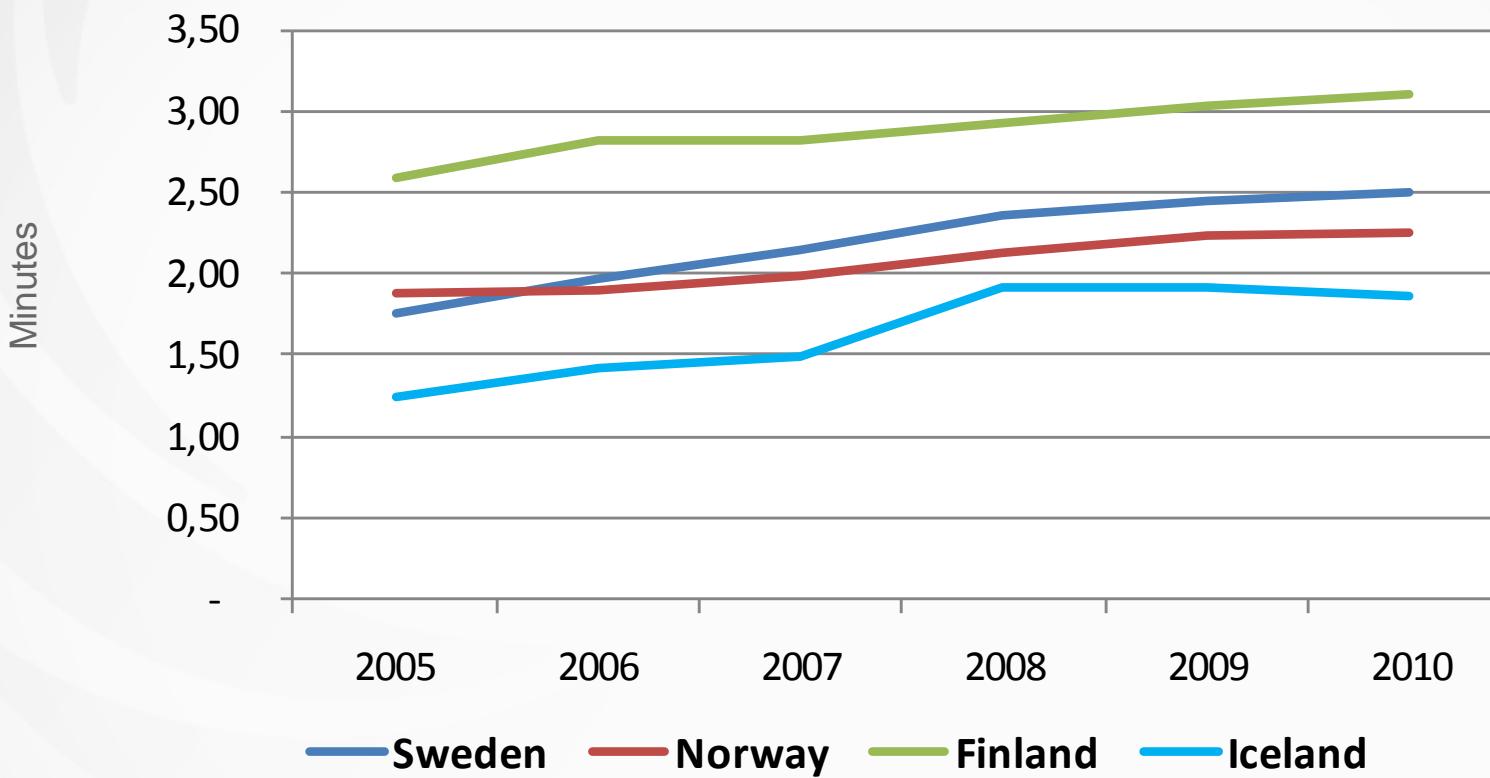
Fjöldi mínutna / áskrift yfir eitt ár



Finland has a significant higher usage of mobile telephony for speech. Finland has the lowest penetration and usage of fixed telephony and of broadband telephony (VoIP). Denmark has the lowest minutes per subscription, but the highest use of SMS messages.

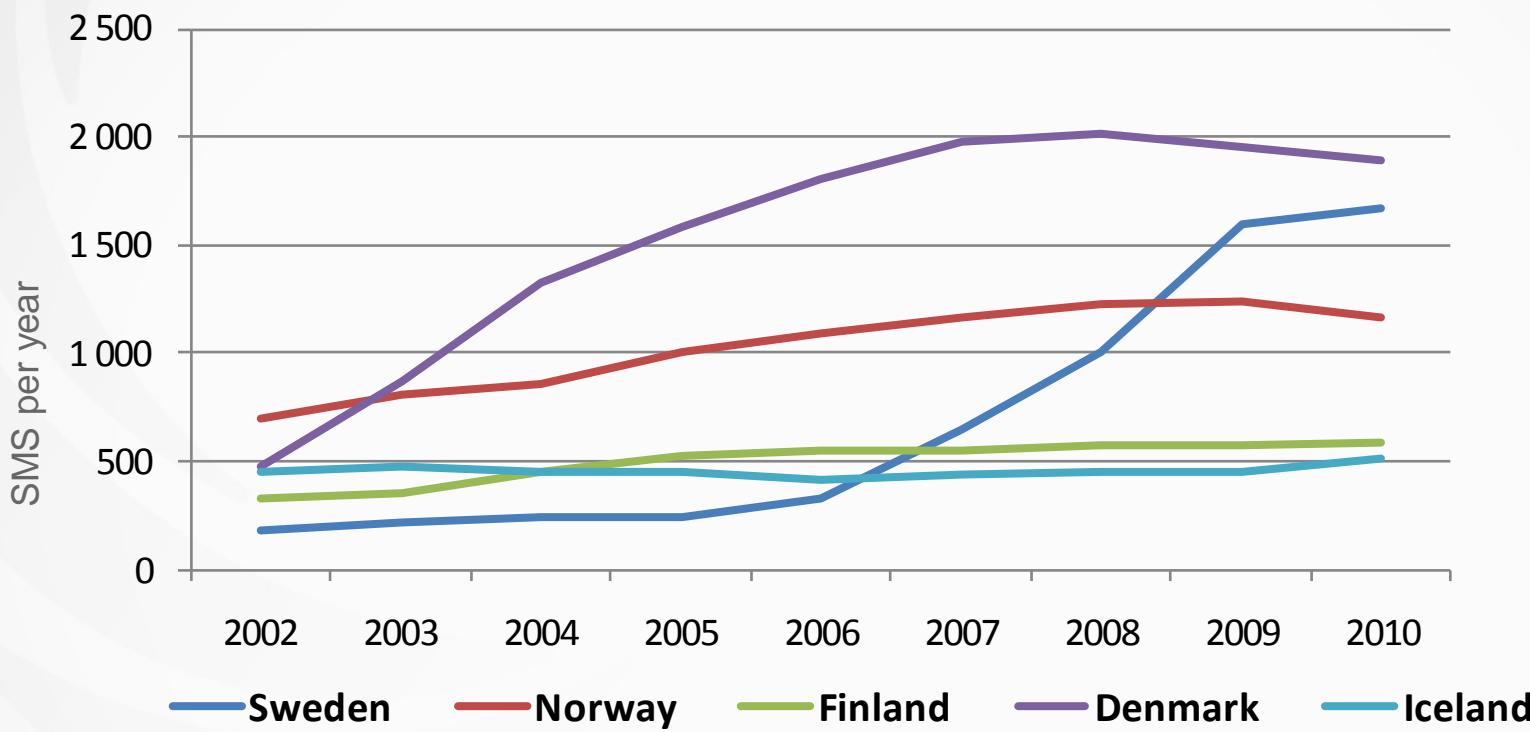
¹ Subscriptions is the average of the number of subscriptions at the beginning and end of each year. Exclusive mobile broadband subscriptions

Meðal tímалengd farsíma-símtals



The average length of a mobile calls are increasing slowly and getting closer to the average length of a fixed telephone calls in the Nordic countries.

