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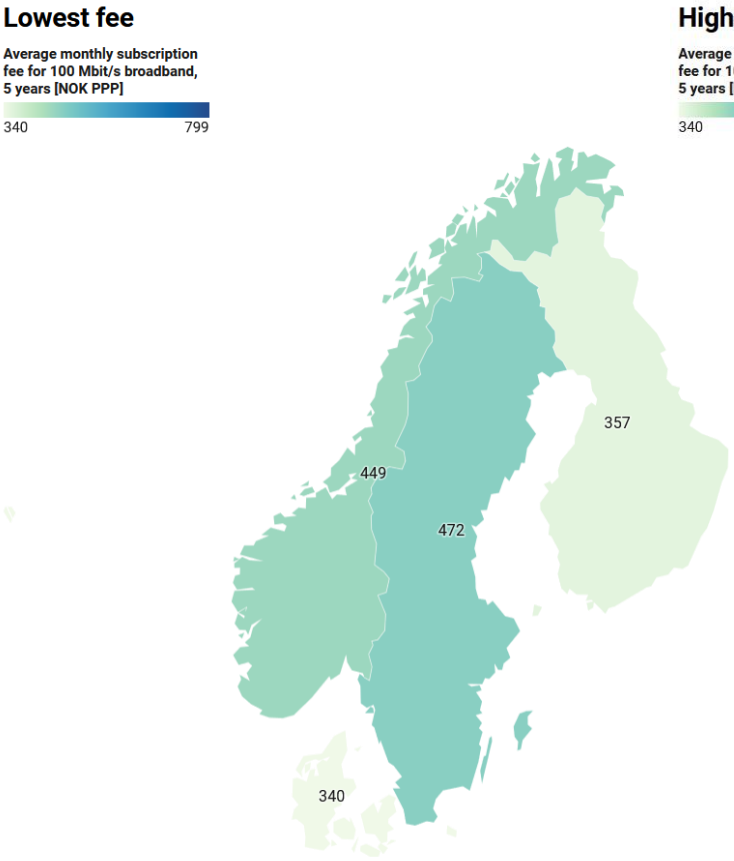
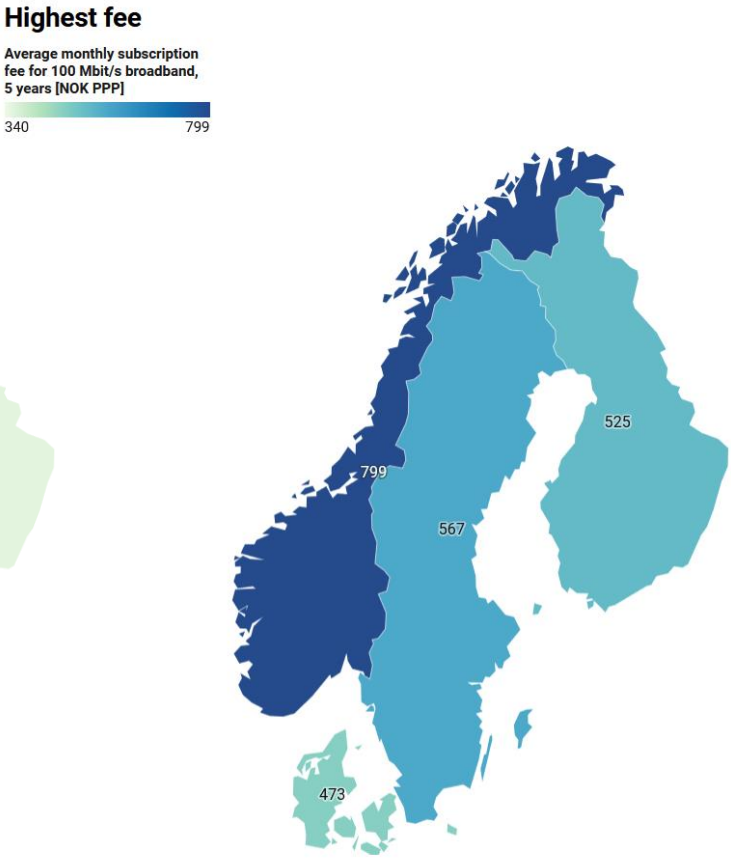
Analysis prepared for Kommunal- og distriktsdepartementet

Assessment of Norwegian fixed broadband pricing in a Nordic context – 2022





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Contents

1. Executive summary 3
2. Background 5
3. Peer group 6
4. Observed data issues 10
5. Overview of pricing analysis 11
6. Fixed broadband: Average monthly subscription fee 12
7. Fixed broadband: ARPU 16
8. Fixed broadband: Regional differences in monthly subscription fees in Norway 18
9. Fixed broadband: One-time fee – new build 22
10. Fixed broadband: One-time fee – existing connection 25
11. Fixed broadband: Total 5 year fee – new build 27
12. Fixed broadband: Total 5 year fee – existing connection 29
13. Fixed broadband: Actual throughput 31
14. FWA: Average monthly subscription fee 34
15. FWA: One-time fee – new build 37
16. FWA: Total 5 year fee 40
17. Broadband & TV bundle: Average monthly subscription fee 45
18. TV: ARPU 47
19. Summary and conclusion 49

1. Executive summary

This analysis is commissioned by Kommunal- og distriktsdepartementet (KDD). It investigates Norwegian broadband prices, comparing them against three other Nordic markets: Denmark, Sweden and Finland. It's an update of a previous analysis written in February 2021 with a few new additions.

Fixed broadband, fixed wireless access (**FWA**) and discounted **bundled broadband & basic TV** plans for consumers are compared for the largest providers – representing 72% to 88% of base depending on country. A threshold of 100 Mbit/s download throughput is applied for fixed broadband – whereas 1000 GB is the threshold for FWA.

The analysis compares both the **monthly subscription fees** (for services and equipment) and **one-off fees** for new build and existing connections. It combines all fees (recurring and one-off) in a comparison of total 5 year fees. Foreign prices have been adjusted to **Norwegian purchasing power**.

With regards to **monthly subscription fees for fixed broadband**, Norwegian plans are generally – with few exceptions – more expensive than same-speed plans in Denmark, Sweden and Finland.

The reporting of **fixed broadband ARPU** (average revenue per user) nuances the picture a bit as the two reporting Norwegian providers report quite different levels: Telenor Norway has the highest ARPU of reporting providers in our four markets, but Telia Norway is at a lower level more comparable with Denmark, Sweden and Finland.

This updated analysis goes deeper into the **regional distribution** of the lowest available monthly subscription fees in Norway, drawing a map covering 350 of Norway's 356 municipalities. The pricing of 100/100 Mbit/s fibre broadband is relatively homogeneous at around 700 NOK per month in Norway – although consumers in certain municipalities have access to cheaper providers.

Only 50% of Norway's households have a choice between two or more broadband providers – even if including FWA. The differences between the regions are quite significant with Oslo standing out as the region with the widest choice of providers.

When it comes to **new build one-time fees**, the Norwegian fees are very reasonable in comparison to the Swedish and Finnish examples. Only Denmark seems to generally operate with lower new build one-time fees. Norwegian one-time fees for *existing connections* are higher than in Denmark, Sweden and Finland.

When summing up the **total fees during a 5 year period**, the Norwegian *new build* customer will pay a lower amount than a Swedish customer and a similar amount as a Finnish customer. Denmark operates with the lowest total fees.

Many, if not most, households are however already connected to modern broadband infrastructure. If comparing the total fees during a 5 year period for a customer with an *existing connection*, the Norwegian customer generally, with few exceptions, pays a higher amount than customers in Denmark, Sweden and Finland.

Norway has fixed broadband networks with **high median throughput**, but so have Sweden and, particularly, Denmark. With Norway's generally higher subscription fees, the willingness to pay for a faster throughput tier might not be as present as in Denmark.

Fixed wireless access (**FWA**) over mobile networks is – with the exception of Finland – a niche proposition, but due to Telenor's decommissioning of the copper network in Norway, FWA has quickly grown its base in Norway and is, de facto, the only available broadband solution for some households.

The FWA take-up in Norway happens although the Norwegian FWA plans are more expensive than same-speed plans in Denmark, Sweden and Finland.

Unlike in the other countries where an **external antenna** is optional, Norwegian FWA providers are currently requiring an external antenna to be installed, something that adds to the total fee without necessarily improving the customer experience. It also limits the location flexibility for the customer.

The Norwegian new build FWA one-time fees are comparable to the Danish and Swedish examples *with external antenna* – and generally lower than in Finland. The one-time fees *without external antenna* are significantly lower, but so far no such options are offered in Norway.

When summing up the **total fees during a 5 year period**, the Norwegian FWA customer with external antenna will always pay a higher amount than all Danish and Finnish customers for the same speed. Norwegian plans are however limited to 2000 GB of full-speed data per month. It is a restriction compared to fixed broadband plans. Providers in Sweden and Finland have not made that restriction; also FWA plans are unlimited.

This updated analysis compares the pricing between FWA and fibre broadband. Although more limited in data volume and likely in actual speed, Norwegian FWA plans are almost always **priced with a premium** over same-speed fibre plans.

It is common to offer combined, discounted, **broadband & TV bundles**. In Norway such bundles almost always come with a higher average monthly subscription fee than similar plans in Sweden, Finland and Denmark.

Telenor Norway has the second highest **TV ARPU**[1] among reporting Nordic operators. Telia Norway is at a lower level – close to the Nordic median.

[1] Since broadband and TV sometimes are bundled together, operators are distributing part of the bundle revenue into broadband ARPU and part into TV ARPU

2. Background

This analysis is commissioned by Kommunal- og distriktsdepartementet (KDD). It provides a one-year-later update of the first analysis "Assessment of Norwegian fixed broadband pricing in a Nordic context", dated 23 February 2021, which was written to support Kommunal- og moderniseringsdepartementet's[2] white paper to the Norwegian Parliament covering electronic communications issued 9 April 2021[3].

[2] The ministry changed name from Kommunal- og moderniseringsdepartementet to Kommunal- og distriktsdepartementet 1 Jan 2022
[3] https://www.regjeringen.no/no/dokumenter/meld.-st.-28-20202021/id2842784/

3. Peer group

Just like in the original analysis, the peer group consists of the four Nordic countries **Norway, Denmark, Sweden and Finland**.

Tefficient has documented the currently publicly offered **fixed broadband consumer**[4] **prices** of the largest providers in Norway, Denmark, Sweden and Finland.

Who the largest providers are is based on official statistics from the respective national telecom regulator – Nkom, Energistyrelsen, PTS and Traficom – for June 2021[5].

Norway (8 largest providers, representing **76%** of the consumer fixed broadband subscriptions):

- Telenor
- Telia
- Viken Fiber (Altibox partner)
- Lyse Fiber (Altibox partner)
- Eidsiva Bredbånd (Altibox partner)
- NextGenTel
- NTE Marked (Altibox partner)
- HomeNet

In order to make the regional comparison across all Norwegian municipalities (see section 8) the subscription pricing for an additional 26 providers[6] has been gathered too, but this information is only displayed in section 8.

Denmark (7 largest providers, representing **72%** of the overall[7] fixed broadband subscriptions):

- TDC
- SE Kommunikation (Norlys)
- Fibia
- Eniig Fiber (Norlys)
- Dansk Kabel TV (TDC)
- Hiper (TDC)
- Boxer (Norlys)

Sweden (4 largest providers, representing **77%** of the consumer fixed broadband subscriptions):

- Telia

[4] Many consumers, living in apartments, will typically subscribe to broadband services through a group agreement administered by the landlord or the housing association. These agreements are not public and the pricing of these could therefore not be included in this analysis. Effectively, this means that that the analysis primarily captures the pricing of broadband services delivered to consumers living in detached housing.

[5] December 2020 for Denmark as the regulator Energistyrelsen will not report 1H 2021 data

[6] Bergen Fiber, Haugaland Kraft Fiber, Signal Bredbånd, Svorka, Tafjord Connect, Altifiber, Tussa, Trollfjord Bredbånd, Enivest, GP Nett, 3net, Telefiber, Afiber, Net2You, Varanger Bynett, Lofotskraft Bredbånd, Sognenett, Numedal Fiber, Årdalsnett, Modum Kabel-TV, Alta Kraftlag, Okapi, Hammerfest Energi Bredbånd, Kragerø Bredbånd, Finnås Kraftlag, Kvamnet

[7] Consumer not broken out in the reporting of Energistyrelsen and Traficom

- Tele2
- Telenor
- Bahnhof

Finland (3 largest providers, representing **88%** of the overall[6] fixed broadband subscriptions):

- Elisa
- DNA
- Telia

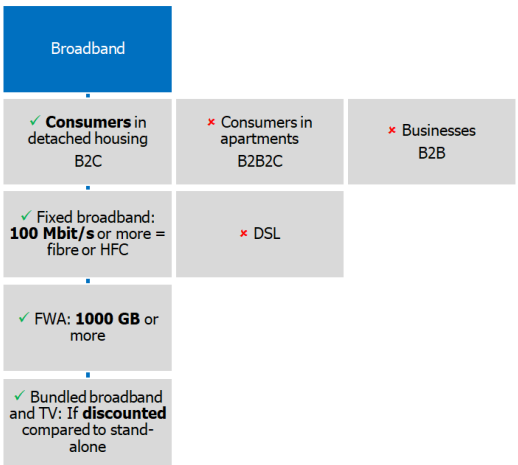
Across these 22 providers, the pricing of **246** different fixed broadband and fixed wireless access (FWA) via 4G or 5G networks plans has been gathered[8]. Recurring subscription fees as well as one-off fees have been gathered and documented. As a general remark, there are more of extra fees (and hidden fees) in fixed broadband and TV if compared to mobile. Key advance purchase information on e.g. binding periods is also more often omitted or hidden in general terms and conditions compared to mobile.

For fixed broadband, a threshold of **100 Mbit/s** in download throughput has been applied, effectively ruling out DSL-based broadband, leaving **hybrid fibre coax** (HFC) and (pure) **fibre** options in.

For FWA, no maximum download throughput threshold has been applied, but instead a threshold of at least **1000 GB** of full speed allowance per month as the data usage of a modern household easily can reach 500 GB per month with the use of streaming services, videoconferencing and downloading of software to connected devices such as game consoles and PCs.

The pricing of fixed broadband or FWA plans that **bundle in basic TV services** have also been gathered – if that bundling provides the consumer with a lower price than buying broadband and TV separately.

The following figure summarises these thresholds and limitations:



All prices have been gathered between 4 and 10 January 2022.

[8] For the Norwegian regional analysis (see section 8), the subscription pricing of an additional 145 fixed broadband plans was captured

Although many market parameters are similar in our four countries, the **purchasing power** differs. Norway has a higher purchasing power than the other three Nordic countries.

In the original analysis, all revenue and pricing diagrams were produced in two versions:

- A comparison in NOK *without* adjustment for purchasing power
- A comparison in NOK *with* adjustment for purchasing power

Although purchasing power parity (PPP) is calculated on a generic basket of goods and services – not specifically for mobile services – and therefore should be regarded as indicative, the original analysis showed that the revenue and pricing differences were visible and the conclusions similar also after adjustment for purchasing power. To make this updated analysis more compact and easier to read, the comparisons are therefore done **with adjustment for purchasing power only**[9].

The input parameters for the PPP adjustment are shown in Figure 1 below.

	GDP per capita, international USD (purchase power parity) 2019	GDP per capita, international USD (purchase power parity) 2020	GDP per capita, international USD (purchase power parity) 2021 (prel.)	Purchase power parity adjustment to Norwegian level, 2021 (prel.)
Norway	65899	65841	69859	1
Denmark	59833	59136	63405	0,9076
Sweden	55656	54480	57425	0,8220
Finland	50738	49806	53084	0,7599

Figure 1. Comparison of purchase parity adjusted GDP per capita (international USD) in Norway, Denmark, Sweden and Finland 2019, 2020 and 2021 (prel.) and the PPP adjustment used for 2021 [source: IMF]

An introduction to PPP is given in the box below[10].

[9] KDD has access to a data file without adjustment for purchasing power
[10] From Our World in Data: https://ourworldindata.org/what-are-ppps

Measuring economic activity in a country is difficult, since 'the economy' is a complex system with lots of moving parts. A common way to deal with this is to focus on aggregate indicators, such as total national output: "the monetary value of all goods and services produced within a country (or region) in a specific time period". That's what economists call the Gross Domestic Product (GDP).

GDP is measured using prevailing national prices to estimate the value of output. In other words, GDP is calculated using local currency units. This means that in order to make meaningful cross-country comparisons, it is necessary to translate figures into a common currency – i.e. use a consistent 'unit of measure'.

One option is to simply translate all national figures into one common currency (for instance, US dollars) using exchange rates from currency markets. But because market exchange rates do not always reflect the different price levels between countries, economists often opt for a different alternative. They create a hypothetical currency, called 'international dollars', and use this as a common unit of measure. **The idea is that a given amount of international dollars should buy roughly the same amount – and quality – of goods and services in any country**.

The exchange rates used to translate monetary values in local currencies into 'international dollars' (int-$) are the 'purchasing power parity conversion rates' (also called PPP conversion factors).