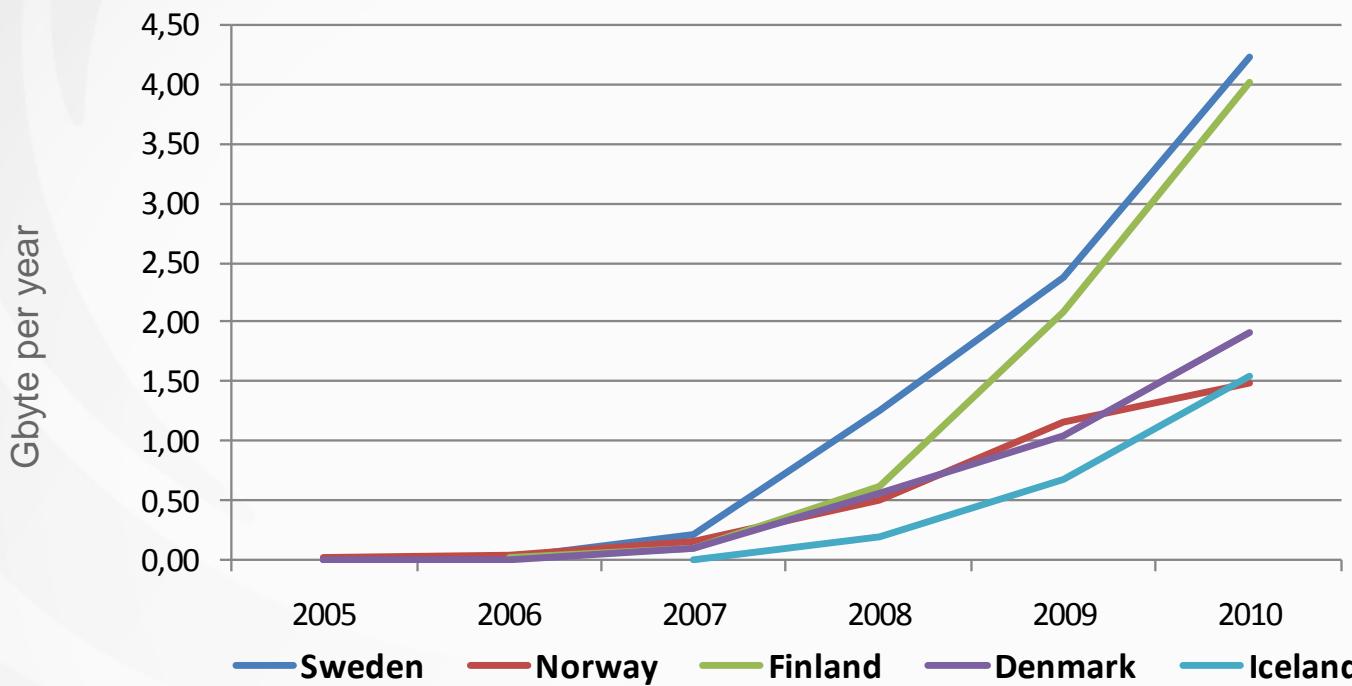
Meðalfjöldi SMS-skeyta send frá hverri áskrift á ári



Average number of SMS messages send per subscription in a year are decreasing in Denmark after a strong growth during the beginning of the decade. Number of SMS are also decreasing in Norway. Number of SMS messages send t has been increasing fast in Sweden, but the last year shows slower growth. In Finland and Iceland the use of SMS messages have been quite modest.

¹ Subscriptions is the average of the number of subscriptions at the beginning and end of each year. Exclusive mobile broadband subscriptions

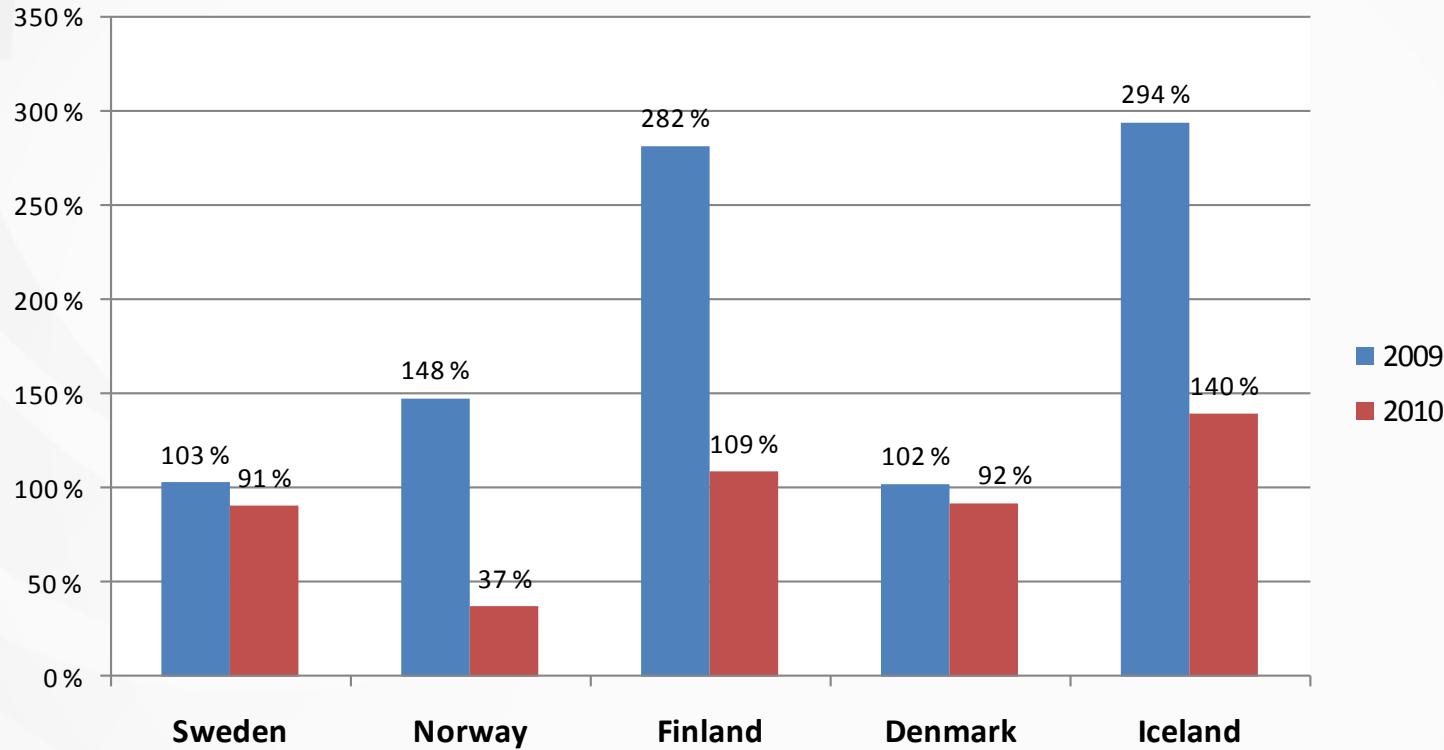
Meðal gagnamagn á áskrift¹ sent yfir farsímanet