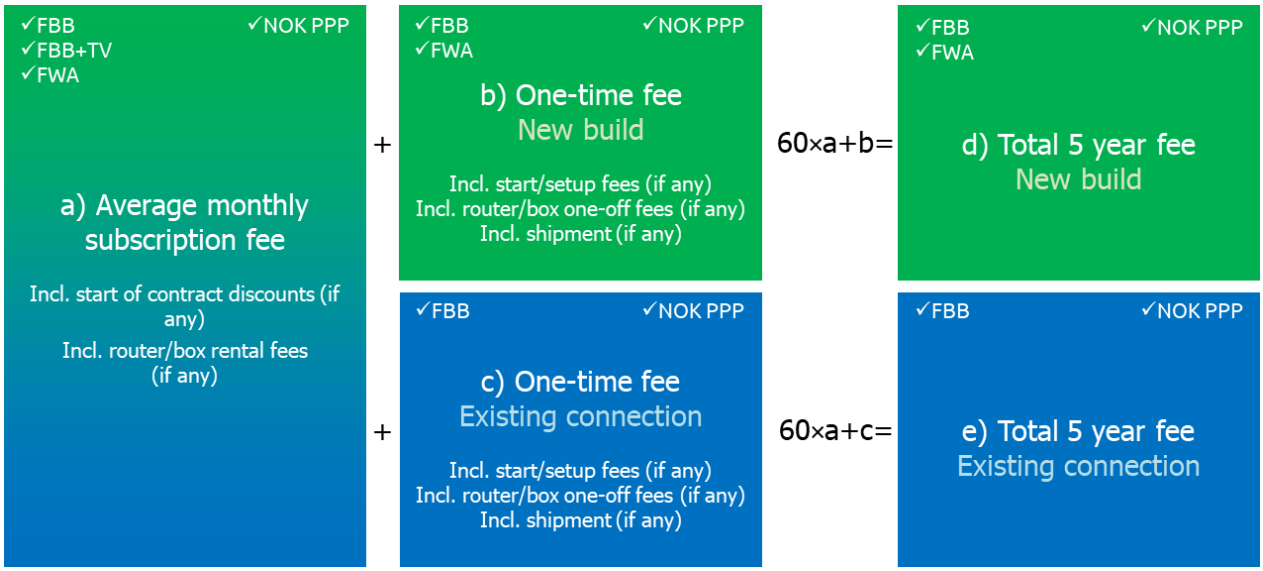
4. Observed data issues

- Most fixed broadband providers are only stating prices after a **specific address** has been inputted. This is done to make sure a provider can deliver services to the exact address but also since the pricing may depend on who (the provider or a regional infrastructure partner) is delivering the underlying broadband infrastructure. In some cases, Tefficient has been able to obtain complete price lists, but in other cases **example addresses** have been used to generate prices. Although hundreds of price plans have been gathered, we can't guarantee that every single address would be covered pricing-wise.

- **New build connection fees** (for new connections into homes) are more difficult to find than monthly subscription fees. The reason is that they vary according to region and neighbourhood. Some providers do not state connection fees in e.g. their price lists. Tefficient has asked all such providers to, at least, give indications of what the connection fees *typically* are. In one or two cases, providers have refused to provide even an indication of their connection fees, requiring a specific address, name, social security number and more. In these cases, we have not been able to follow through and the new build connection fees are hence not covering every possible provider. In Sweden and Finland, consumers could apply for a tax reduction on certain new build connection fees. Such tax reductions have not been taken into account; the analysis will always show the full price before any possible tax reduction. We realise though that such tax reductions could affect how providers decide to distribute fees in between e.g. recurring subscription fees and one-time installation fees.

5. Overview of pricing analysis

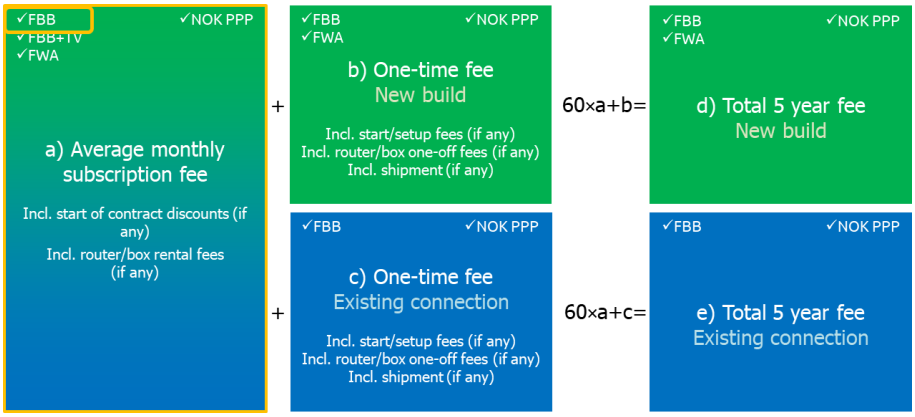
The following image will be used in the analysis to help the reader navigate between all price comparisons:



The area currently analysed will be highlighted in the beginning of each pricing section.

In the previous analysis, the total 2 year fee was used as one comparison. In this updated analysis, it has been replaced with the total *5* year fee as we realised that the relatively short 2 year period wasn't representative for how long the typical fixed broadband consumer holds onto its broadband provider.

6. Fixed broadband: Average monthly subscription fee



Broadband providers are generally innovative in making monthly subscription prices look low. The most usual practice is to discount the price during a limited time: We have found providers giving up to 50% time-limited discount – over periods of 1, 3, 6, 12 and 24 months. This type of discounting is most common in Sweden but it also happens in Denmark and Finland. **Norway is an exception**; on pure fixed broadband plans this is rarely happening.

This habit to have different fees during different stages of a customer engagement means that it's a big difference for the price comparison if we compare the prices during first month of an engagement – or later on. To make the comparison as fair as possible, this analysis defines a **comparison period of 5 years (60 months)**. We have calculated how much it will cost a customer during that time – and based on that calculated an **average monthly subscription fee** – valid for the first 60 months.

A few fixed broadband providers in Norway (but not elsewhere) charge an additional monthly subscription fee for customers who need a **router**. In this analysis, we have taken it into account only when it's mandated. In e.g. the case of Telenor Norway, customers are recommended to use Telenor's router at a subscription price of 39 NOK per month, but as Telenor doesn't require it, it's has not been included. Many other operators require their customers to use the router of the provider, but don't charge a monthly subscription fee for it[11].

Without exceptions, all researched fixed broadband plans in the four Nordic countries come *without* limits on the volume of data usage (GB). The defining parameter for the monthly service subscription price is instead the download throughput – measured in **Mbit/s**.

Figure 2 below compares the average monthly subscription fee[12] of all offered fixed[13] broadband subscription plans to the maximum download throughput in Norwegian kroner (NOK) after adjustment for purchasing power. The prices in Denmark, Sweden and Finland have first been recalculated into NOK[14] then into purchasing power parity NOK (NOK PPP).

[11] Most often they charge a shipping fee, though, something this analysis takes into account when comparing the total 5 year fees
[12] Excluding connection one-off fees, equipment one-off fees and other one-off fees (if any). The total costs will be compared later in the analysis. All prices include VAT (valid throughout the analysis).
[13] Fixed wireless access (FWA) excluded; compared separately later in the analysis
[14] Using the exchange rates of 4 January 2022: 1 DKK = 1,34621 NOK, 1 SEK = 0,97306 NOK and 1 EUR = 10,013 NOK

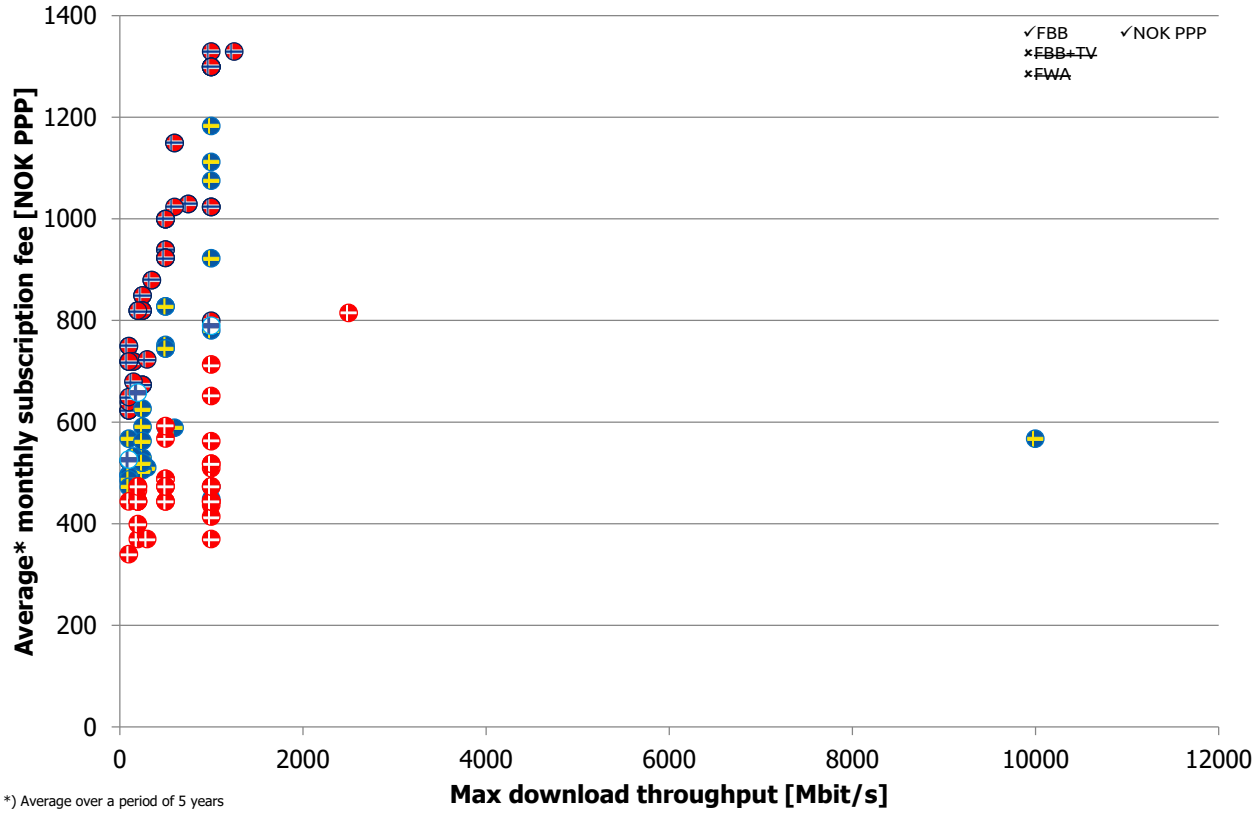


Figure 2. Comparison of the average monthly subscription fee for fixed broadband in NOK PPP during 5 years among providers in Norway, Denmark, Sweden and Finland, January 2022 [source: providers' webpages and pricelists complemented by direct emails to providers when necessary]. The PPP values for 2021 are preliminary [source: IMF].

The first thing we can note is that one Swedish provider – Bahnhof – offers fixed broadband with 10000 Mbit/s and that one Danish provider – YouSee (TDC) – offers fixed broadband with 2500 Mbit/s. Although impressive throughputs at low prices, it challenges this visualisation as the differences in the more common speeds up to about 1000 Mbit/s are hard to see. In Figure 3 the horisontal scale has therefore been truncated, omitting Bahnhof's and YouSee's two superfast plans from the graph.

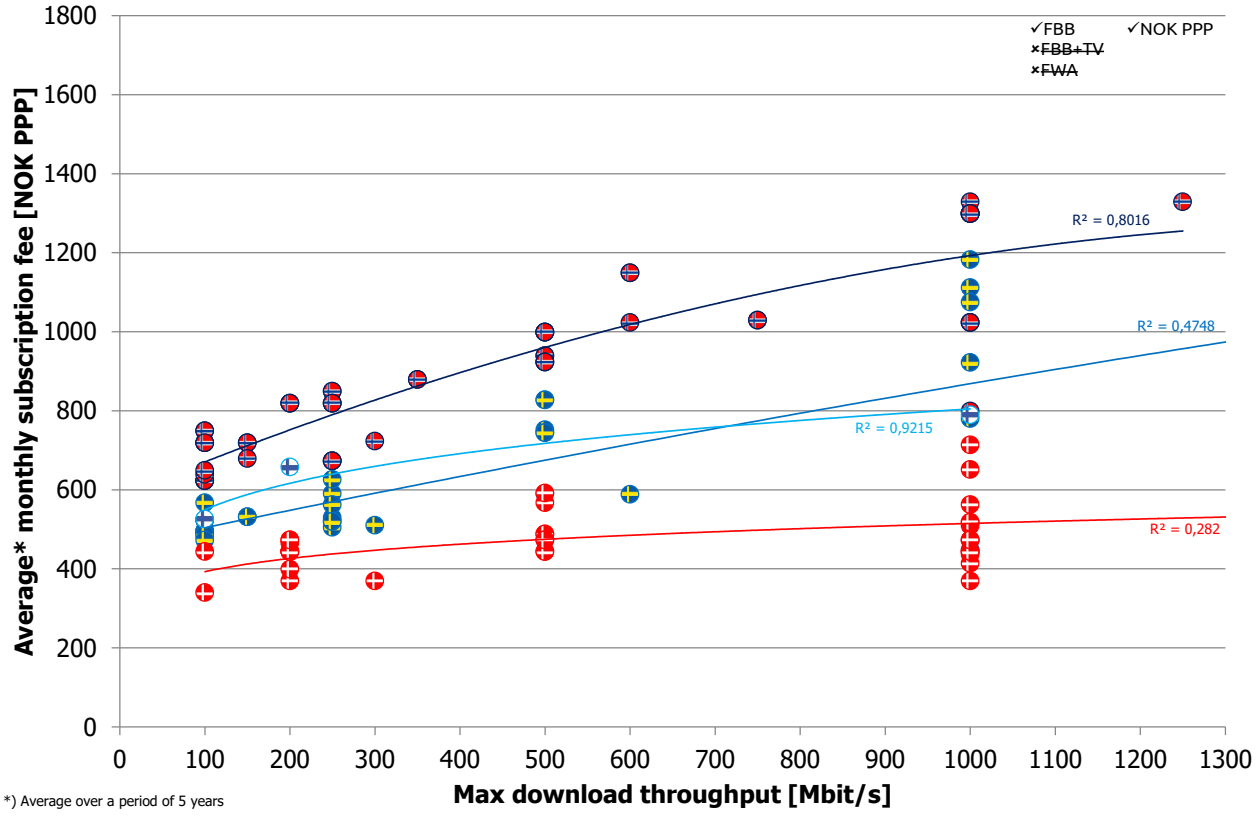


Figure 3. Comparison of the average monthly subscription fee for fixed broadband in NOK PPP during 5 years among providers in Norway, Denmark, Sweden and Finland, January 2022 for plans up to 1300 Mbit/s [source: providers' webpages and pricelists complemented by direct emails to providers when necessary]. The PPP values for 2021 are preliminary [source: IMF].

From Figure 3 it's clear that after compensation for purchasing power, Norwegian fixed broadband plans – for the same download throughput – generally, with few exceptions[15], have higher average monthly subscription fees than plans in the other countries.

To easier compare what is typical for each country, trend lines have been added to Figure 3[16]. Norway generally has the highest average subscription fees – while Denmark generally has the lowest fees. Sweden and Finland seem similar and are positioned in between Norway and Denmark.

The Norwegian fixed broadband plans are, after compensation for differences in purchasing power, generally – with few exceptions – more expensive than same-speed plans in Denmark, Sweden and Finland.

There are few Finnish plans in Figure 3 which is explained by the local providers' focus to rather offer FWA than fibre-based fixed broadband. Fixed broadband is, to detached houses, offered mainly through DSL in

[15] Exceptions: GP Nett and HomeNet offer 1000 Mbit/s for 799 NOK. NextGenTel offers 1000 Mbit/s for 1023 NOK per month on top of the fibre network of several partners: Telenor, Øvre Eiker Fibernett, Kvam Kraftverk Fibernett, Bofiber Fibernett, Sykkylven Energi Fibernett and Hvaler Bredbånd Fibernett.

[16] The R^2 values show the coefficient of determination or how well a trend/regression line represents the pricing data. A perfect match would be $R^2=1$ whereas no match would be $R^2=0$.

Finland. The download throughput is sometimes boosted by so called hybrid (DSL+mobile) broadband, but still not meeting the 100 Mbit/s threshold of this analysis.

7. Fixed broadband: ARPU

Before continuing the pricing comparison with one-time fees and total fees, let's look at what the operators in the four Nordic countries report as their average revenue per broadband subscriber per month, i.e. the ARPU. Although the exact definition of what different operators include in their reported broadband APRU isn't clear, we believe it well represents what the average broadband subscriber pay per month and is comparable with the average monthly subscription fee just covered[17].

Figure 4 shows the development in fixed broadband ARPU for the nine reporting operators in our four markets.