Data volume transferred over mobile networks have increased fast in every Nordic country. The growth in data traffic is close to or above 100 percent in all the countries except in Norway. It is the dedicated data subscriptions that generates most of the data traffic in mobile networks. Norway and Iceland has the lowest number of these types of subscriptions per capita, and Finland and Sweden the highest. This may be one of the reasons behind the relatively large difference in Gbyte per subscription. Sweden and Finland has a lower number of fixed broadband subscriptions per capita than the other countries, and possibly a larger share of customers that has substituted their fixed broadband with mobile broadband.

¹Includes subscriptions and traffic for both mobile and mobile broadband.

Vöxtur gagnaumferðar í farsímanetum

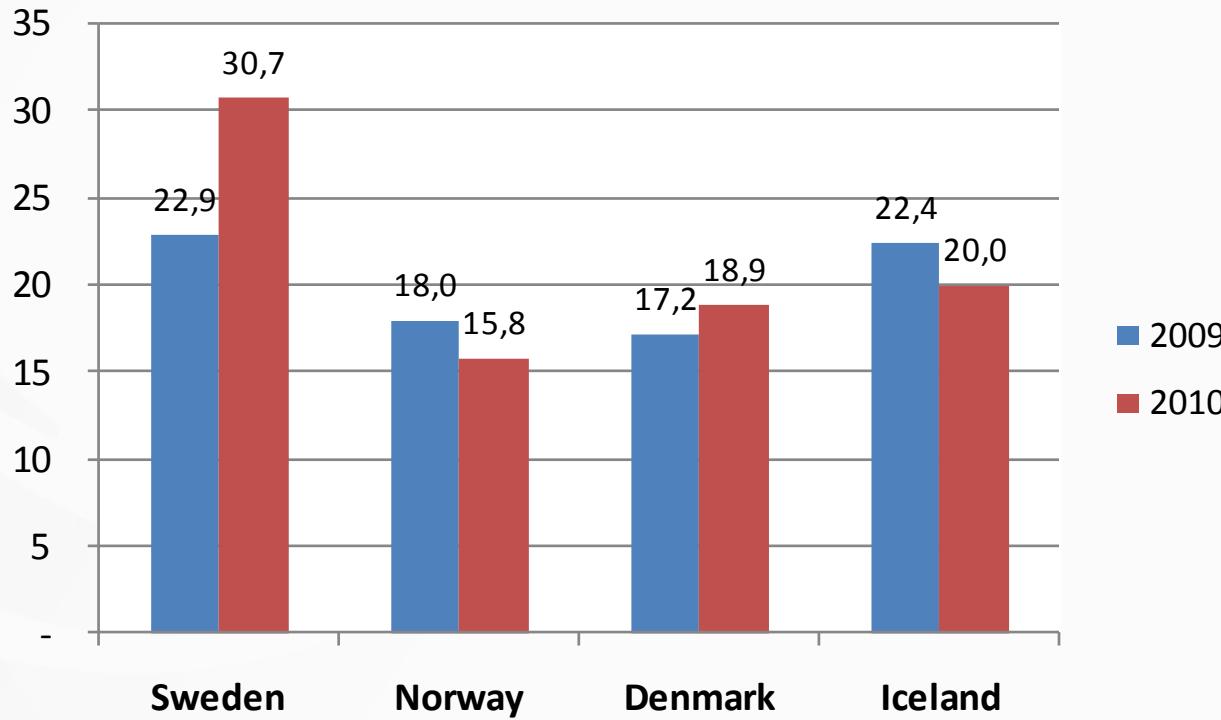


Substantially slower growth in Norway in 2010 than in the other Nordic countries.

Meðal gagnamagn sent um farsímanet á háhraða gagnaáskrift¹



Gbyte per year



Data volume transferred by mobile broadband subscriptions. The Swedish users are using twice as much data as users in Norway.

¹Includes only dedicated data or mobile broadband subscriptions

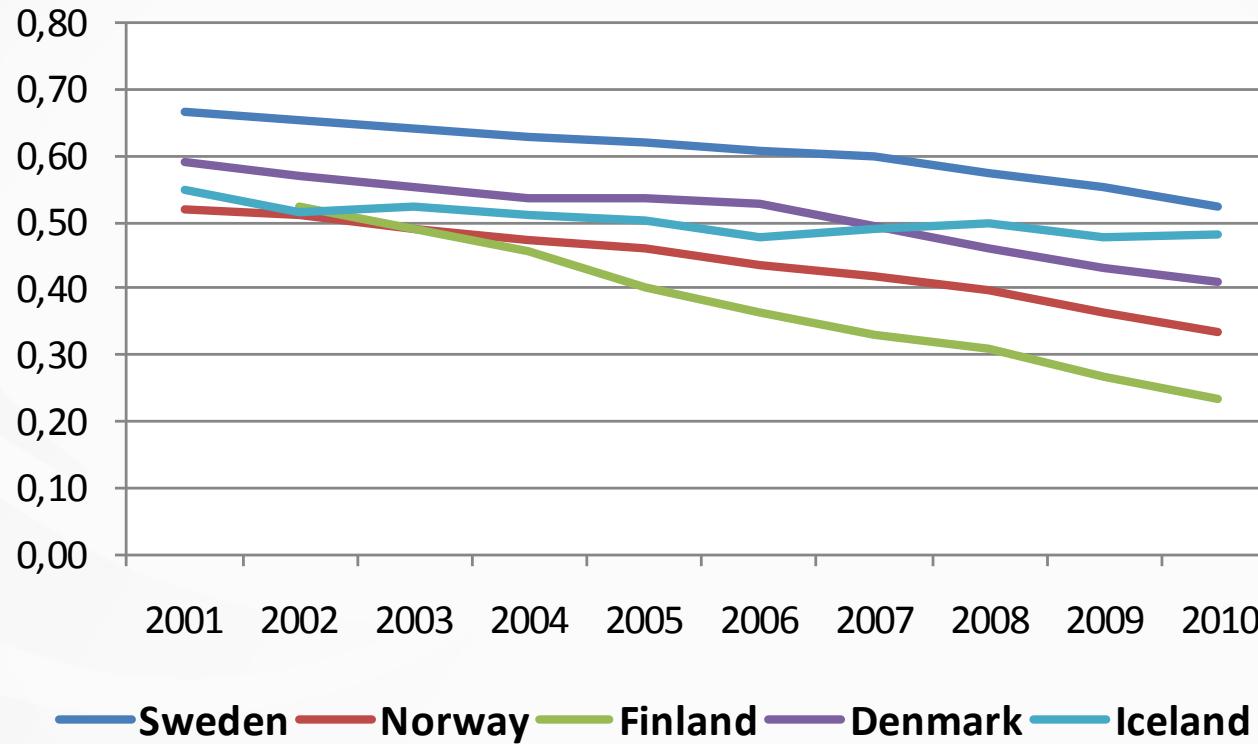


Þjónusta í fastanetinu

Fjöldi áskrifta í fasta símanetinu á mann



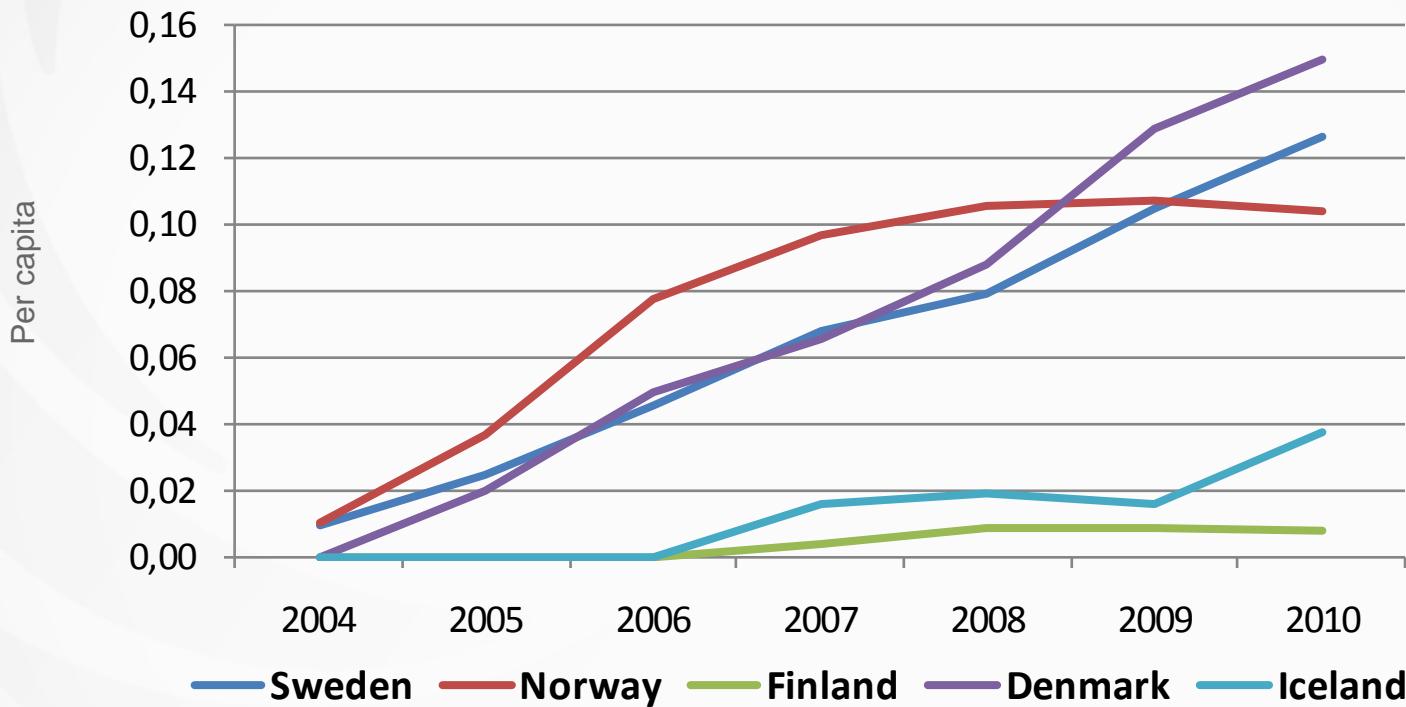
Per capita



— Sweden — Norway — Finland — Denmark — Iceland

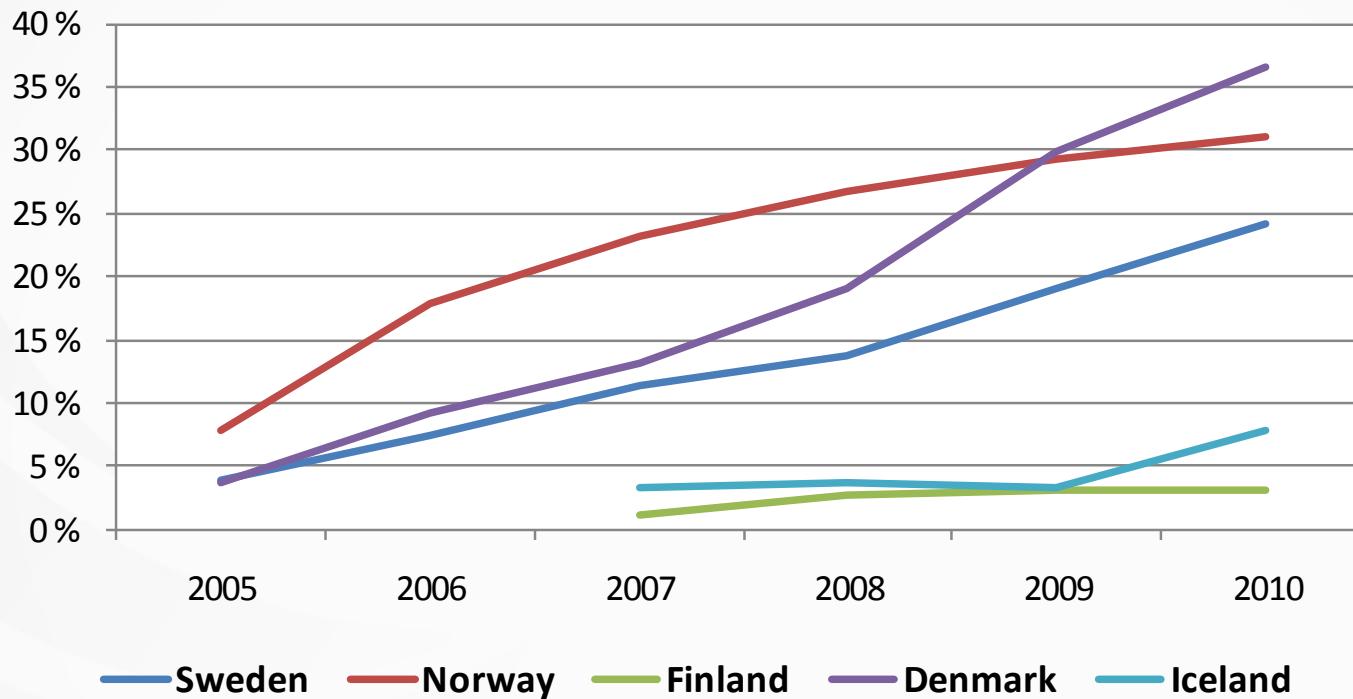
The number of fixed telephone subscriptions per capita is decreasing in every Nordic country.
The decrease is less apparent in Iceland.