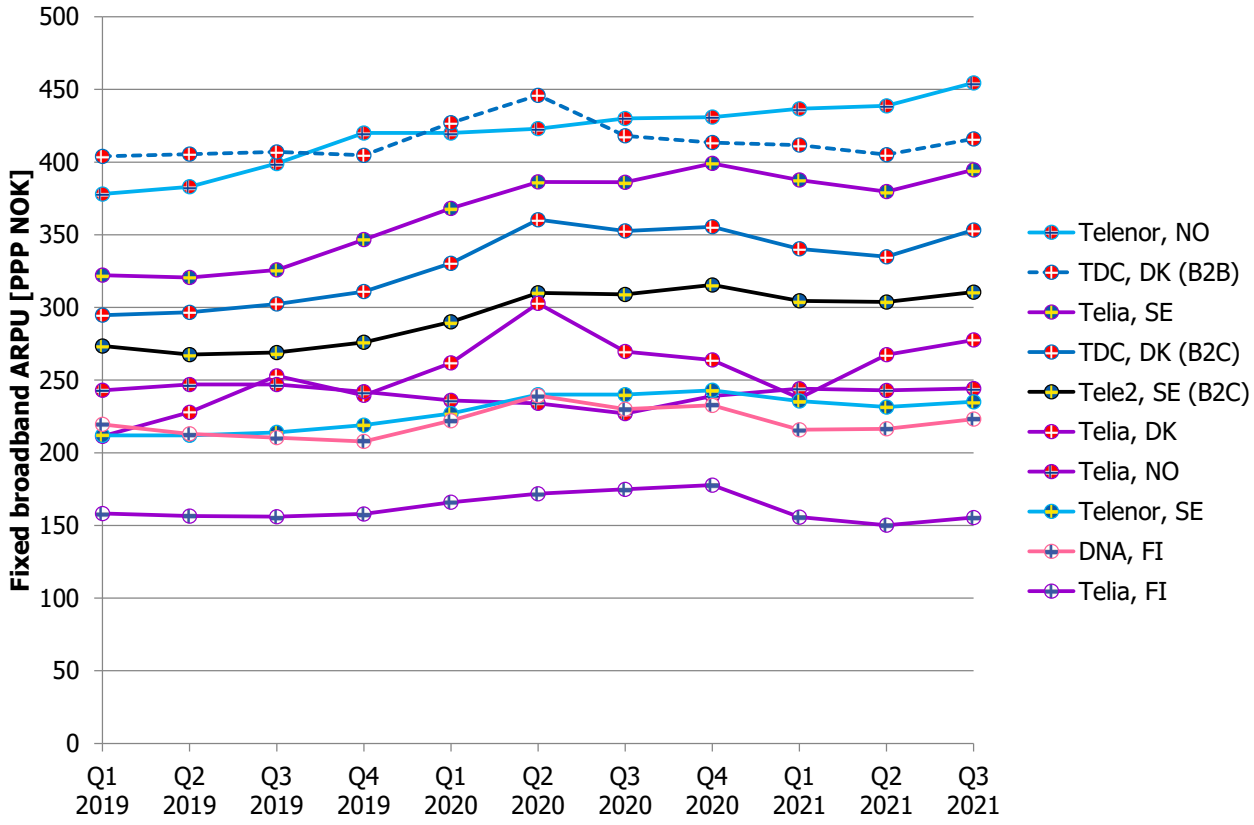


Figure 4. Comparison of reported fixed broadband ARPU in NOK PPP among providers in Norway, Denmark, Sweden and Finland [source: operators' financial reporting]. The PPP values for the respective full year are applied to each quarter in that year. The 2021 values are preliminary [source: IMF].

After purchase power adjustment, **Telenor Norway** reports the highest fixed broadband ARPU. It is almost twice that of Telia Norway, the only other Norwegian provider reporting broadband ARPU.

Based on data from the Norwegian regulator, Nkom, the fixed broadband ARPU in the first half of 2021 was **423 NOK**, suggesting that the ARPU of Telenor is more representative for Norway than the ARPU of Telia.

[17] Have in mind though that the pricing information on fixed broadband in this analysis is limited to download throughput of 100 Mbit/s and higher – whereas the reported ARPU include slower connections such as DSL. This explains why ARPU levels generally are lower than the average monthly subscription fees in the previous section.

The ARPU comparison is not always like-to-like as e.g. Tele2 Sweden only reports its B2C ARPU when others include also B2B in its ARPU reporting. One reason to Telenor Norway's high broadband ARPU might be a larger share of B2B customers in its base compared to e.g. Telia Norway that entered fixed broadband via the acquisition of the more consumer-oriented cableco Get. Denmark's TDC breaks down its ARPU on B2B and B2C and it's an example of that the B2B ARPU is higher.

After compensation for differences in purchasing power, Telenor Norway reports the highest fixed broadband ARPU among reporting Nordic operators. Telia Norway reports a much lower level – more comparable with Denmark, Sweden and Finland.

Another comparability issue is how different operators split revenues from customers who subscribe to bundled broadband & TV services. For that reason we will towards the end of the analysis look also at reported TV ARPU.

8. Fixed broadband: Regional differences in monthly subscription fees in Norway

The original analysis from 2021 didn't contain any conclusion on how the fixed broadband pricing differs between different regions of Norway. The number of covered broadband providers wasn't sufficient to map each and every part of Norway.

To be able to address the regional pricing differences in this updated analysis, 26 additional providers[18] were added for Norway, lifting the total to 34. It is still not a total market scan as Nkom lists 84 fibre providers in the consumer market in 1H 2021, some of which are very local and with few customers. But with these 34, essentially all[19] of Norway's 356 municipalities can be assessed.

Nkom has (via KDD) provided Tefficient with a file that, for each Norwegian municipality, lists all providers that can supply any broadband – defined as fibre, HFC, DSL or FWA. Being listed doesn't mean that a provider is able to supply broadband to any address in a municipality, but to *some* addresses within the municipality. This file has been a key input to this section.

In the context of this analysis, we however decided to focus at **fixed broadband with a minimum download throughput of 100 Mbit/s** which would disqualify providers in municipalities where they only offer e.g. DSL or FWA. In Nkom's file, both Telenor and Telia are listed as a provider in *all* the 356 municipalities. NextGenTel is listed in 107. Since these three providers offer DSL and FWA we can't however say in which of these municipalities they can offer fixed broadband with a minimum download throughput of 100 Mbit/s. In the map that we are about to present, we have therefore excluded the 'national' providers Telenor, Telia and NextGenTel[20] and comparing the pricing differences for the **remaining 31 providers**, most of which are regional or local.

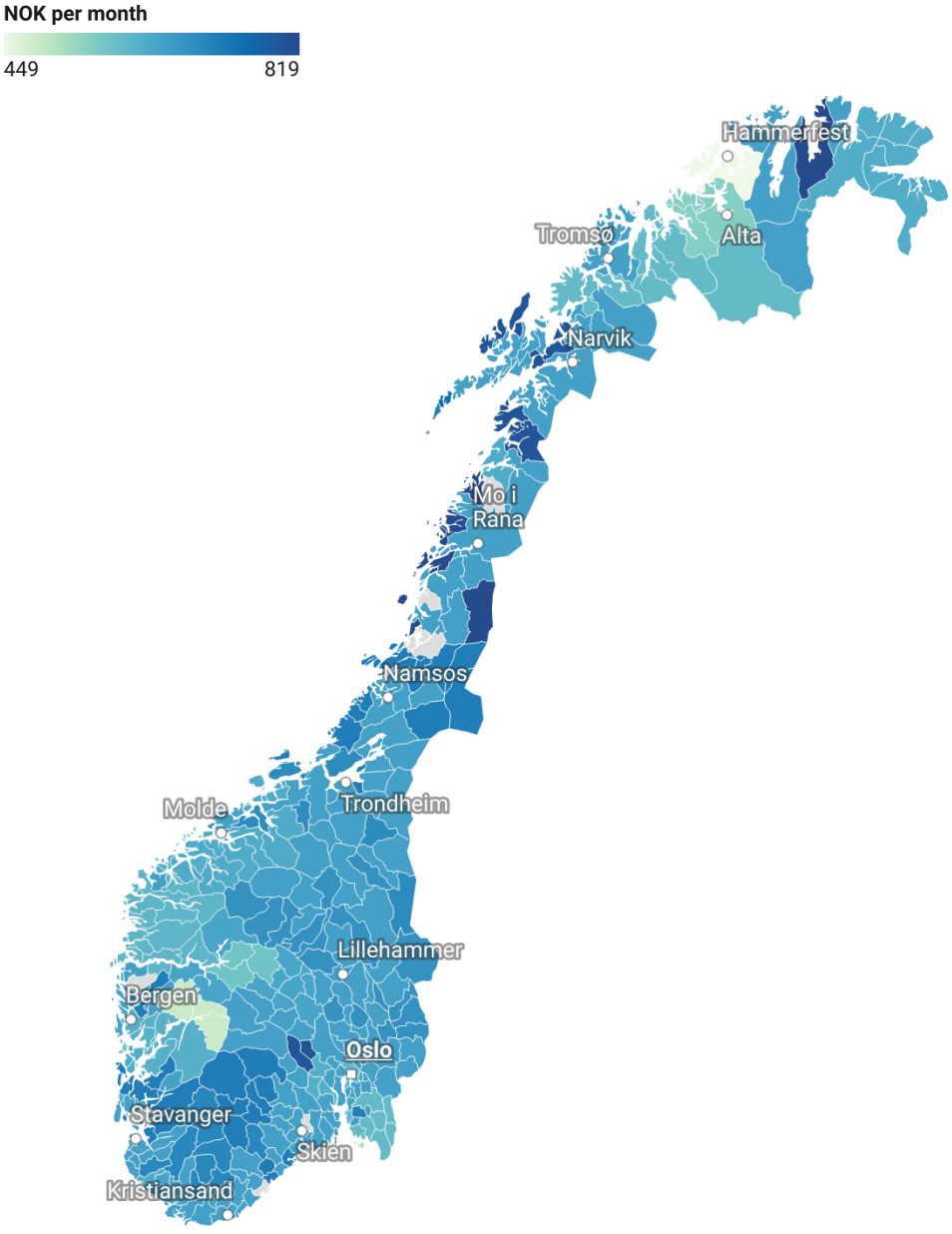
[18] Bergen Fiber, Haugaland Kraft Fiber, Signal Bredbånd, Svorka, Tafjord Connect, Altifiber, Tussa, Trollfjord Bredbånd, Enivest, GP Nett, 3net, Telefiber, Afiber, Net2You, Varanger Bynett, Lofotskraft Bredbånd, Sognenett, Numedal Fiber, Årdalsnett, Modum Kabel-TV, Alta Kraftlag, Okapi, Hammerfest Energi Bredbånd, Kragerø Bredbånd, Finnås Kraftlag, Kvamnet

[19] 350 of 356 municipalities. The missing municipalities are Beiarn, Bindal and Vevelstad (Nordland fylke), Siljan (Vestfold og Telemark fylke) and Fedje and Masfjorden (Vestland fylke). According to the mapping between the municipalities and providers of broadband that Tefficient received from Nkom (via KDD), it would however not help to include more providers as in these six municipalities there are no additional broadband providers beyond those on the 34 list.

[20] NextGenTel has though been included in municipalities where it offers fibre broadband in partnership with local fibre infrastructure companies: Sykkylven (Møre og Romsdal fylke), Øvre Eiker, Modum, Drammen, Hvaler (Viken fylke) and Bergen (Vestland fylke). In Hvaler, the subscription is 100 NOK cheaper, 523 NOK.

Lowest fibre fee per municipality: 100/100 Mbit/s*

Regional providers, i.e. excluding national providers that have the same fee throughout: Telenor [719 NOK], Telia [749 NOK] and NextGenTel [623 NOK except Hvaler]



**) Or higher if not 100/100 Mbit/s offered. The 819 NOK price from Signal Bredbånd is for 250/250 Mbit/s, but no lower speed sold. Altibox partners typically provide 150/150 Mbit/s for 719 NOK. Prices as communicated by providers on homepages in January 2022. Data for a total of 31 regional providers (Viken, Lyse, Eidsiva, NTE, Bergen Fiber, HomeNet, Haugaland Kraft, Eninvest, Signal Bredbånd, Svorka, Tafjord Connect, Altifiber, Tussa, Trollfjord Bredbånd, GP Nett, 3net, Telefiber, Afiber, Net2You, Varanger Bynett, Lofotskraft, Sognenett, Numedal Fiber, Årdalsnett, Modum Kabel-TV, Alta Kraftlag, Okapi, Hammerfest Energi, Kragerø Bredbånd, Finnås Kraftlag, Kvamnet) shown. No data obtained for 6 of 356 municipalities (grey).*

Map: Tefficient • Source: Tefficient • Created with Datawrapper

Figure 5. Lowest 100/100 Mbit/s fibre monthly subscription fee among 31 providers [source: providers' webpages and pricelists complemented by direct emails to providers when necessary]. Mapping between municipalities and providers based on a file provided by Nkom via KDD [source: Nkom].

An **interactive version of the map** in Figure 5 is available at https://datawrapper.dwcdn.net/neDt0/1/.

Among the 31 providers, a fibre subscription with at least 100 Mbit/s in download and upload (here written as 100/100) throughput has a **monthly subscription price between 449 and 819 NOK**.

The lowest price, 449 NOK, is offered by **Hammerfest Energi Bredbånd** and provides a 125/125 Mbit/s subscription as part of a 12 month binding contract. The provider supplies it in just two municipalities: Hammerfest and Hasvik (Troms og Finnmark fylke).

The highest among the lowest-in-municipality prices displayed in Figure 5, 819 NOK, is offered by **Signal Bredbånd** (an Altibox partner) in ten municipalities, mainly in Nordland fylke. In these municipalities, it is still the lowest available price among the 31 potential[21] providers. For that price, customers get a 250/250 Mbit/s subscription[22], though. The binding period is 12 months. Since neither Telenor, Telia nor NextGenTel are included in the map (for reason stated earlier), fibre customers that want a 100/100 Mbit/s subscription might want to check if either of these three providers could supply it to their address. As stated in Figure 5, Telenor's monthly fee is 719 NOK for a non-binding contract. Telia's fee is 749 NOK – also non-binding whereas NextGenTel's fee is 623 NOK on a 12 month binding contract.

Before concluding, we have to reiterate that there's nothing saying that a certain displayed price is available to each and every address in a municipality – only to some addresses within the municipality. A consumer is therefore recommended to enter its address with as many broadband providers as possible to figure out which provider could supply broadband with the lowest monthly subscription fee.

Although the price difference between 449 and 819 NOK is substantial, the map shows a **relatively homogeneous pricing** of fibre broadband in Norway. A contributor to this is the national pricing applied by some of the largest providers – Telenor, Telia, NextGenTel[23] and HomeNet. The pricing among the Altibox partners has also converged; most, but not all, today offer 150/150 Mbit/s for the same 719 NOK per month.

The pricing of 100/100 Mbit/s fibre broadband is relatively homogeneous at around 700 NOK per month in Norway – although consumers in certain municipalities have access to cheaper providers. The national pricing applied by 'national' providers likely serves as benchmark for many smaller, regional, providers.

The first reaction might be that a relatively homogeneous pricing is something positive; if fibre broadband e.g. would be significantly more expensive in rural parts of Norway, it would hinder a policy in which all regions in Norway should be able to take equal part in the digitalisation of the society.

But as shown in the previous section, Norway's broadband subscriptions are generally more expensive (also after purchasing power adjustment) than in Denmark, Sweden and Finland. With this in mind, a relatively homogeneous pricing is perhaps rather something negative; it's homogeneous and high.

[21] All these are obviously not available in each municipality
[22] The entry level plan offered at Signal Bredbånd https://signal.altibox.no/privat/priser/
[23] Although the subscription in Hvaler municipality is 100 NOK cheaper at 523 NOK

A possible root cause is that many Norwegian households still lack a real choice of broadband provider. The following graph based on Nkom data visualises how many providers the average household per region (fylke) has access to:

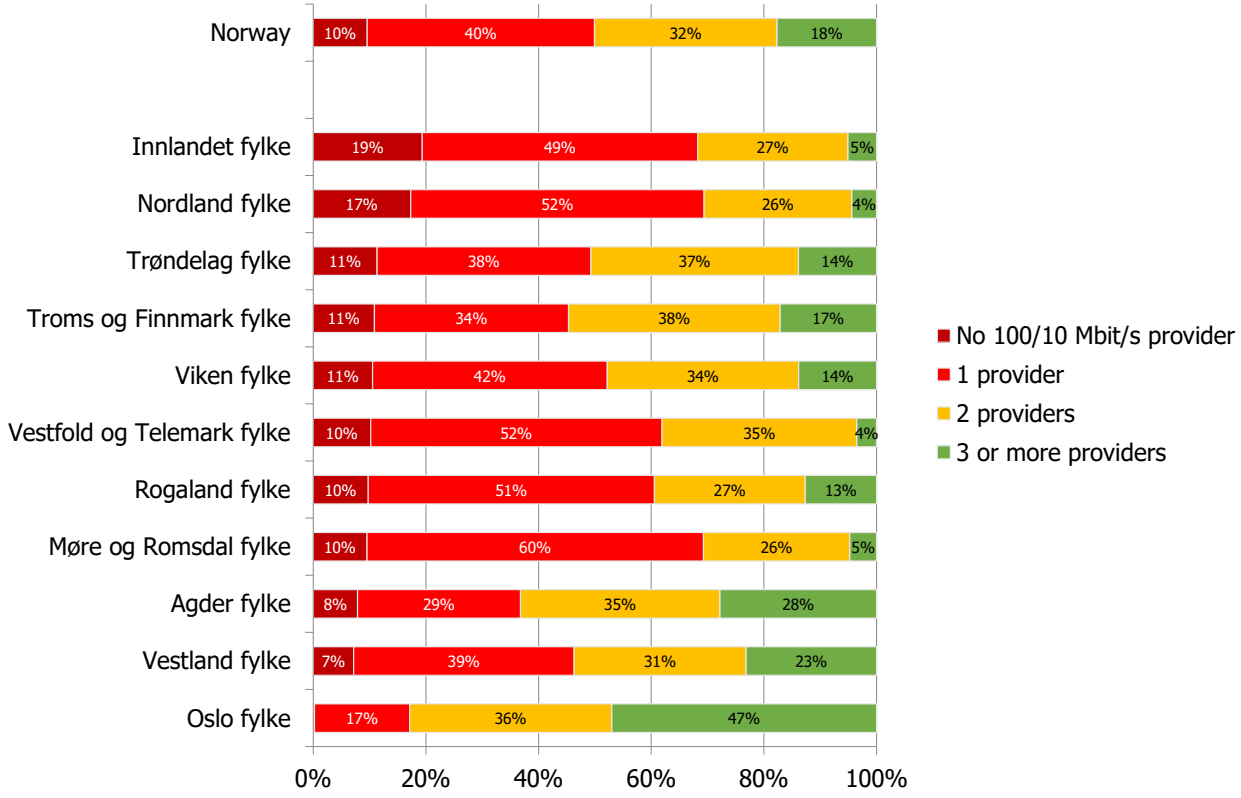


Figure 6. Share of households per fylke against the number of available broadband (incl. FWA) providers offering at least 100 Mbit/s download throughput (and at least 10 Mbit/s upload throughput) June 2021 [source data: Nkom[24], compiled by Tefficient]

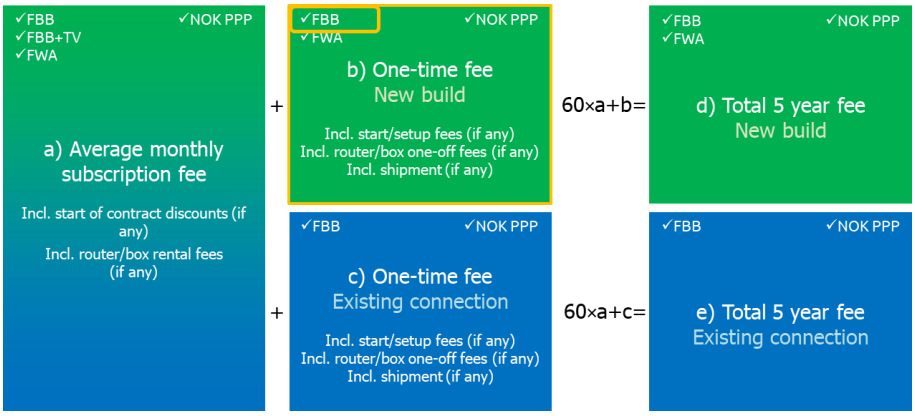
The dark red areas are immediately problematic as these households don't have access to any provider being able to deliver 100 Mbit/s of download throughput. The red areas are potentially problematic as these households only have one choice of provider. In Norway overall (top bar), only 50% of households have the choice of two or more providers. Only Oslo looks significantly more competitive; here 83% of households can choose between two or more providers. The lowest available price for a fibre subscription with at least 100/100 Mbit/s in Oslo is still not the cheapest in Norway: GP Nett asks 599 NOK for a 200/200 Mbit/s subscription. It's lower than the typical 700 NOK, but there are cheaper options in other parts of Norway.