Áskriftir Símbjónustu yfir háhraðanet (VoIP) á mann



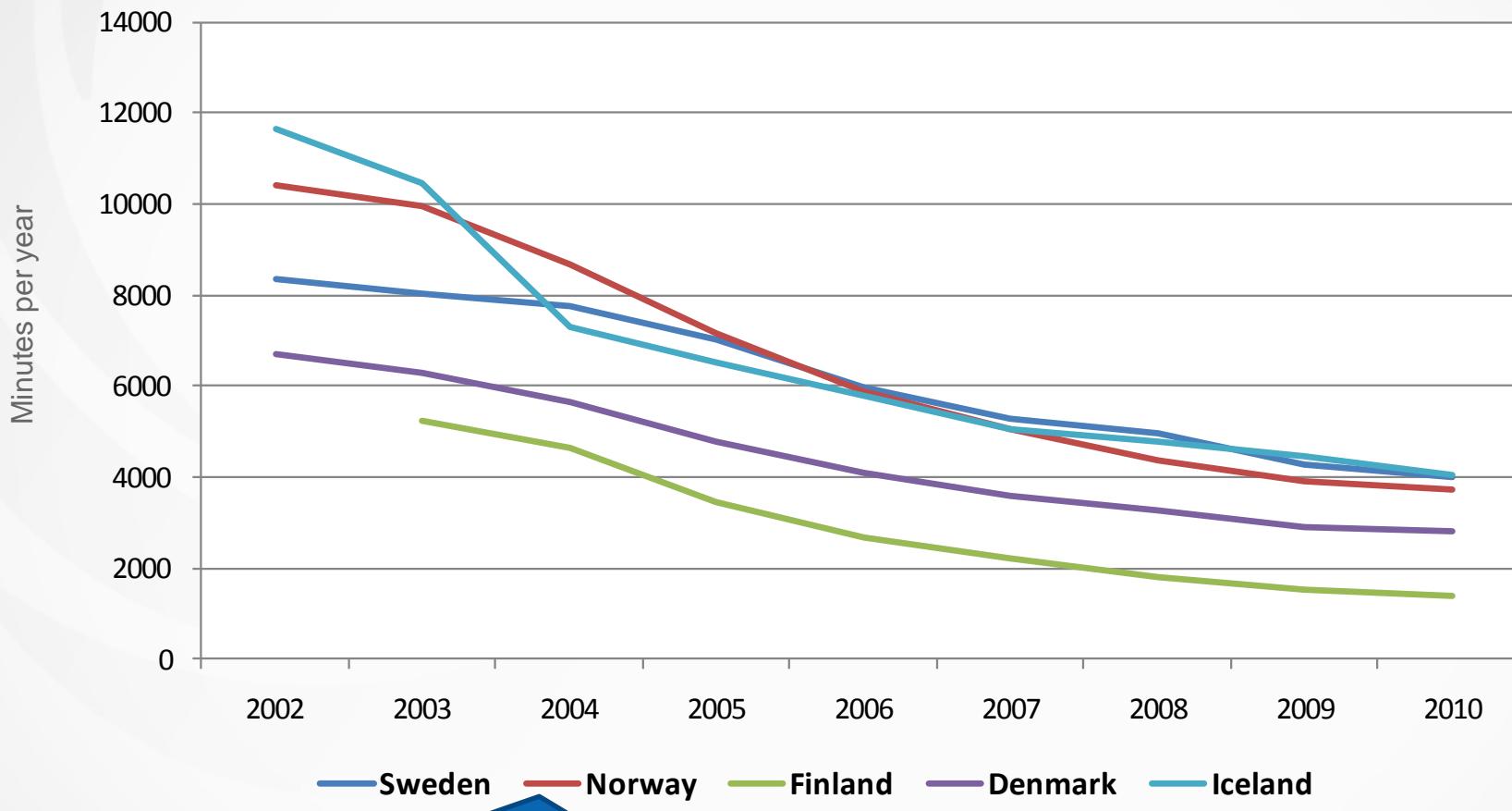
The number of broadband telephony subscriptions per capita is increasing fast in Denmark and Sweden. In Norway the growth has stopped. In Iceland there has been a strong growth the last year. In Finland the number of broadband telephony are relatively modest.

Hlutur VoIP af heildar síma-bjónustu í fasta netinu



The share of broadband telephony of all fixed telephony subscriptions in the end of the year were over 35 percent in Denmark, over 30 per cent in Norway and almost 25 per cent in Sweden. In Finland and Iceland the share of broadband telephony of all fixed telephony subscriptions were relatively modest.

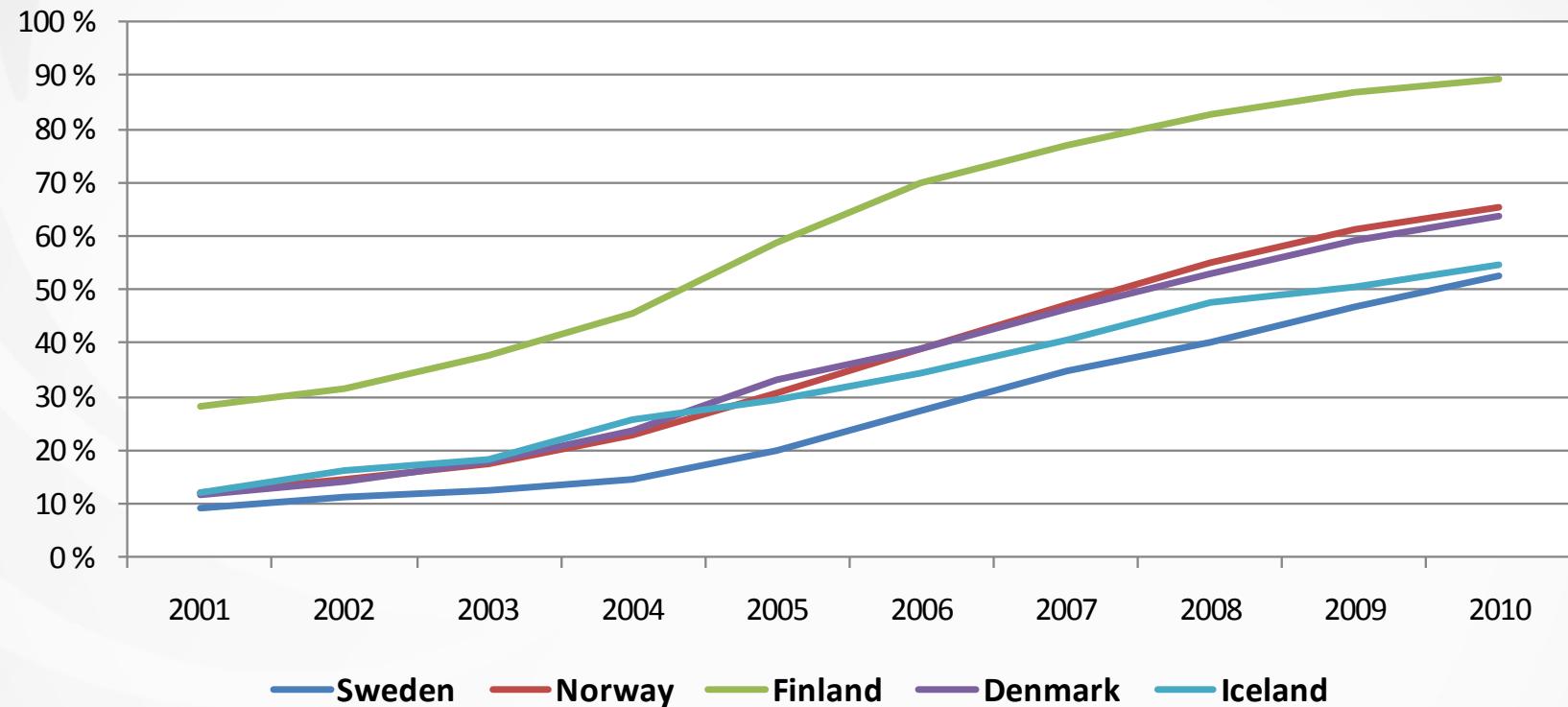
Fjöldi mínútna í fasta netinu á áskrift yfir eitt ár



The usage is declining in all countries. Finland has the lowest usage, but has the highest usage of mobile telephony.

¹ Subscriptions is the average of the number of subscriptions at the beginning and end of each year.

Hlutur mínútana sem eiga uppruna sinn í farsímakerfi af öllum mínútum

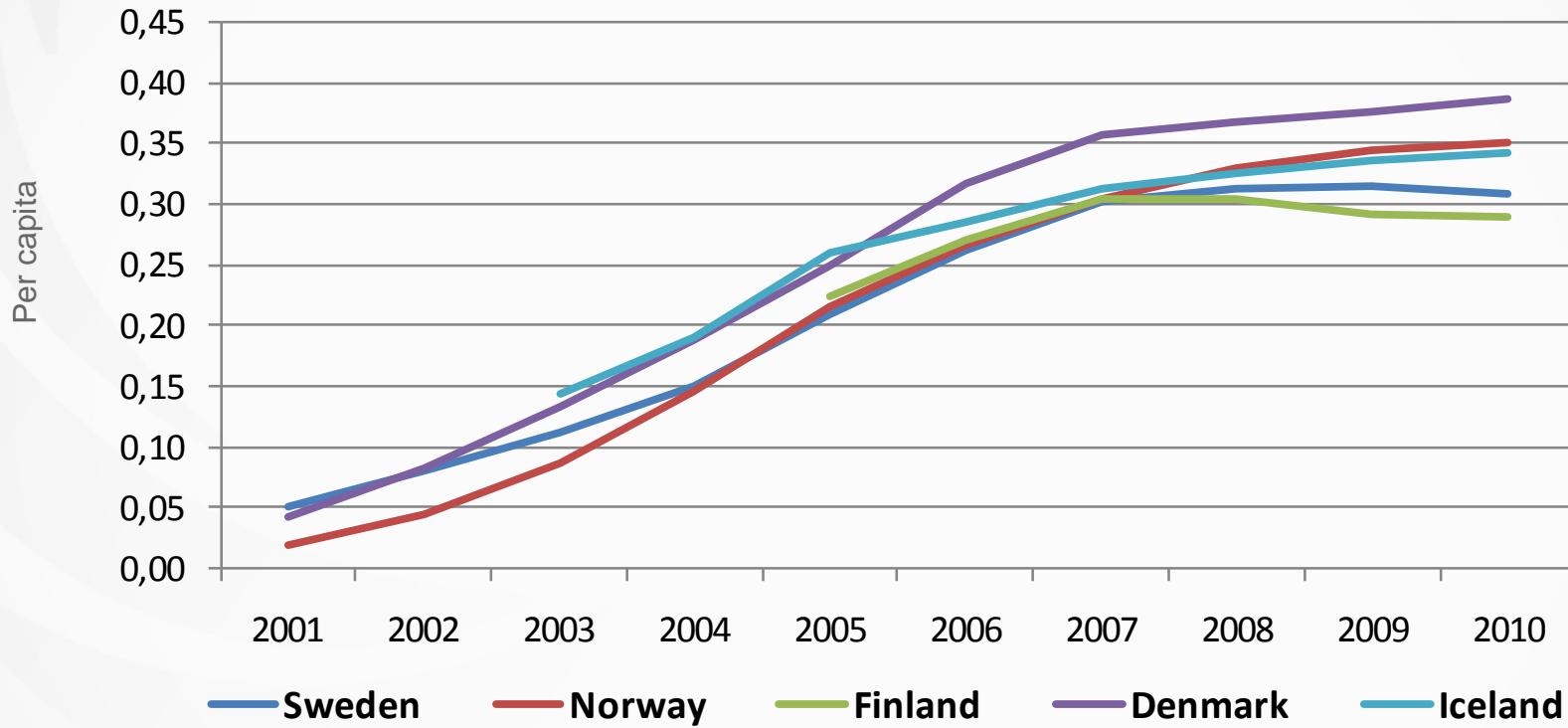


The graph shows that the usage of mobile telephony are more and more dominant in terms of minutes. The share of mobile minutes of all originated minutes is almost 90 percent in Finland. The share of mobile minutes of all originated minutes in Denmark and Norway where approximately 65 percent and in Sweden and Iceland where 53 and 55 percent respectively.



Internet þjónusta

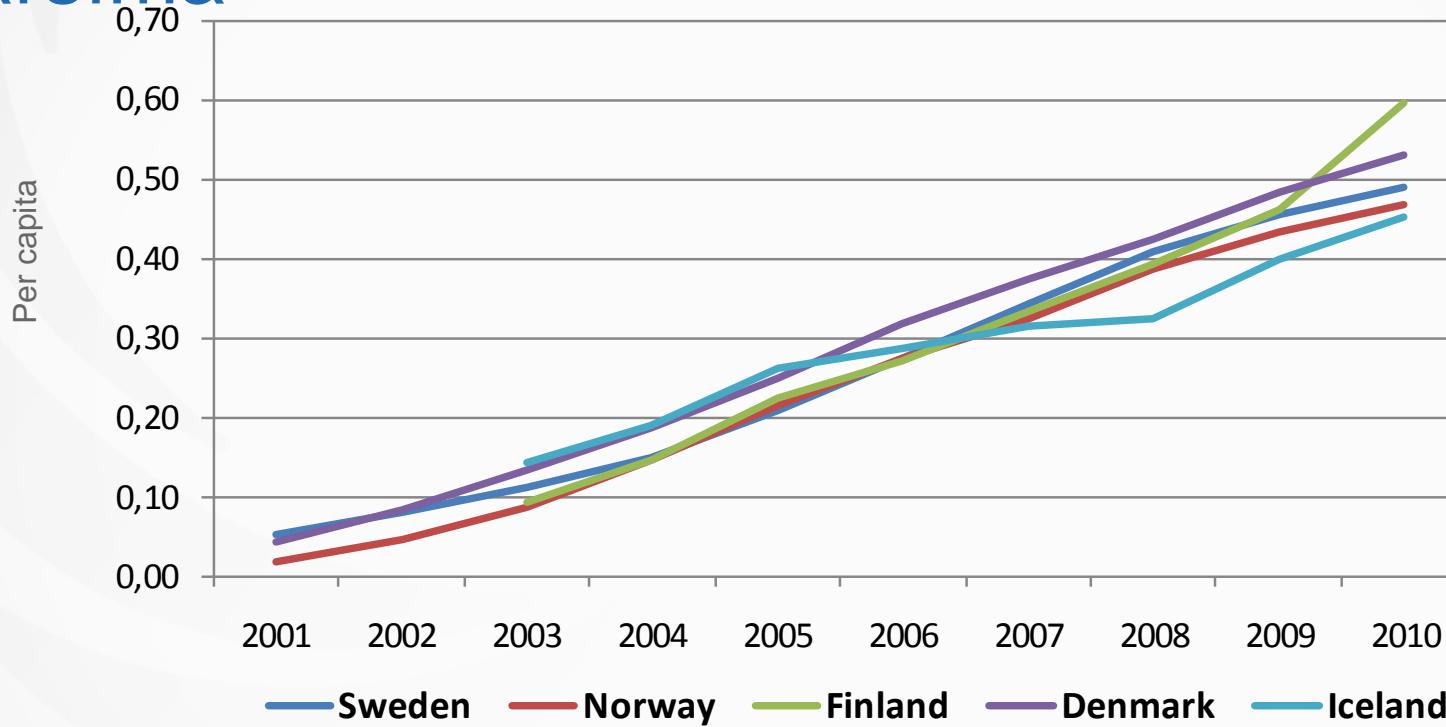
Fjöldi háhraða áskrifta á mann¹ (per capita)