In comparison to other countries, Norway's high prices should however make it more attractive for alternative providers to expand into new regions.

Only 50% of Norway's households have a choice between two or more broadband providers – even if including FWA. The differences between the regions are quite significant with Oslo standing out as the region with the widest choice of providers.

[24] https://ekomstatistikken.nkom.no/#/article/dekning_regionalt2021#husdekning_fbbtek

9. Fixed broadband: One-time fee – new build



As mentioned, new build connection fees (for new connections into homes) are more difficult to find and track than monthly subscription fees. The main reason is that they vary according to region and neighbourhood. In all our countries, broadband providers can balance the requirement to rollout a fibre network of their own with **commercial agreements to offer services over partner networks**. So called open fibre networks are common in Sweden and Finland – whereas agreements in Denmark and Norway historically have been more bilateral between companies, but now gradually turning into open networks too. In Norway, Telenor is – together with providers that received state aid – regulated to offer access to its fibre network for other providers.

When tracking the pricing of the 22 Nordic operators, you might also – on top of this – get a sense of that the information on the **new build connection fees deliberately are kept out of the public domain**. They seem to be used during negotiations to convince new customers to accept e.g. binding contracts or a subscription to a higher throughput tier.

In the cases where connection fees weren't found online, most providers did provide a range or example indications on request. One or two operators however refused to provide even an indication without having been given a name, an address and a social security number. Hence, the following comparison of the one-off cost to connect a detached home to a full fibre network[25] is not complete and should be read with some caution.

Since the connection fees aren't dependent on the subscribed throughput of the connection, we here correlate it to the binding period of the contract instead.

[25] Although a few providers publish connection fees for HFC (coax) networks, HFC networks are in reality not expanded much any longer and these connection fees are therefore not included in the analysis. Generally speaking, HFC has lower connection fees compared to full fibre.

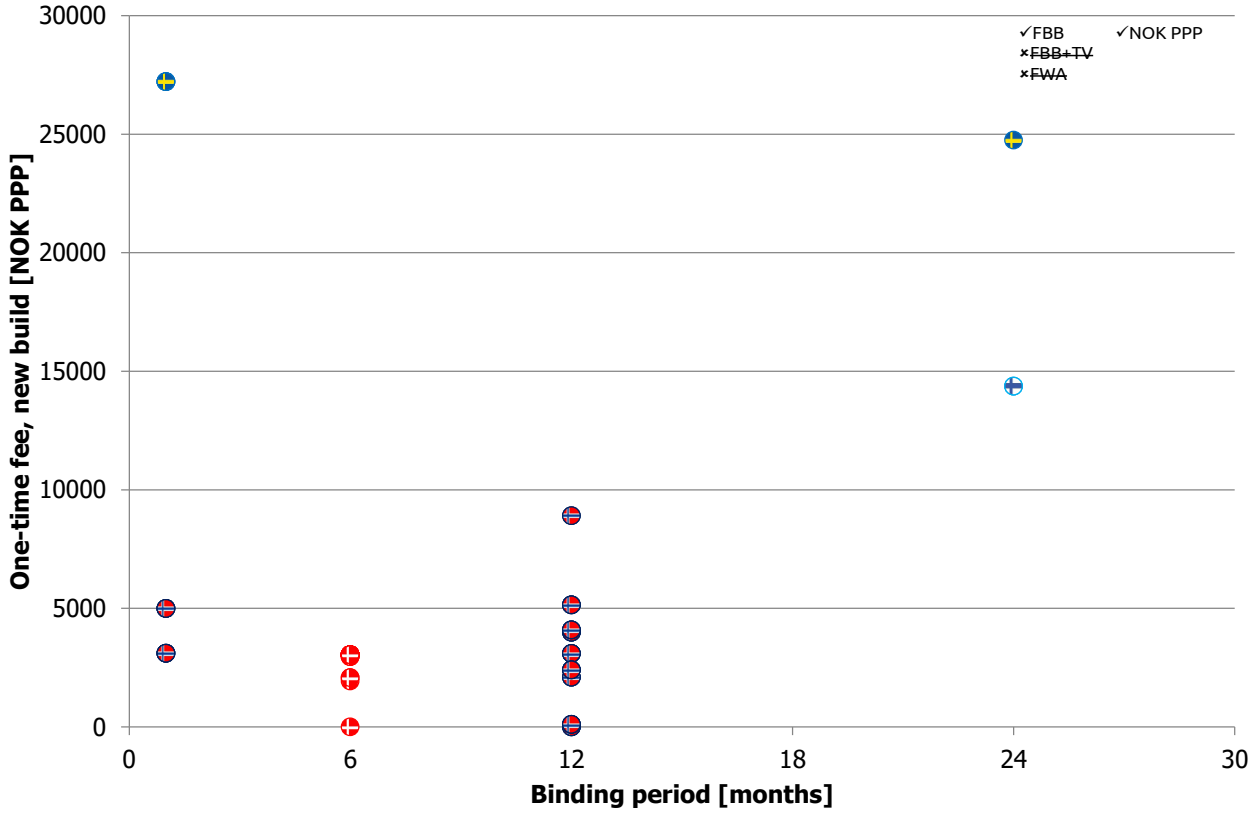


Figure 7. Comparison between one-time fees in NOK PPP for new fibre broadband into a detached home among providers in Norway, Denmark, Sweden and Finland [source: providers' webpages and pricelists complemented by direct emails to providers when necessary]. The PPP values for 2021 are preliminary [source: IMF].

In **Norway**, the one-time fee for a new build is often 5000 NOK or lower – most typically if signing up for a 12 months binding contract. The market leaders Telenor and Telia are however confident enough to rely on non-binding contracts (here shown as 1 month binding period). When comparing the one-time fees, we note that the requirement in Norway most often is that the house owner is responsible for any digging on own grounds. This is typically included in the one-time fees in Denmark, Sweden and Finland.

Denmark operates with one-time fees that tend to be a bit lower (around 2000 NOK PPP) than what is typical for Norway although the binding time is limited to 6 months[26].

In contrast the new build connection fees are much higher in **Sweden** – often well above 20000 NOK PPP although the binding period might be as long as 24 months.

The only example from **Finland** (Telia) is also more expensive than in Norway – although with 24 months binding.

[26] The maximum allowed in the consumer market in Denmark

With purchase power adjustment, the Norwegian new build one-time fees of around 5000 NOK or lower are very reasonable in comparison to the Swedish and Finnish examples. Only Denmark seems to generally operate with lower new build one-time fees.

But we have to ask how important the new build one-time fees are for the average broadband subscriber of today. According to "Telecommunications Markets in the Nordic and Baltic Countries 2020[27]", a majority of fixed broadband subscriptions were already fibre in Norway (60%), Sweden (75%) and Finland (57%) in December 2019. Only Denmark with its 40% was lower – in part explained by HFC (coax) network generally having wider spread.

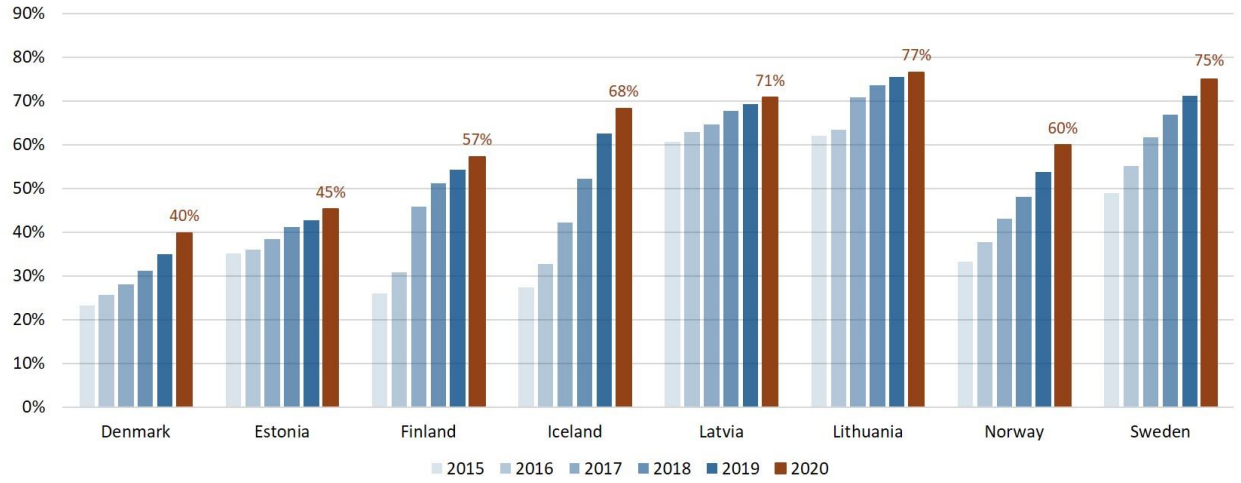
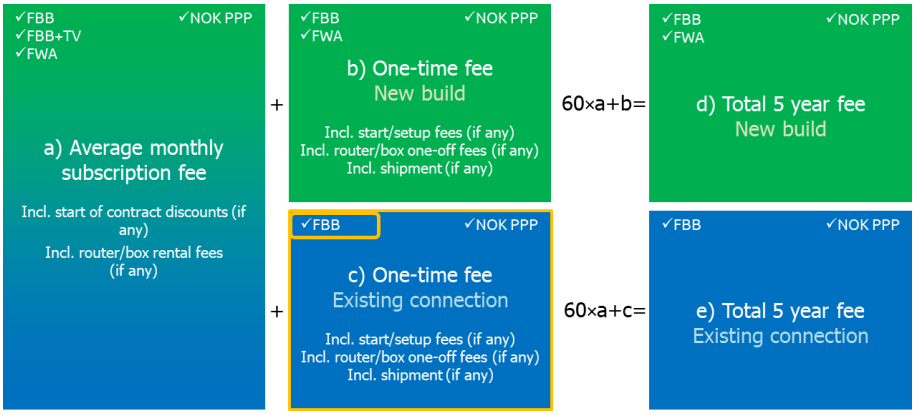


Figure 8. Share of fibre subscriptions per Nordic and Baltic country, December 2020 [source: PTS].

In reality though, most of these fibre subscriptions are delivered to apartments; the take-up in detached homes is lower since the *homepass* (how many homes that could get fibre would they like to) generally, due to the cost to build networks, is much lower in detached housing areas than in apartment housing areas. Taking the yet unconnected detached homes into account, it makes sense to compare also the total fees – including the new build one-time fee – over our selected 5 year period. That comparison follows, but first the one-time fees for existing connections.

[27] https://statistik.pts.se/nordic-baltic-telecom-market/graphs/3-broadband-services/3-7-share-of-fiber-subscriptions/

10. Fixed broadband: One-time fee – existing connection



With the growing adoption of fibre, the likelihood of a detached house already having a fibre connection is increasing. When a new owner moves in, he/she typically doesn't need to pay as high one-off fee as in the new build case – since the fibre is already installed and pulled into the house.

The graph below compares the one-time fees for an existing connection against the binding period of the contract.

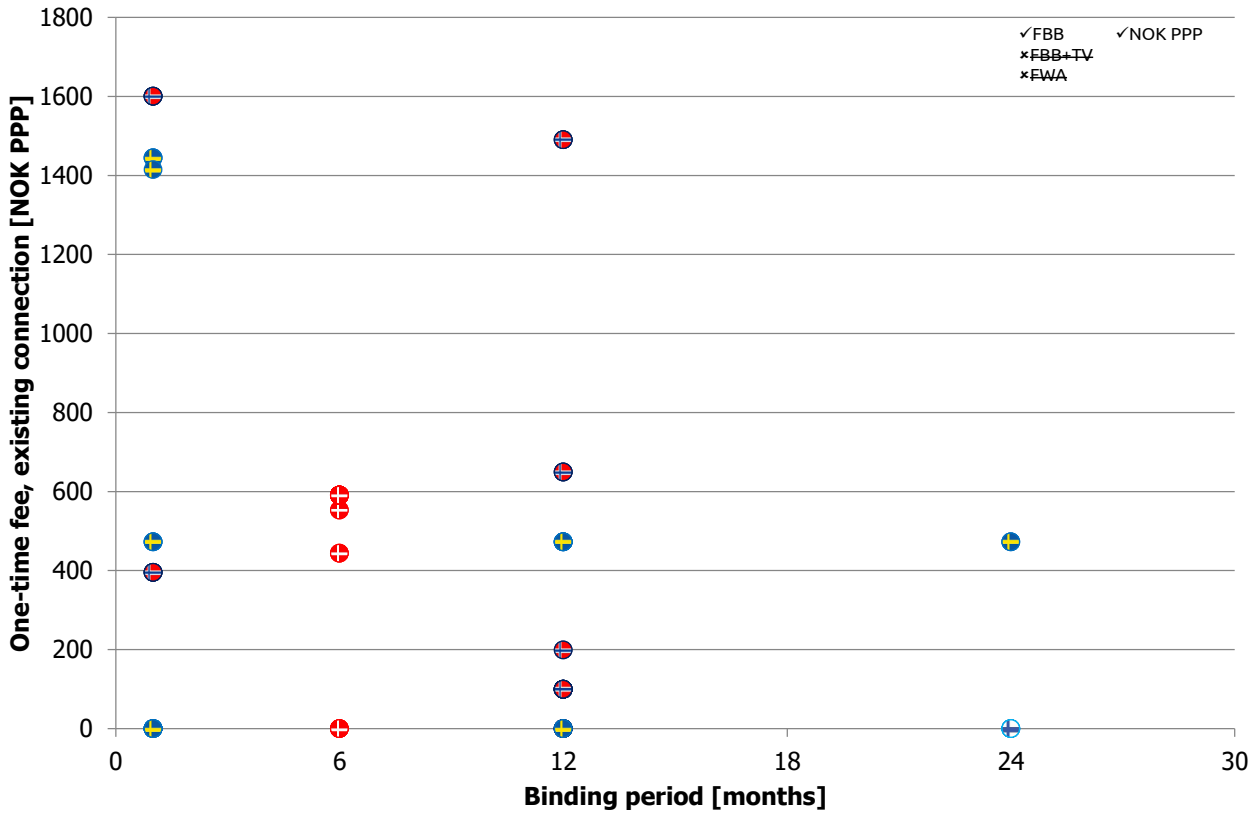


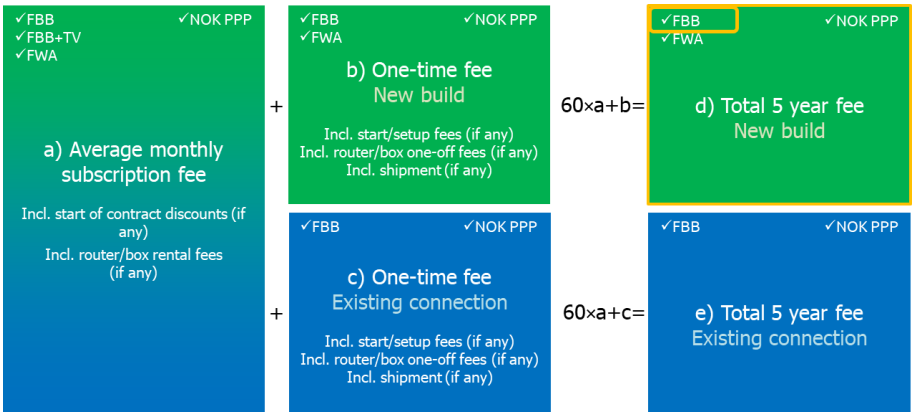
Figure 9. Comparison between one-time fees in NOK PPP for fibre broadband reconnection of a detached home among providers in Norway, Denmark, Sweden and Finland [source: providers' webpages and pricelists complemented by direct emails to providers when necessary]. The PPP values for 2021 are preliminary [source: IMF].