The growth has stagnated in all countries. There is even a decline in Finland and Sweden. This could partly be explained by substitution to mobile broadband. All Nordic countries are within the OECD top 10 on broadband penetration.

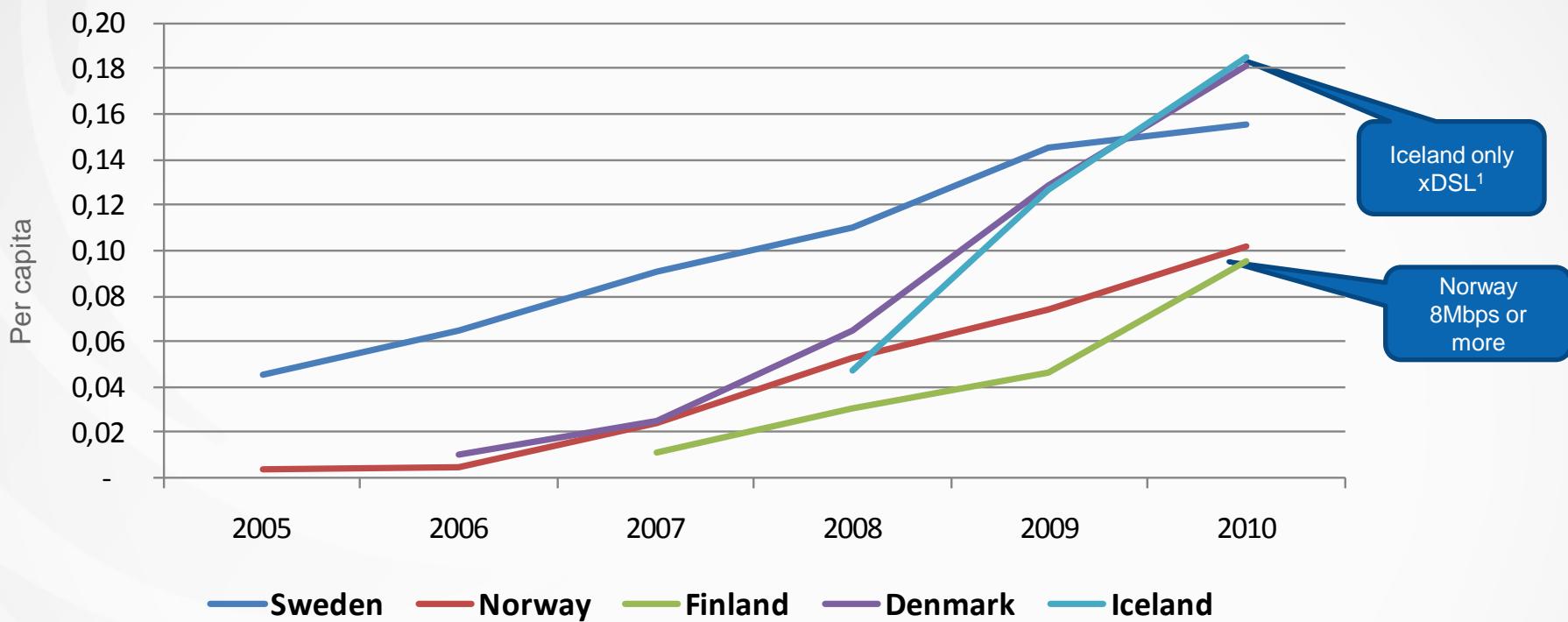
¹Including both private and business subscriptions

Fjöldi háhraða áskrifta á mann, b.á m. háhraða gagnaáskriftir um farsíma



When adding the growth in mobile broadband to fixed broadband the graph shows that Finlands then has the highest penetratio with almost 0,6 subscriptions per capita.

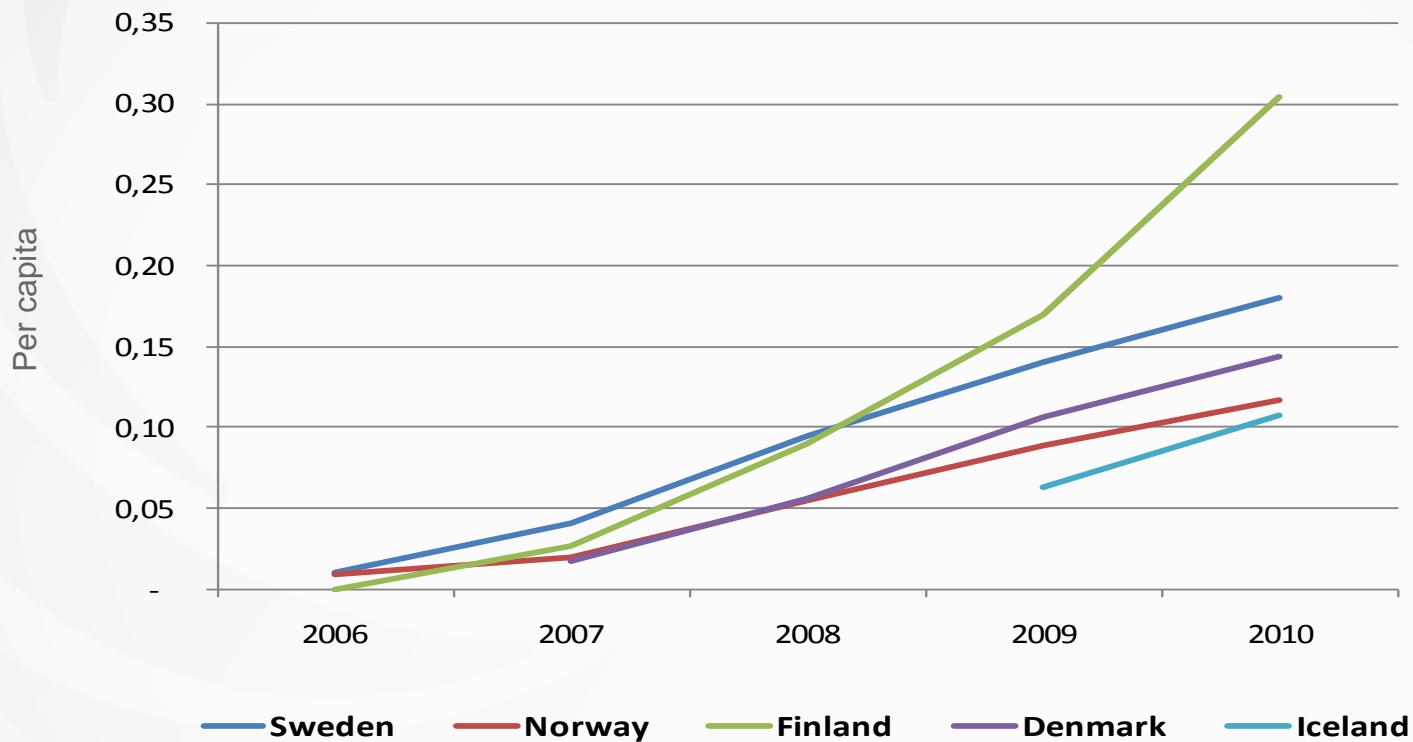
Fjöldi fastanetsáskrifta á mann með meira en 10 Mb/s



The graphs shows broadband penetration for subscriptions with speeds of 10 Mbps or more downstream.