The first take-out is that the **one-off fees for existing connections tend to be much lower** than for new builds. Many providers don't charge anything whereas some providers see an opportunity to recover some of the cost of administrating a new customer although the connection is already established. The biding periods vary – Figure 9 could suggest that providers are keener not to charge high existing connection fees when binding periods are longer.

The highest unique one-off fees for existing connections are with Norwegian providers.

With purchase power adjustment, some Norwegian one-time fees for existing connections are higher than in Denmark, Sweden and Finland. Since these fees are quite modest in comparison to subscription fees over a longer period, it's not a very important cost component in the bigger picture.

11. Fixed broadband: Total 5 year fee – new build



With focus on connecting the unconnected, we are now adding the new build one-time fee to the monthly subscription fee during 60 months to get the *total* fee for a customer that decides to install fibre into a detached home and then subscribe to a broadband service for 5 years.

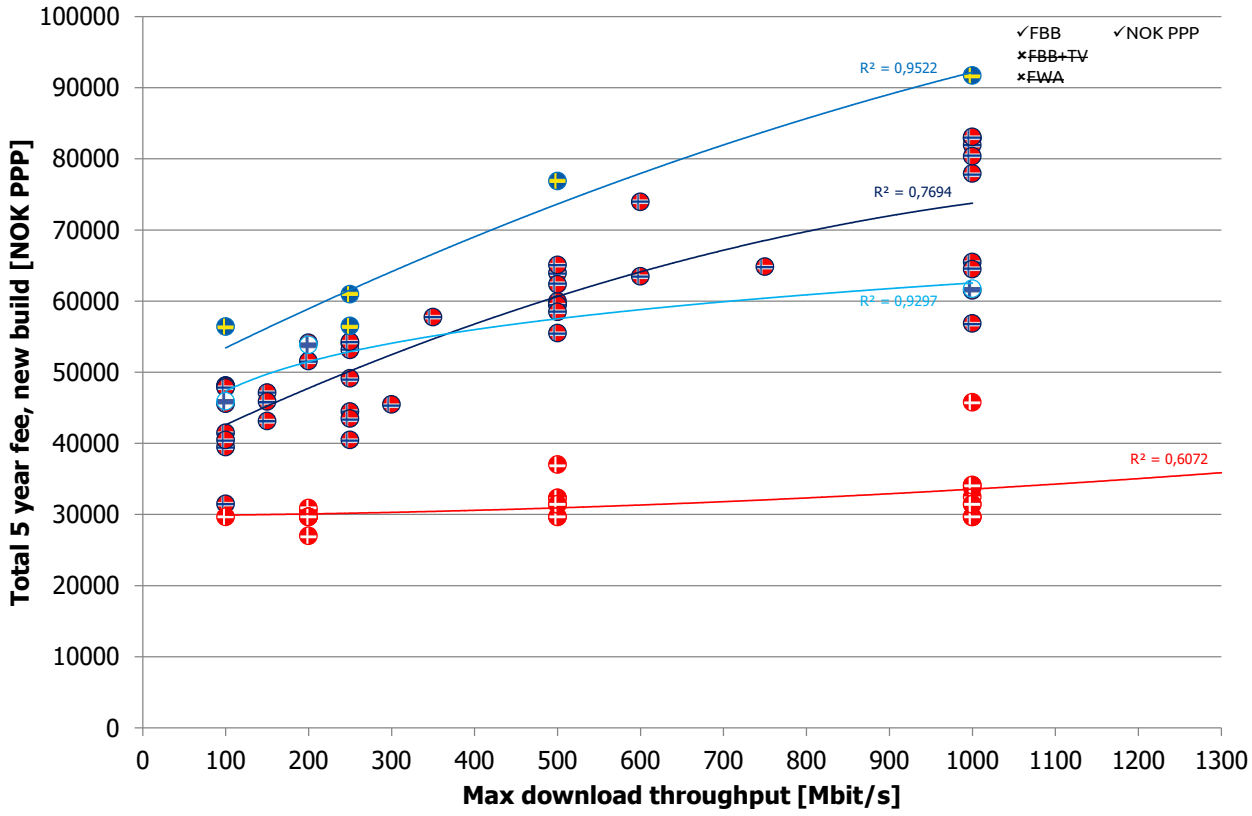
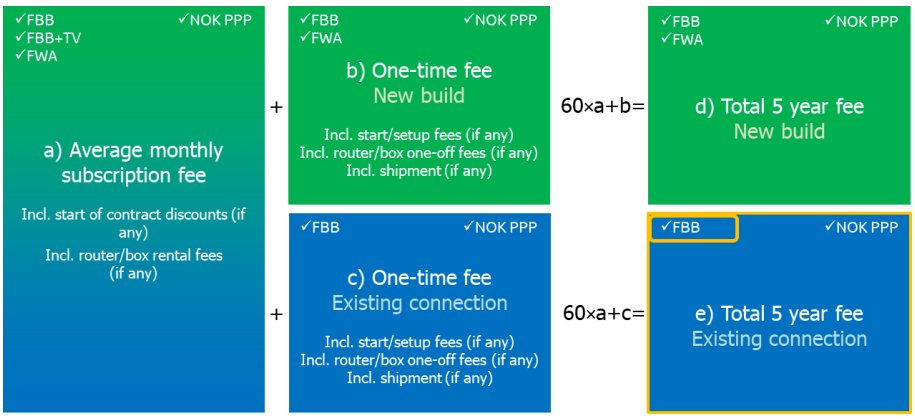


Figure 10. Comparison of the total fee (new build) for fixed broadband in NOK PPP during 5 years among providers in Norway, Denmark, Sweden and Finland, January 2022 for plans up to 1300 Mbit/s [source: providers' webpages and pricelists complemented by direct emails to providers when necessary]. The PPP values for 2021 are preliminary [source: IMF].

Figure 10 shows how the high new build one-time fees in Sweden affect the total cost (after purchasing power adjustment) during a 5 year period. Although the monthly subscriptions fees are higher in Norway, the relatively low new build one-time fees lower Norway to a level comparable with Finland. Denmark still operates with the lowest fees – by far.

When summing up the total fees during a 5 year period, the Norwegian new build customer will pay a lower amount than a Swedish customer and a similar amount as a Finnish customer after purchasing power adjustment. Denmark operates with the lowest total fees.

12. Fixed broadband: Total 5 year fee – existing connection



As mentioned in section 9, a majority of homes overall are however already connected today. The previous section made sense for the unconnected homes only.

Let's now make the same comparison of total fees but for customers that **already have an existing connection** into the home. A usual case is when people move – unless it's an entirely new house, the previous owner had likely made sure that a broadband connection was installed into the house. But this comparison also makes sense in open networks when the customer decides to change broadband provider.

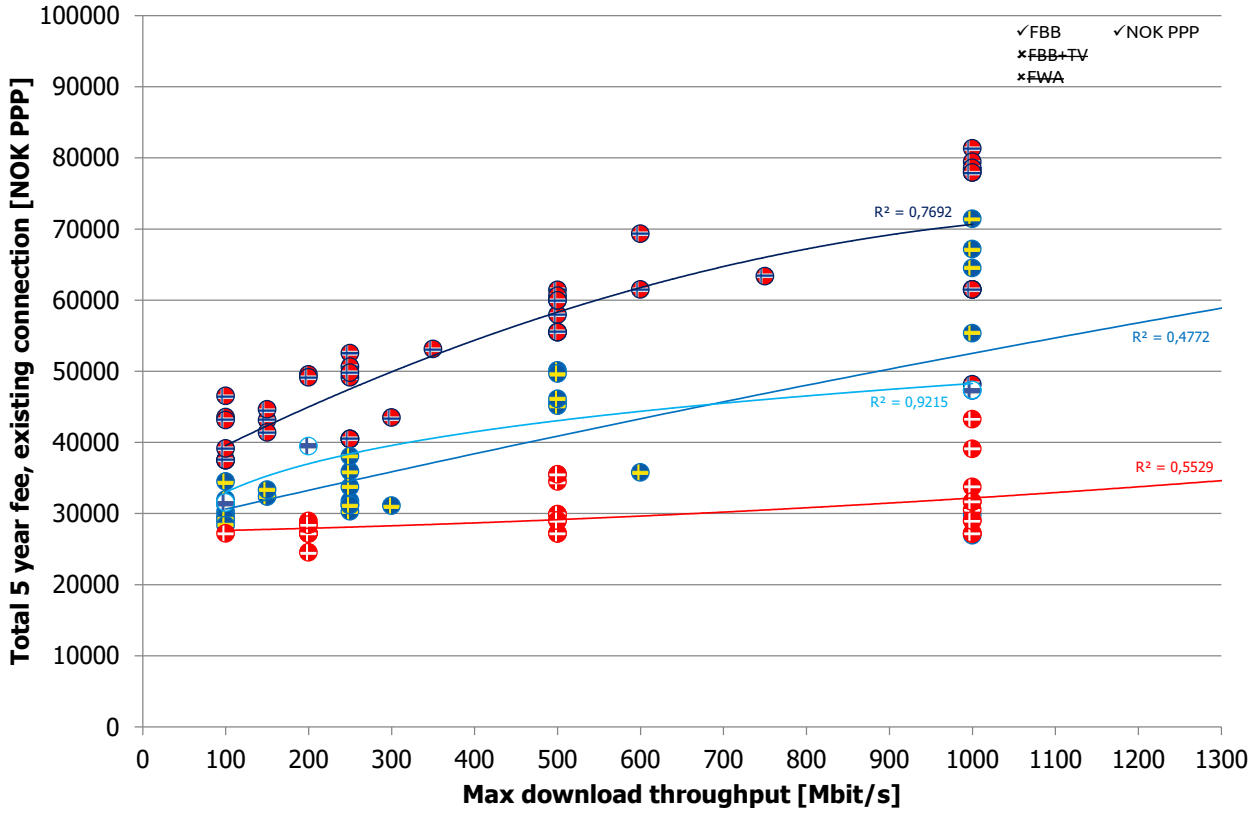


Figure 11. Comparison of the total fee for fixed broadband (existing connection) in NOK PPP during 5 years among providers in Norway, Denmark, Sweden and Finland, January 2022 for plans up to 1300 Mbit/s [source: providers' webpages and pricelists complemented by direct emails to providers when necessary]. The PPP values for 2021 are preliminary [source: IMF].

Based on an existing connection, Norwegian total fees are generally, with few exceptions[28], the highest as the high monthly subscription fees now dominate over the often very low one-off fees for an existing connection.

As usual, Denmark generally has the lowest fees. Sweden and Finland seem quite similar and are positioned in between Norway and Denmark.

When summing up the total fees during a 5 year period, the Norwegian existing connection customer will most often, with few exceptions, pay a higher amount than customers in Denmark, Sweden and Finland after purchasing power adjustment.

[28] Exceptions: GP Nett, HomeNet and NextGenTel 1000 Mbit/s offers.

13. Fixed broadband: Actual throughput

We have now analysed fixed broadband pricing in depth. Before going into FWA and packages with TV, let's take a look at the actual throughput that fixed broadband customers in our countries averagely get. Since fixed broadband is priced based on throughput, this is a combination of two factors:

- What the broadband connection technically delivers
- How much the customers have been willing to pay for the connection

The Nordic and Baltics statistics issued for 2020[29] shows how large share of the overall fixed broadband base that subscribe to plans with marketed throughput of 100 Mbit/s or more:

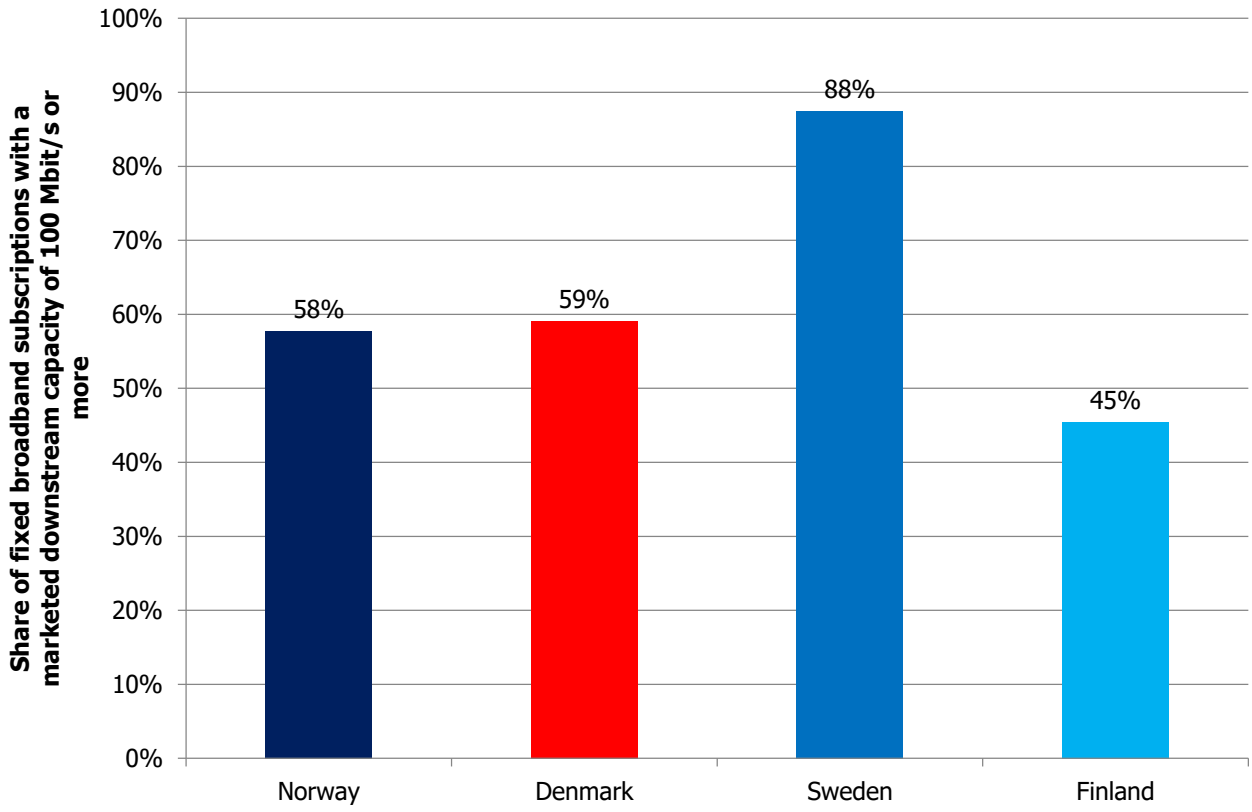


Figure 12. Share of fixed broadband subscriptions with 100 Mbit/s or more marketed download throughput in Norway, Denmark, Sweden and Finland, December 2020 [source: PTS, compiled by Tefficient]

This graph could suggest that Sweden would have the highest actual throughput of these four countries – and Finland the lowest. We don't know how the speeds distribute *within* the 100 Mbit/s or more category, though. As shown, plans with e.g. 500 or 1000 Mbit/s are quite a common offering today.

To try to figure out, we turn to Ookla Speedtest. Ookla uses crowdsourced data based on tests actively done by broadband users. The drawback is that we don't know how representative these tests are. In addition, the throughput measured by these tests is affected by the throughput tier paid for by the customers. Finally,

[29] https://statistik.pts.se/nordic-baltic-telecom-market/graphs/3-broadband-services/3-6-fixed-broadband-subscription-100-mbps/

they cover *all* available broadband technologies – including DSL which otherwise isn't in the scope of this analysis.

With these words of caution, let's compare the latest available median[30] download throughput in our four countries:

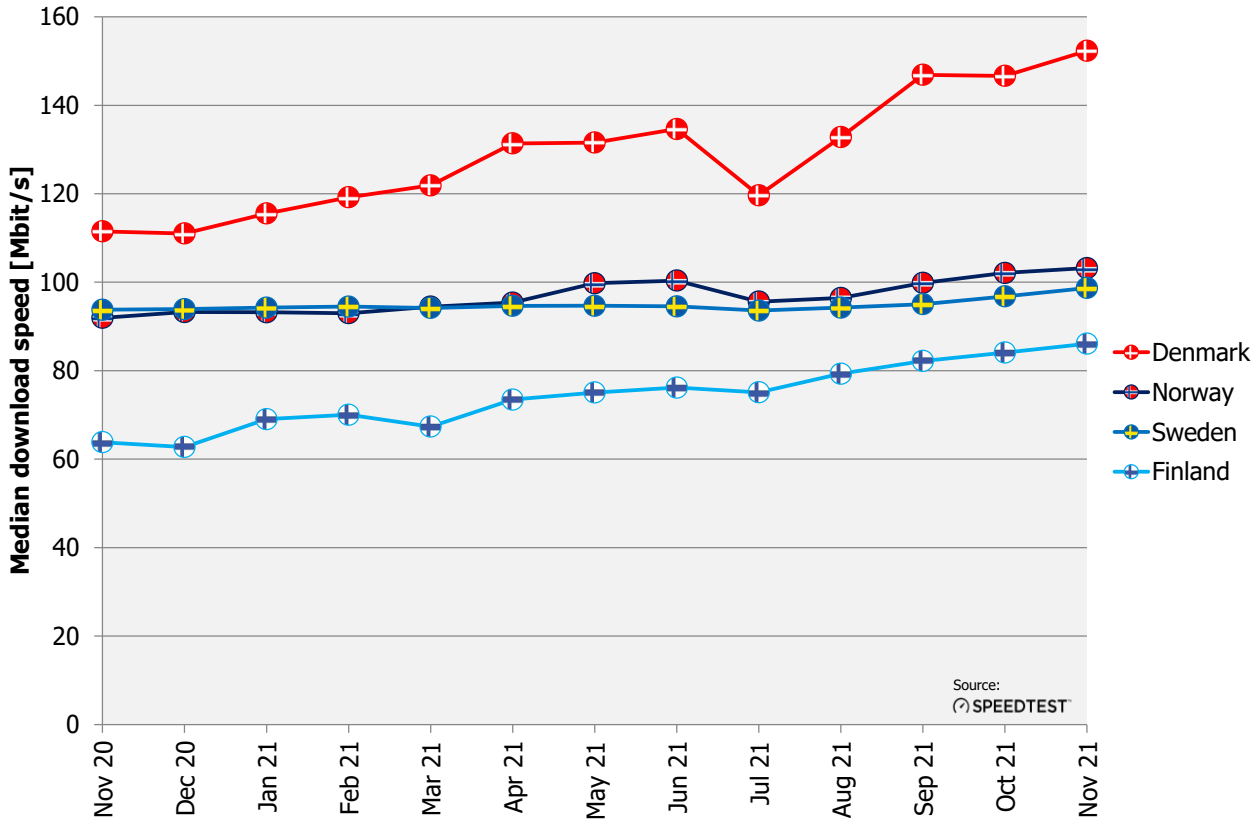


Figure 13. Median fixed broadband download speed across all technologies and subscription types for Norway, Denmark, Sweden and Finland per month Nov 2020-Nov 2021 [source: Ookla Speedtest]

Perhaps surprisingly – Denmark has the lowest share of fibre connections and an average 59% of fixed broadband subscriptions with marketed throughput of 100 Mbit/s or more – it's **Denmark** where fixed broadband users have the highest median download throughput. A key reason to it is that the Danish cable TV networks are well distributed and generally deliver high fixed broadband speeds. The level of competition in Denmark has increased in 2019 and 2020 with new players (and TDC) aggressively rolling out fibre while TDC's YouSee has promised all existing customers at least a doubling of their cable internet speeds[31].

As expected, Finland is having the slowest fixed broadband – although Finland is closing some of the gap to Norway and Sweden. A likely explanation is that with unlimited mobile data totally dominating mobile subscriptions in Finland (80% of non-M2M subscriptions were unlimited in June 2021) the willingness to pay for higher fixed broadband speed tiers is not really present in Finland.

[30] Ookla has recently changed from average throughput to median throughput in its data sets. This has lowered the values quite significantly but is more representative for the typical experience.
[31] https://www.berlingske.dk/virksomheder/yousee-slaar-aggressivt-tilbage-i-bredbaandskamp-stoerste-loeft-af

Norwegian fixed broadband connections are fast – the median value was **103 Mbit/s** in November 2021 – but the median Danish fixed broadband connection is much faster: 152 Mbit/s. The table below compares these speeds with the broadband ARPU[32] in NOK PPP. Finland isn't shown as Traficom doesn't separate fixed broadband revenues from other fixed network revenues.

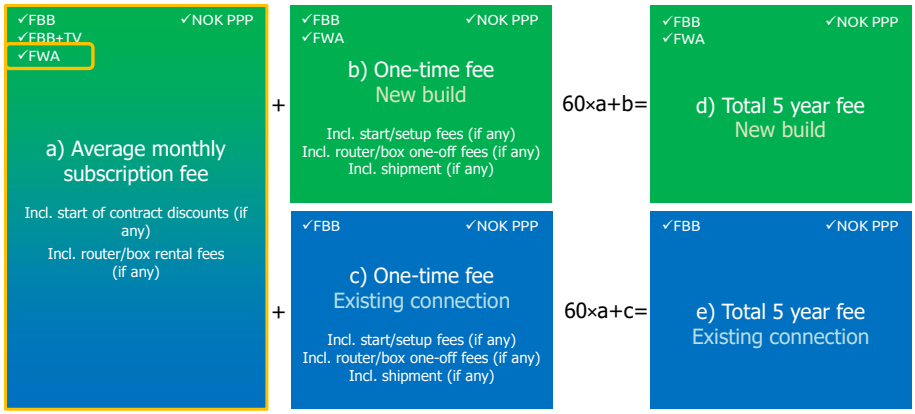
Country	Median download throughput, Nov 2021, Ookla [Mbit/s]	Average revenue per fixed broadband user (ARPU), 1H 2021[33], NOK PPP
Norway	103	423
Denmark	152	381
Sweden	99	336

Of these three countries, Norway has the highest ARPU but significantly slower median throughput than Denmark – and similar median throughput as Sweden, who has the lowest ARPU in NOK PPP. This suggests that the average Norwegian user chose to subscribe to a slightly lower throughput tier than the average Danish user. Price could of course be a driver for that choice.

Norway has fixed broadband networks with high median throughput, but so have Sweden and especially Denmark. With Norway's generally higher subscription fees, the willingness to pay for a faster throughput tier might not be as present as in Denmark.

[32] Based on data reported by regulators Nkom, Erhvervsstyrelsen and PTS respectively
[33] 2020 for Denmark and Sweden as Erhvervsstyrelsen and PTS report revenues only annually

14. FWA: Average monthly subscription fee



In fixed wireless access (FWA), mobile operators can use their regular mobile networks to deliver fixed broadband-replacing connectivity in areas where fixed broadband networks aren't available. In a Norwegian perspective, where Telenor is phasing out its traditional copper network, FWA is promoted as a solution that could deliver faster broadband than DSL and, at the same time, avoid an expensive fibre rollout to households and small businesses. Although FWA is possible already with 4G, the vast amount of spectrum that **5G** offers is making the FWA prospect more interesting. Since an FWA customer might use something like 500 GB of data per month – where the average Norwegian non-M2M mobile user consumed 7.5 GB per month in the first half of 2021 – the fear was always that FWA users would negatively impact the network experience for regular mobile phone users. In the future, 5G will not just offer more spectrum but also the possibility to separate different types of traffic from each other and control the quality for different services independently of each other – so called *network slicing*.

Until 2019, Norwegian providers were careful in offering FWA, but it is now sold as a broadband solution in certain areas. And according to Nkom data, the take-up has been good, see Figure 14.

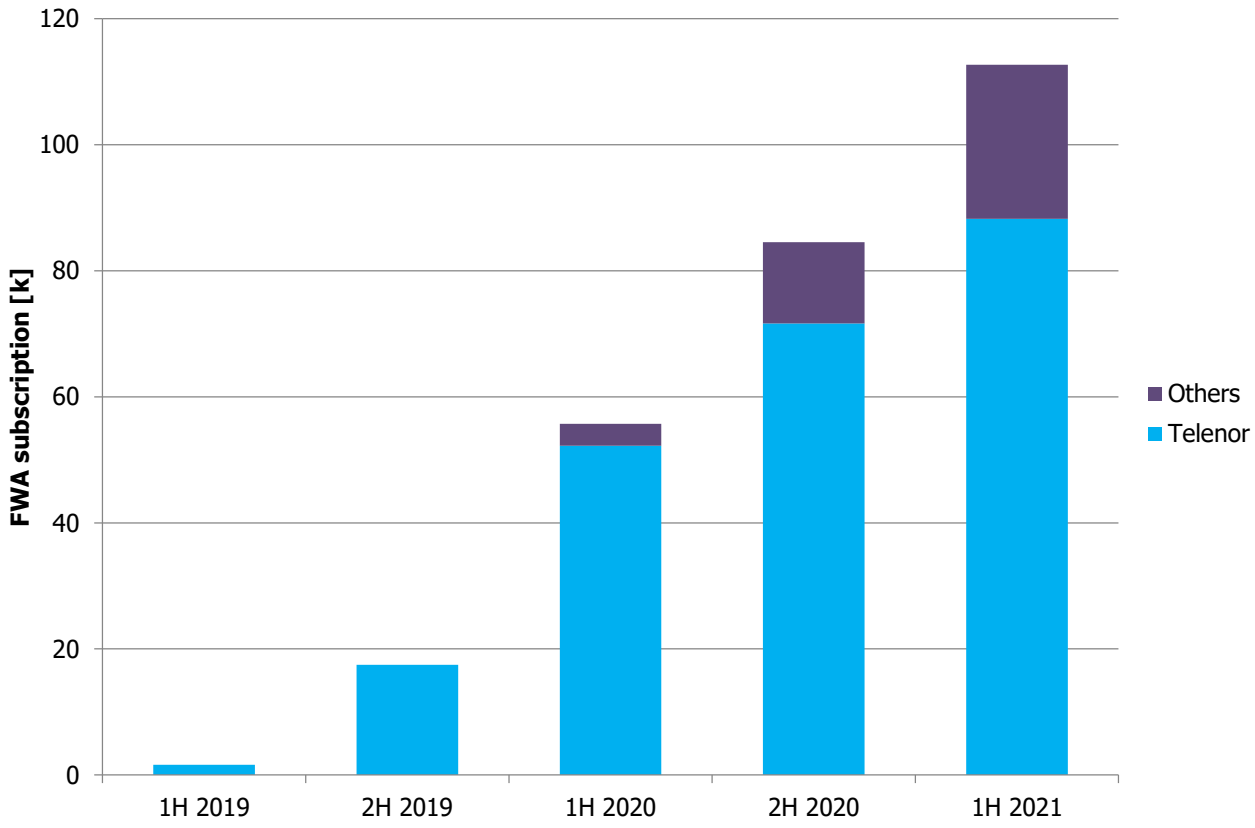


Figure 14. Development in the number of FWA subscribers in Norway 1H 2019-1H 2021 [source: Nkom, compiled by Tefficient]

In June 2021, there were almost **113000 FWA subscriptions** in Norway, 78% of them with Telenor, 16% with Telia and 5% with others, mainly NextGenTel. Without a doubt, FWA is a success in Norway, fuelled by Telenor's decommissioning of the copper network.

Generally speaking, Danish and Swedish providers have had a more cautious approach. In February 2019, the Danish mobile-only provider '**3**' however launched "Internet til hjemmet" for a set price of 230 DKK to anyone who wants to use 3's mobile network to connect the home to internet. The service can use an external antenna, but it's not required and up to the customer to decide.

In stark contrast to how FWA historically was addressed in Norway, Denmark and Sweden, **Finnish providers have for a long time offered FWA** over 4G networks to any household or business *regardless of location*. The use of an external antenna has, in most cases, been up to the end-user[34]. In June 2021, **23%** of the Finnish non-M2M mobile subscription base was data-only (FWA or portable mobile broadband) compared to 5% in Norway, 14%[35] in Denmark and 10% in Sweden. The high share of data-only subscriptions in Finland has contributed to that the Finnish mobile data usage is the highest in the world[36]: Where the average Norwegian non-M2M mobile user consumed 7.5 GB per month in the first half of 2021, the average Finnish user consumed 32.6 GB.

[34] In essence, this is mobile broadband but as there are no limitations on mobile data usage and no speed throttling after a certain monthly consumption, end-users have been able to use them to substitute fixed broadband.
[35] December 2020 as June 2021 will not be reported by Energistyrelsen
[36] https://tefficient.com/back-to-normal-or-will-5g-push-the-envelope/

Let's now look at the comparison of the average monthly subscription fee (over 5 years) for FWA services in our countries.

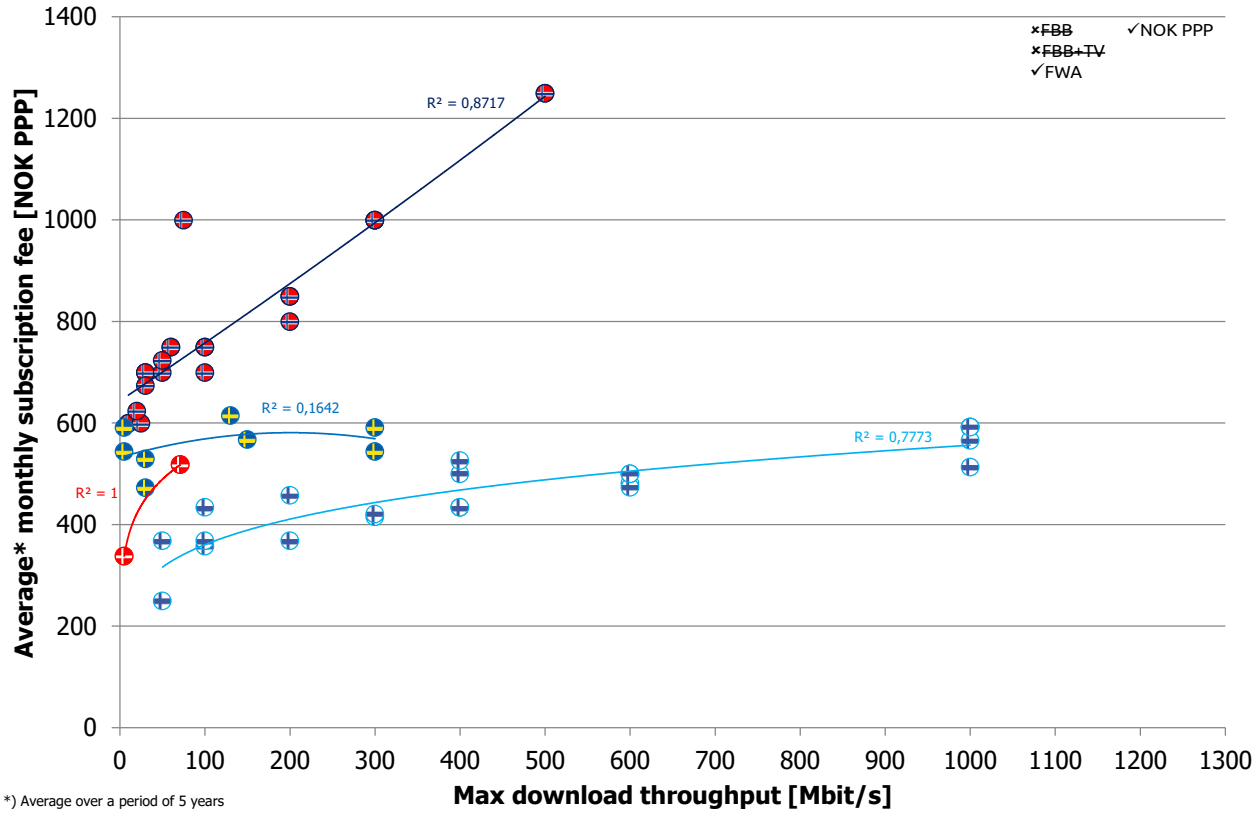


Figure 15. Comparison of the average monthly subscription fee in NOK PPP during 5 years for FWA plans with at least 1000 GB of data per month among providers in Norway, Denmark, Sweden and Finland, January 2022 [source: providers' webpages and pricelists complemented by direct emails to providers when necessary]. The PPP values for 2021 are preliminary [source: IMF].

The maximum download throughput should to a much higher extent than what is the case for fixed broadband be seen as *indicative* for FWA as the mobile capacity is shared between several users. Some providers in Denmark and Sweden[37] are not even communicating any throughput figures – the FWA user will get the throughput that the mobile network can deliver in the specific location of the customer. Such a 'best effort' approach doesn't exist in fixed broadband where providers monetise based on throughput tiers.

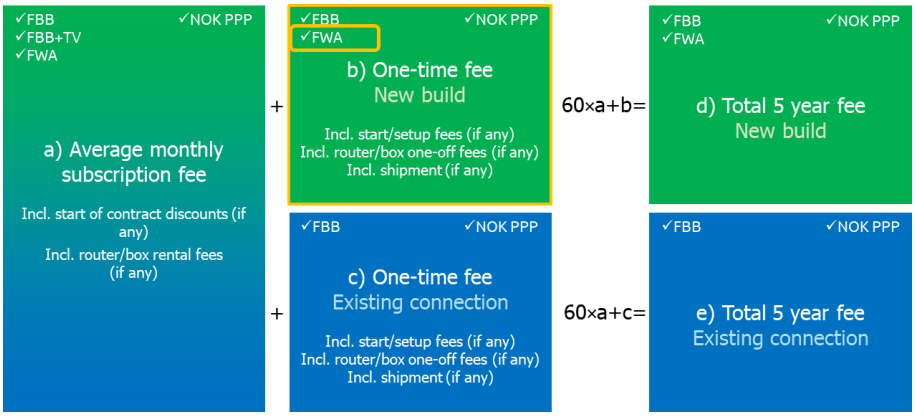
In contrast, Norwegian and Finnish providers do use throughput tiers also for FWA.

Norwegian FWA plans are, just like for fixed broadband, more expensive in NOK PPP terms than FWA plans in the other countries. What is striking in Figure 15 are the really low fees of the Finnish FWA plans.

The Norwegian FWA plans are, after compensation for differences in purchasing power more expensive than same-speed plans in Denmark, Sweden and Finland. Finnish FWA plans are very reasonably priced which could explain their popularity.

[37] 3 Denmark, Tele2 Sweden and partly Telenor Sweden – visualised as 5 Mbit/s max download throughput in the figure

15. FWA: One-time fee – new build



In Norway, FWA currently always comes with a requirement of an **external antenna** which is wall or roof mounted. In Denmark, Sweden and Finland, an external antenna is usually an option, but not a requirement[38]. Since the one-off fee for an external antenna and installation can be as high as 5000 NOK in Norway and sometimes even higher in Finland, we need to separate between plans that require an external antenna and plans that don't when comparing the one-time fees.

Since the connection fees aren't dependent on the maximum throughput of the FWA connection, we here correlate it to the binding period of the contract instead.

[38] For a customer living in an area with good mobile coverage, an external antenna is not necessarily adding much to the network experience. A FWA customer without an external antenna also has higher mobility as he/she easily can take the router with him/her if moving to another location permanently or temporarily. This is possible in Denmark, Sweden and Finland for FWA customers without an external antenna installation. Since the Norwegian FWA providers Telenor, Telia and NextGenTel solely are offering FWA with an external antenna, all their FWA customers are locked to a specific address – the one where the outdoor antenna is installed.