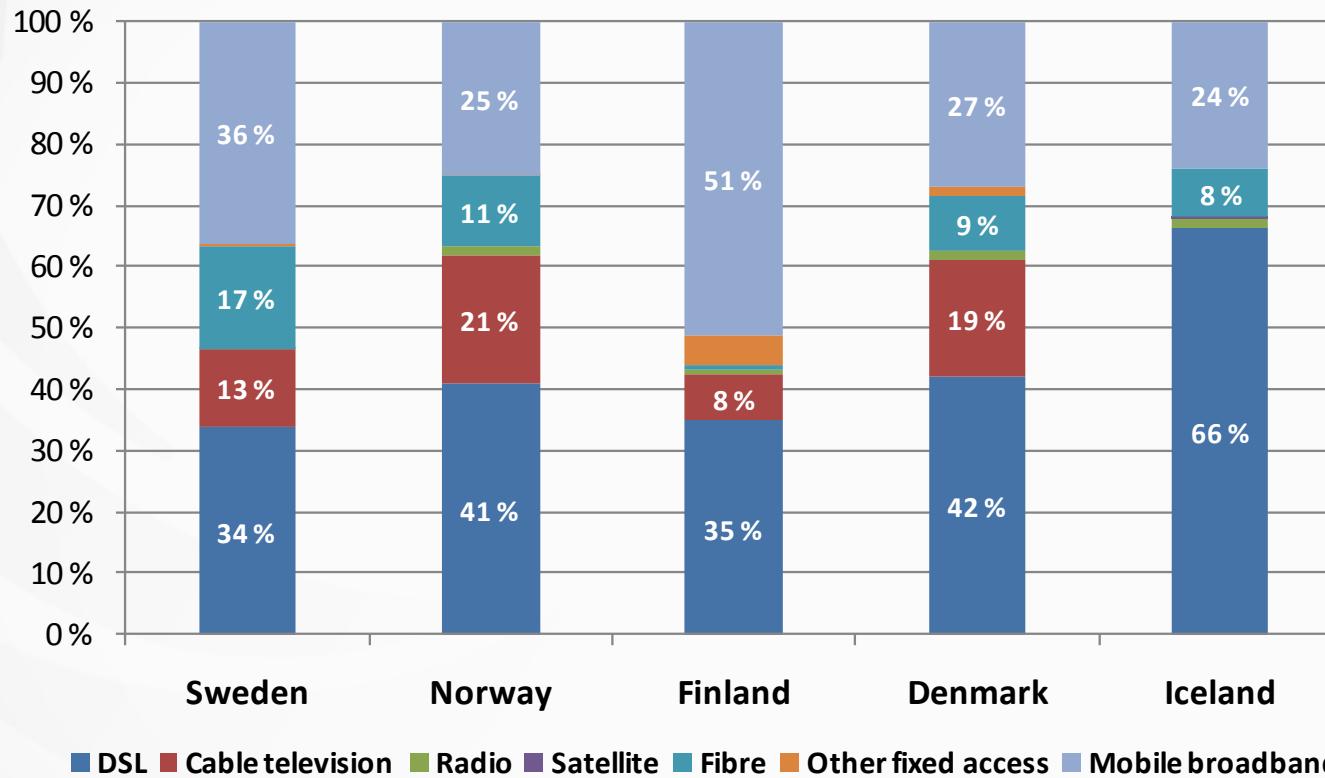
¹Many subscriptions are advertised with speeds up to for example 12 Mbit/s. Actual speed depends on factors like distance from central exchange. We believe that this is the case for xDSL subscriptions also elsewhere in the Nordic countries.

Fjöldi háhraða áskrifta um farsíma á mann



The graph is showing the number of dedicated mobile broadband subscriptions in relation to the total population. About 30 out of a 100 inhabitants has a mobile broadband subscription in Finland, 18 in Sweden, 14 in Denmark, 12 in Norway and 11 in Iceland. The growth rate for subscriptions in 2010 is 80 percent in Finland, 72 percent in Iceland. And in Denmark, Sweden and Norway 36, 30 and 33 percent respectively.

Hlutur allra háhraða aðferða árið 2010, þ.m.t. háhraða farsímatengingar



Sweden has the highest share of fibre. The number of xDSL subscriptions has fallen in all the Nordic countries for the first time.

Niðurstöður

- Ísland er vel búið fjarskiptainnviðum
 - Nærri öll heimili (í borg og bý) eiga kost á a.m.k. 2 Mb/s internettengingu
 - Hægt er að setja upp gagnaver sem krefst mjög hraðra tenginga nærri hvar sem er nærri byggð á Íslandi (og víða utan byggðar)
 - Landið er tengt umheiminum um þrjá sæstrengi sem hver um sig annar margfaldri þörf landsins til margra ára
 - Helsti dragbítur á internetnotkun er þó sá sami og á við um flest samskipti Íslendinga við umheiminn, fjarlægðin
 - Við berum hærri kostnað en meginlandsþjóðir
 - Virðist þó ekki hafa tafið okkur mikið hingað til !
 - Fjöldi farsímaáskrifta hér er heldur lægri en á hinum Norðurlöndunum
 - 1,2 áskriftir /mann
 - Farsímasímtöl styttri hér á landi en á hinum Norðurlöndunum
 - Gæti verið vegna meiri fastanetsnotkunar
 - Fastanetssímtöl hér eru afar ódýr

Niðurstöður

- Gagnamagn í farsímanetinu hér í lægri kantinum
 - Hér er þó hraðasti vöxturinn
 - Íslendingar byrjuðu síðar en Norðurlöndin að nýta sér gagnatengingar um farsíma
- Símaáskriftum um fastanetið fækkar hægar hér en á Norðurlöndunum
 - E.t.v. vegna lágs verðs
- VoIP er minna notað hér en á Norðurlöndunum
 - Vöxtur þó mikill, en skýrist einnig vegna mikillar notkunar fastanets símaþjónustu
- Öll Norðurlöndin svipuð er varðar fjölda háhraða áskrifta í fastanetinu
- Íslendingar með mesta hraðann ásamt Dönum
- Ég sé engin teikn um það að Íslendingar standi öðrum þjóðum að baki hvað varðar fjarskipti
- Öll Norðurlöndin eru meðal 10 efstu OECD þjóða er varðar útbreiðslu háhraða tenginga



Þakka áheyrnina