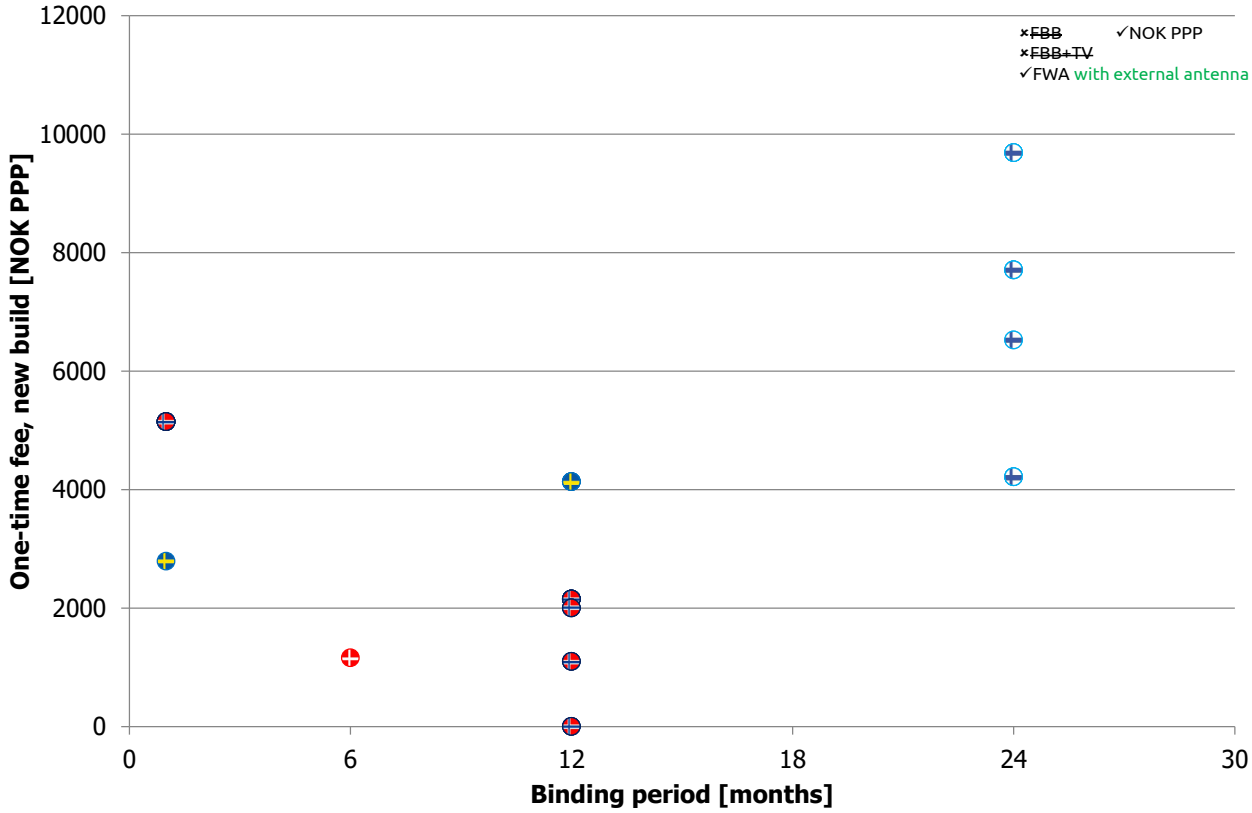


Figure 16. Comparison between one-time fees in NOK PPP for new build FWA with external antenna among providers in Norway, Denmark, Sweden and Finland [source: providers' webpages and pricelists complemented by direct emails to providers when necessary]. The PPP values for 2021 are preliminary [source: IMF].

In **Norway**, the one-time fee for a new build FWA with external antenna is at around 2000 NOK or lower – if signing up for a 12 months binding contract. Telenor also offers a non-binding option (here shown as 1 month) for around 5000 NOK. Norway's one-time fees compare reasonably well with the purchasing power adjusted one-time fees in Denmark and Sweden. The one-time fees in Finland are often significantly higher than in Norway after purchasing power adjustment[39].

With purchase power adjustment, the Norwegian new build FWA with external antenna one-time fees at around 5000 NOK or lower are comparable to the Danish and Swedish examples – and generally lower than in Finland.

There are, as pointed out, no FWA options *without* external antenna in Norway, though. Figure 17 is therefore without Norwegian representation.

[39] Finnish consumers can get a tax deduction for up to 500 EUR, but such tax deductions are excluded in this analysis

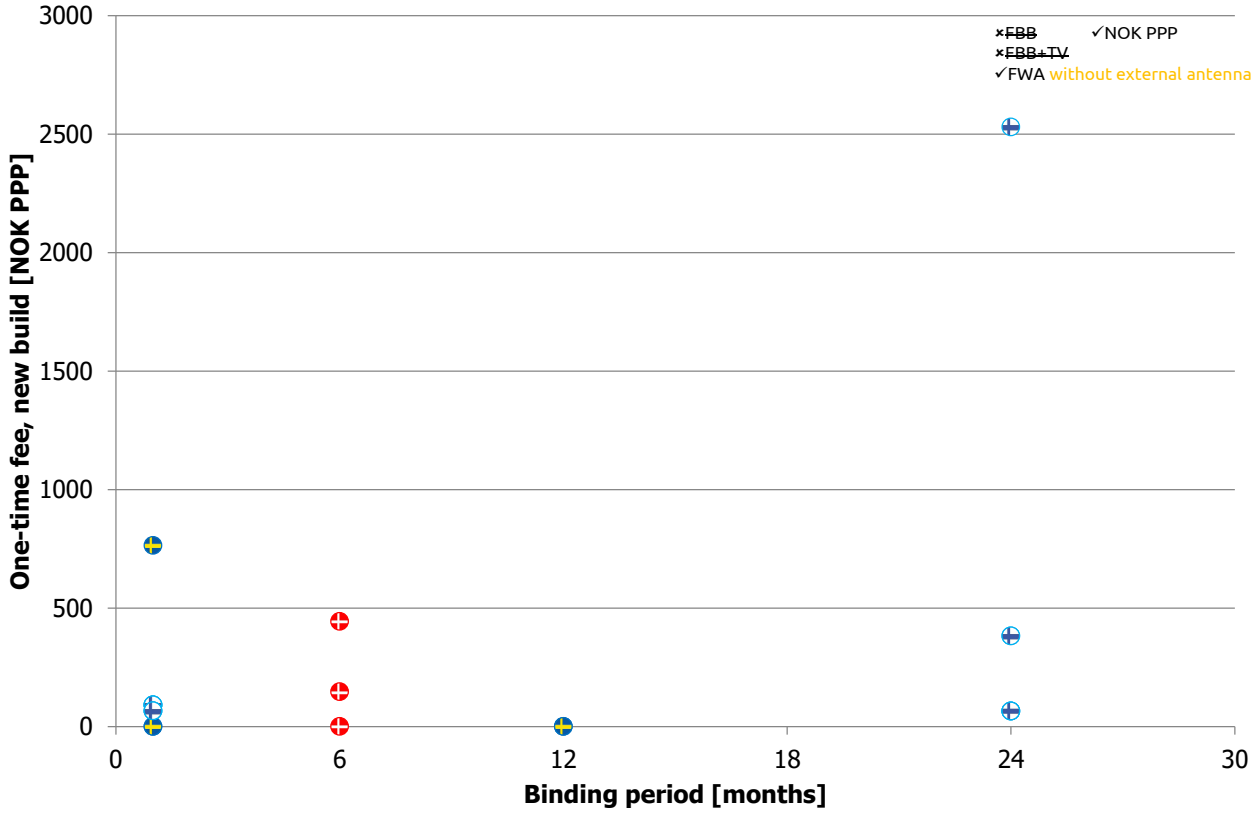


Figure 17. Comparison between one-time fees in NOK PPP for new build FWA without external antenna among providers in Norway (not offered), Denmark, Sweden and Finland[40] [source: providers' webpages and pricelists complemented by direct emails to providers when necessary]. The PPP values for 2021 are preliminary [source: IMF].

The one-time fees when choosing a FWA plan without external antenna are considerably lower, but some providers still charge an activation fee or charge for a mandated router.

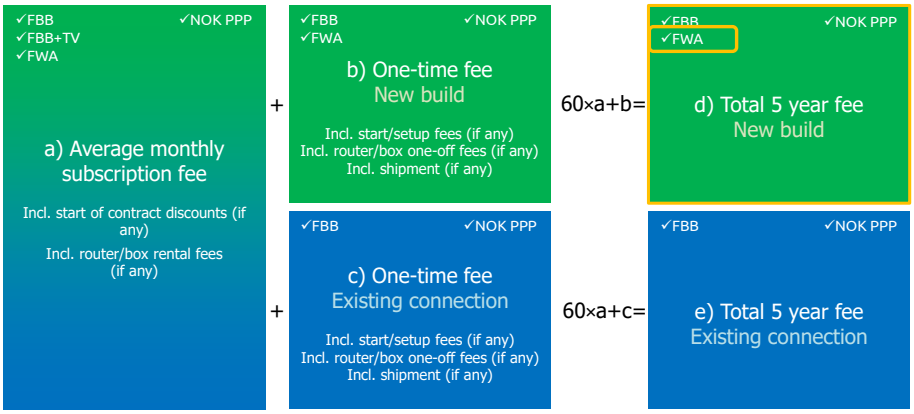
A FWA plan without an external antenna provides the consumer with an **added location flexibility** as the router can be moved permanently or temporarily. That would however mean that the provider no longer has control over where the traffic is generated. This could be the reason to why Norwegian providers so far have avoided to offer FWA options without external antenna. The experience from Finland – where this FWA alternatively totally dominates – is however that providers have been able to manage this in their networks.

The new build FWA without external antenna one-time fees are significantly lower, but so far no such options are offered in Norway.

Since the "existing connection" option doesn't really exist for FWA – the reuse of an existing FWA installation by a new provider would be technically challenging[41] – we make the assumption that the one-time fees are the same as in the new build case and move immediately into comparing the total 5 year fees.

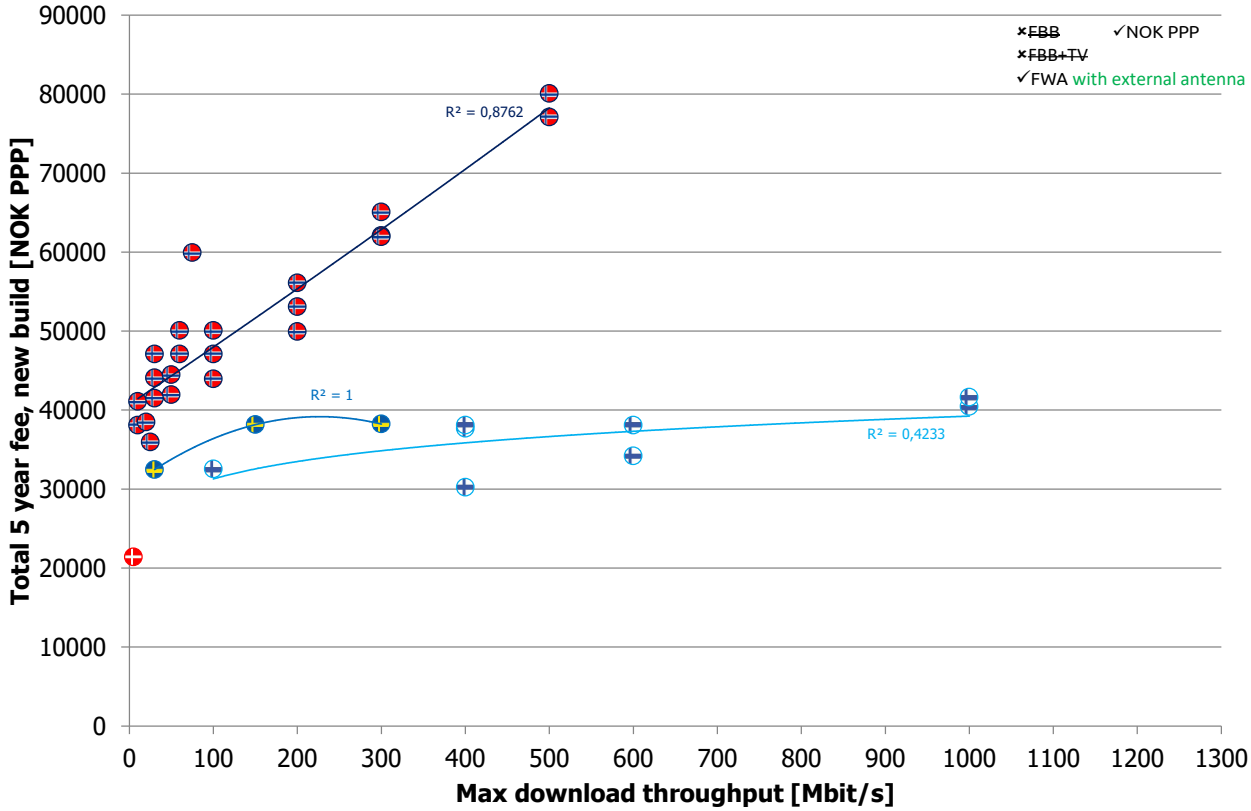
[40] The high (~2500 NOK PPP) one-time fee in Finland is for one 5G offer where the 5G router is mandatory and costs a total of 192 EUR.

16. FWA: Total 5 year fee



We are now adding the new build FWA one-time fee to the monthly FWA subscription fee during 60 months to get the *total* fee for a customer that decides to install FWA into a home and then subscribe to a FWA service for 5 years.

First we compare the total fees with external antenna:



[41] Nkom did though in August 2021 propose that Telenor should be obliged to allow reuse of FWA antennas: https://www.nkom.no/aktuelt/nkom-varsler-endring-av-reguleringen-av-fast-tradlost-bredband. Tefficient is unaware of the further development on this matter.

Figure 18. Comparison of the total fee (new build FWA with external antenna with at least 1000 GB of data per month) in NOK PPP during 5 years among providers in Norway, Denmark, Sweden and Finland, January 2022 [source: providers' webpages and pricelists complemented by direct emails to providers when necessary]. The PPP values for 2021 are preliminary [source: IMF].

When comparing the options with an external antenna, i.e. how FWA currently is sold in Norway, it's visible that the total cost of installing and using FWA in Norway always is higher than in Denmark, Sweden and Finland – after purchasing power adjustment.

When summing up the total fees during a 5 year period, the Norwegian FWA customer with external antenna will always pay a higher amount than all Danish and Finnish customers for the same speed after purchasing power adjustment.

As mentioned, we have only included FWA plans with 1000 GB or more in this pricing comparison.

Figure 19 shows that the Norwegian standard is 2000 GB[42]. Danish providers are more restrictive – 1000 GB[43]. In Sweden and Finland all FWA plans come with **unlimited data**. This is in line with how fixed broadband works across the Nordic. If FWA should be perceived as a true replacement to fixed broadband, providers could – as done in Sweden and Finland – refrain from imposing allowances on FWA. A very significant majority of customers will never reach these allowances anyhow.

[42] Telenor and NextGenTel allow their FWA customers to use more than that, but then with a throughput limitation of maximum 5 Mbit/s. In its webpages, Telia doesn't specify what happens after 2000 GB, but on a direct question, a customer service representative said that Telia doesn't currently enforce the policy and that it will only be a problem would the user consume more than 2000 GB several months in a row.

[43] 3 Denmark launched a 5G-based FWA plan 18 January 2022 – after the gathering of the FWA prices. This plan, which comes with a 70 DKK premium on top of 4G-based FWA, has an allowance of 2000 GB.

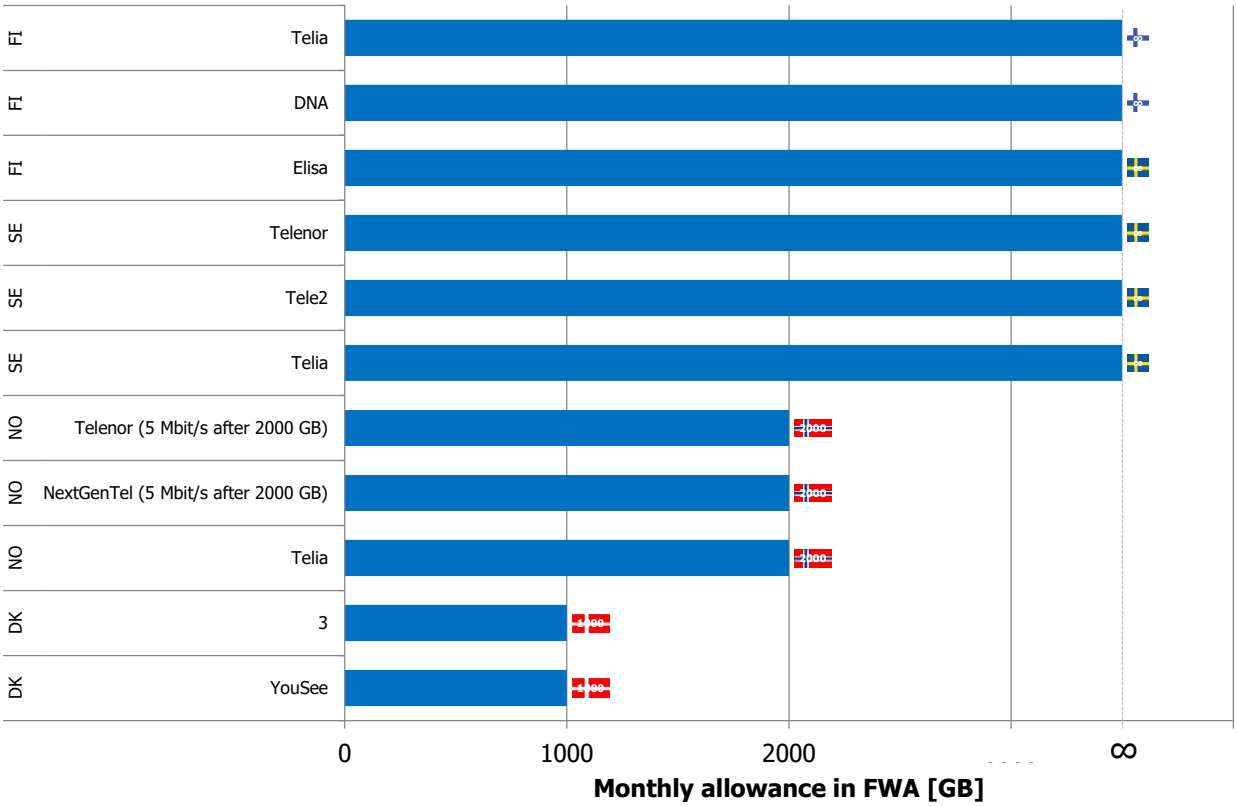


Figure 19. Comparison of the monthly data allowance in FWA plans among providers in Norway, Denmark, Sweden and Finland, January 2022 [source: providers' webpages and pricelists complemented by direct emails to providers when necessary]

Norwegian FWA plans are limited to 2000 GB of full-speed data per month. Although more than sufficient for households today, it is a restriction compared to fixed broadband plans. Providers in Sweden and Finland have decided not to make that restriction; also FWA plans are unlimited.

The 2000 GB limitation on Norwegian FWA plans is particularly noteworthy in the just-presented context where the total 5 year fees always are higher – in PPP terms – than in Denmark, Sweden and Finland.

To end this section, we present the total fees without external antenna – although Norway lacks representation in this graph.

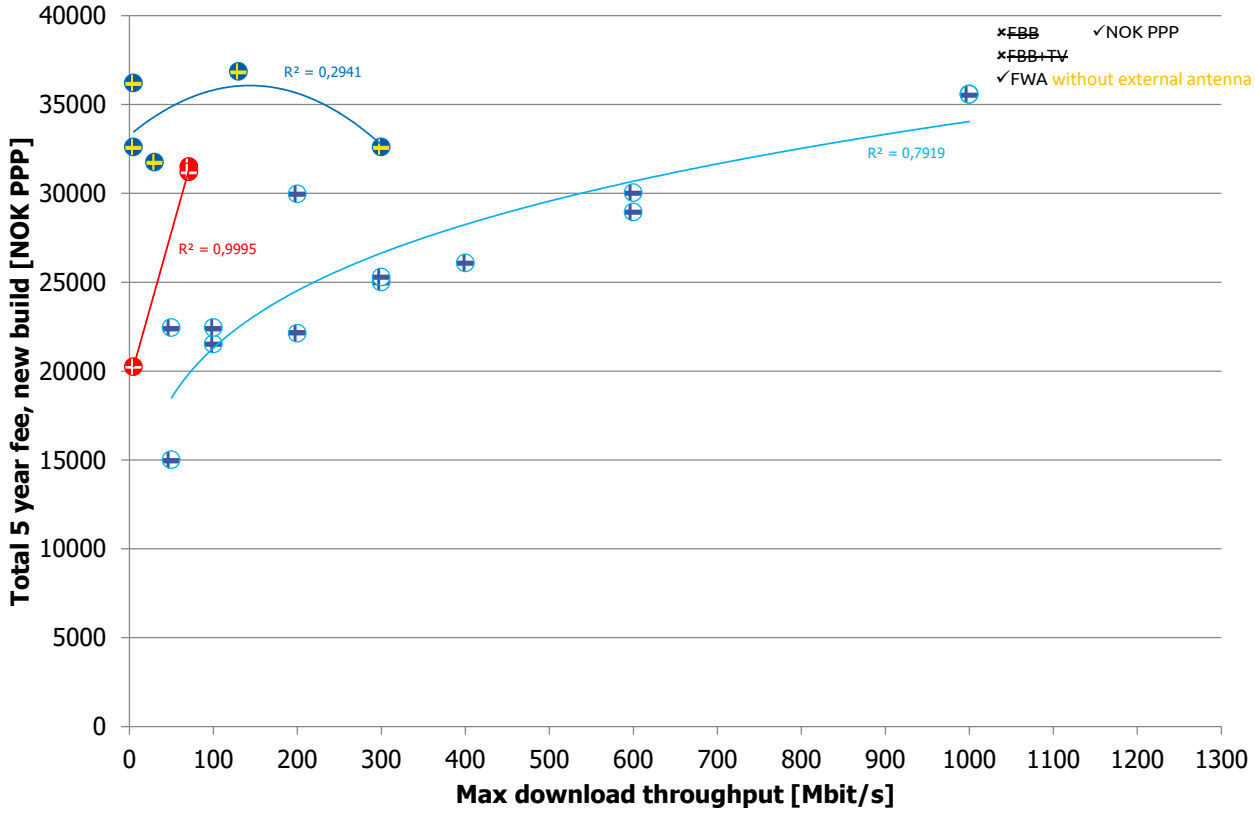


Figure 20. Comparison of the total fee (new build FWA without external antenna with at least 1000 GB of data per month) in NOK PPP during 5 years among providers in Norway (not offered), Denmark, Sweden and Finland, January 2022 [source: providers' webpages and pricelists complemented by direct emails to providers when necessary]. The PPP values for 2021 are preliminary [source: IMF].

If comparing with Figure 19, total fees are generally lower without an external antenna. At lower speed tiers, around maximum 100 Mbit/s, Finnish households can have Internet access via FWA without external antenna for a total fee of about 22000 NOK during 5 years. That is about half of the total fees compared to a fibre subscription with the same maximum speed.

	Finland Approximate total 5 year fee, new build [NOK PPP]	**Norway** Approximate total 5 year fee, new build [NOK PPP]
Fibre 100 Mbit/s	46000	43000
FWA 100 Mbit/s with external antenna	33000	47000
FWA 100 Mbit/s without external antenna	22000	Not offered

Unlike Finland, the table suggests that FWA actually is priced with a premium over fibre in Norway. This is remarkable as FWA, as previously discussed, often won't deliver the maximum speed whereas fibre most often does.

To visualise this, we have compared the total 5 year new build fees for FWA in Norway with that of fibre.

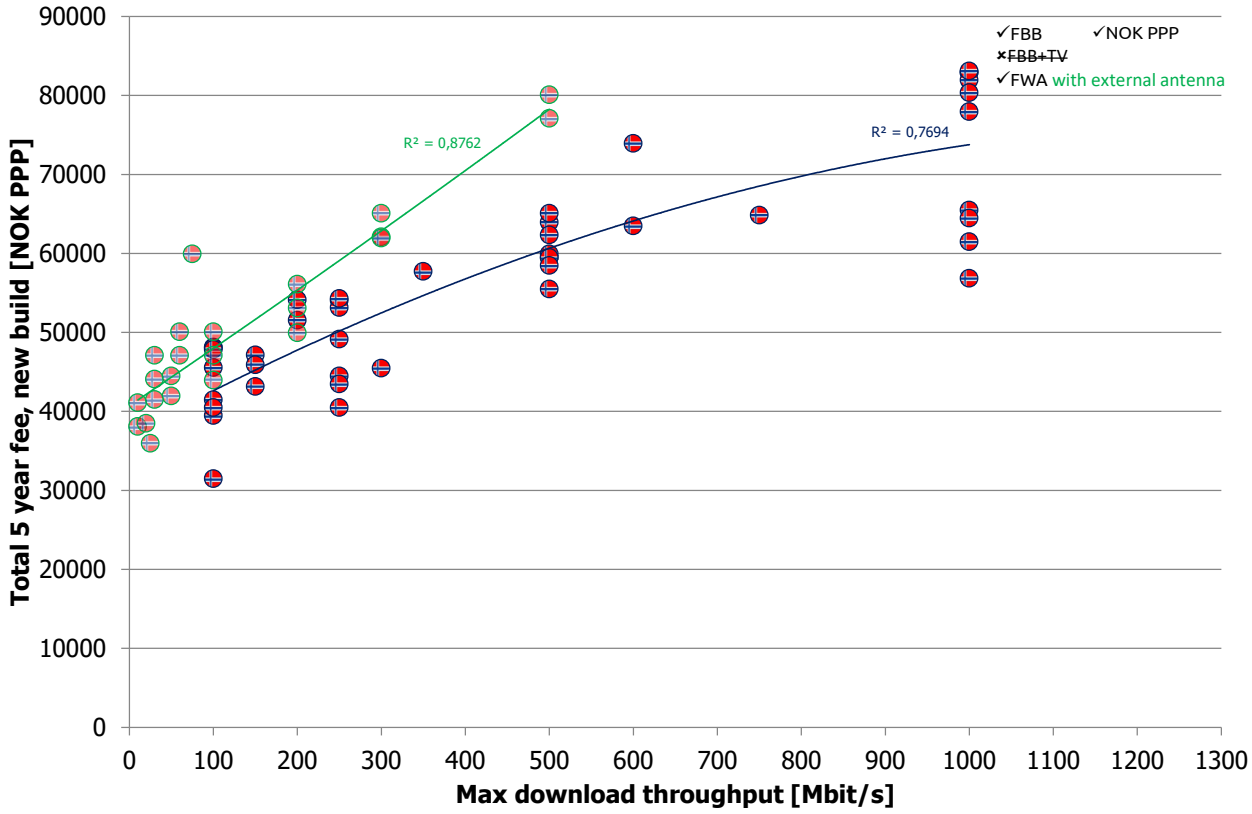


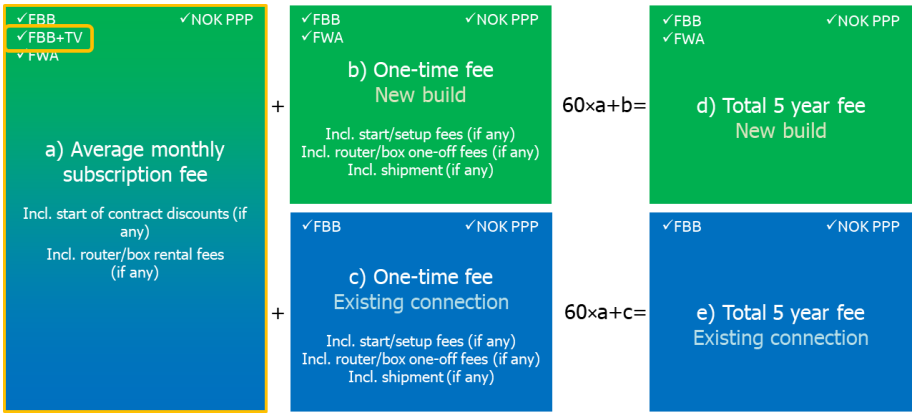
Figure 21. Comparison of the total fee between new build fibre (blue line) and new build FWA with external antenna (green line) in NOK PPP during 5 years among providers in Norway, January 2022 [source: providers' webpages and pricelists complemented by direct emails to providers when necessary].

FWA fees are shown with the green marker line whereas fibre fees are shown with a blue marker line. Figure 21 is indeed showing that **FWA almost always is priced with a premium** when compared to same-speed fibre. In Finland, it's *fibre* that comes with a premium. This is also the case in other markets outside of the Nordics where FWA is now widely introduced, e.g. USA. In Austria, a country that resembles Finland and has had FWA for long, FWA and fixed broadband plans are generally neutrally priced (same speed, same price).

In Norway, FWA isn't therefore a lower-cost option to fibre. This is bad news for Norwegian households that aren't able to get fibre: On top of that disappointment, they have to pay more for a FWA solution.

Norwegian FWA plans are, although more limited in data volume and likely in actual speed, almost always priced with a premium over same-speed fibre plans. In other active FWA markets internationally, it's typically fibre that comes with a premium.

17. Broadband & TV bundle: Average monthly subscription fee



Some broadband providers offer customers a *discounted* bundle between broadband and TV. As TV services today can be delivered over broadband with high quality, broadband providers see TV services as a way to increase revenue from one and the same customer. Telecom providers are also taking market share in TV from traditional TV providers such as terrestrial TV and cable TV players. At the same time the whole TV market is undergoing a rapid change when new streaming providers such as Netflix, HBO Max and Disney+ challenge the traditional TV.

It is today very easy for a consumer with a broadband connection to subscribe to the content (TV and streaming) that he/she wants. This means that fewer consumers see the need for telecom or TV providers to create packages of channels for them. Whereas the traditional telecom and TV providers have had the tendency to lock customers in on long binding contracts, the new streaming providers have, in contrast, made it easy for customers to flexibly come and go, committing only to one month at a time.

Hence we have in this analysis, as mentioned, only captured broadband plans that bundle in TV services if that bundling **provides a discounted price** to the customer. Otherwise that bundle isn't providing any additional value; the customer can do that bundling him/herself whenever he/she feels for it.

Figure 22 shows the average monthly subscription fee during the first 5 years. The exact TV content will of course vary between countries and between providers, but we have selected the **basic, entry level, TV option** for all providers. Typically that means all free-to-air national channels plus 10-15 additional TV channels and occasionally also one streaming service.

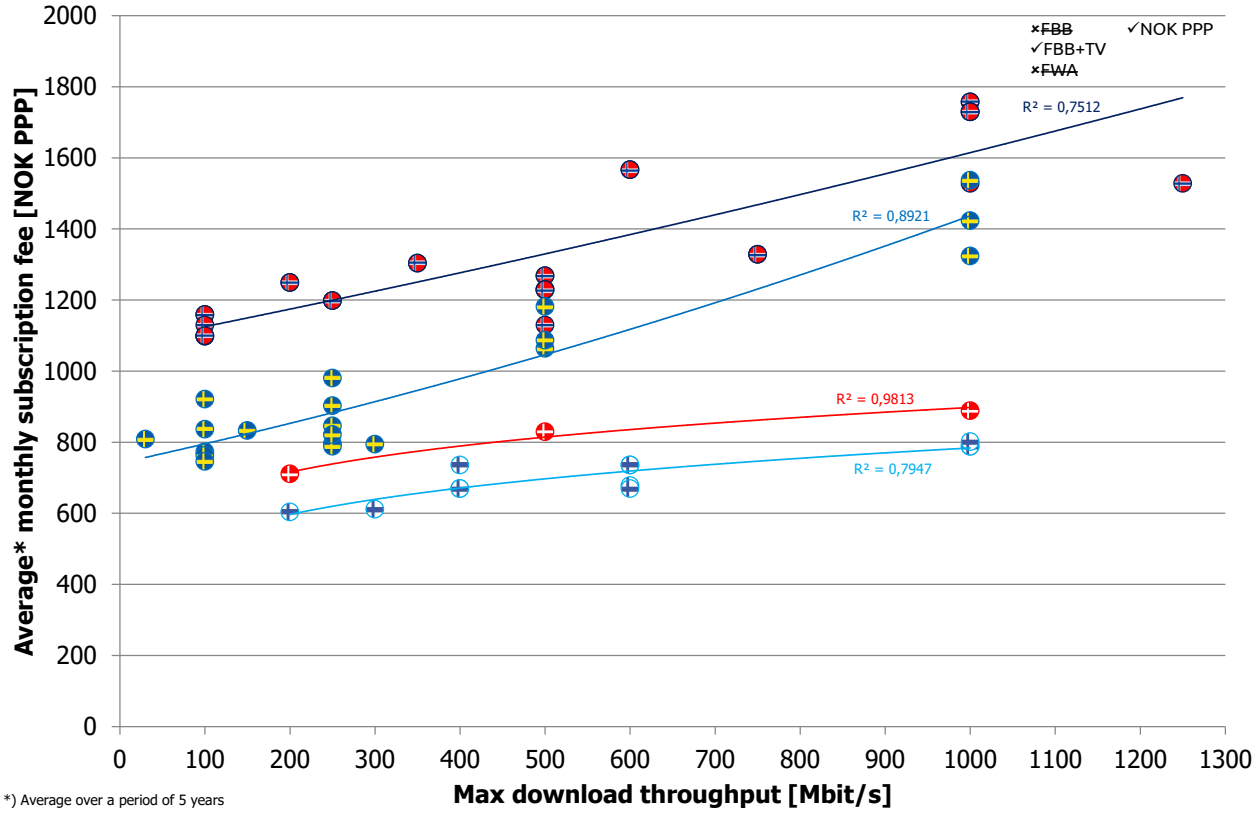


Figure 22. Comparison of the average monthly subscription fee for a discounted broadband & TV bundle in NOK PPP during 5 years among providers in Norway, Denmark, Sweden and Finland, January 2022 [source: providers' webpages and pricelists complemented by direct emails to providers when necessary]. The 2021 PPP values are preliminary [source: IMF].

It should be noted that we have included FWA plans with bundled TV into Figure 22. There are two such plans in Sweden – and all of the Finnish plans with bundled TV are FWA.

Similarly to how it looked for pure fixed broadband, Norway's broadband & TV bundles are almost always more expensive – for a given throughput in PPP terms – than similar bundles in Denmark, Sweden and Finland. The TV content will, as said, differ between the markets but we can see that it's **the broadband component that explains the difference in price** as the trends are similar to e.g. Figure 3.

After purchasing power adjustment, Norwegian bundled broadband & TV plans almost always come with a higher average monthly subscription fee than similar plans in Sweden, Finland and Denmark

18. TV: ARPU

As with fixed broadband, some Nordic providers report TV ARPU (average revenue per user per month)[44]. It provides an additional comparison to the just-concluded comparison of average monthly subscription fees for broadband & TV bundles.

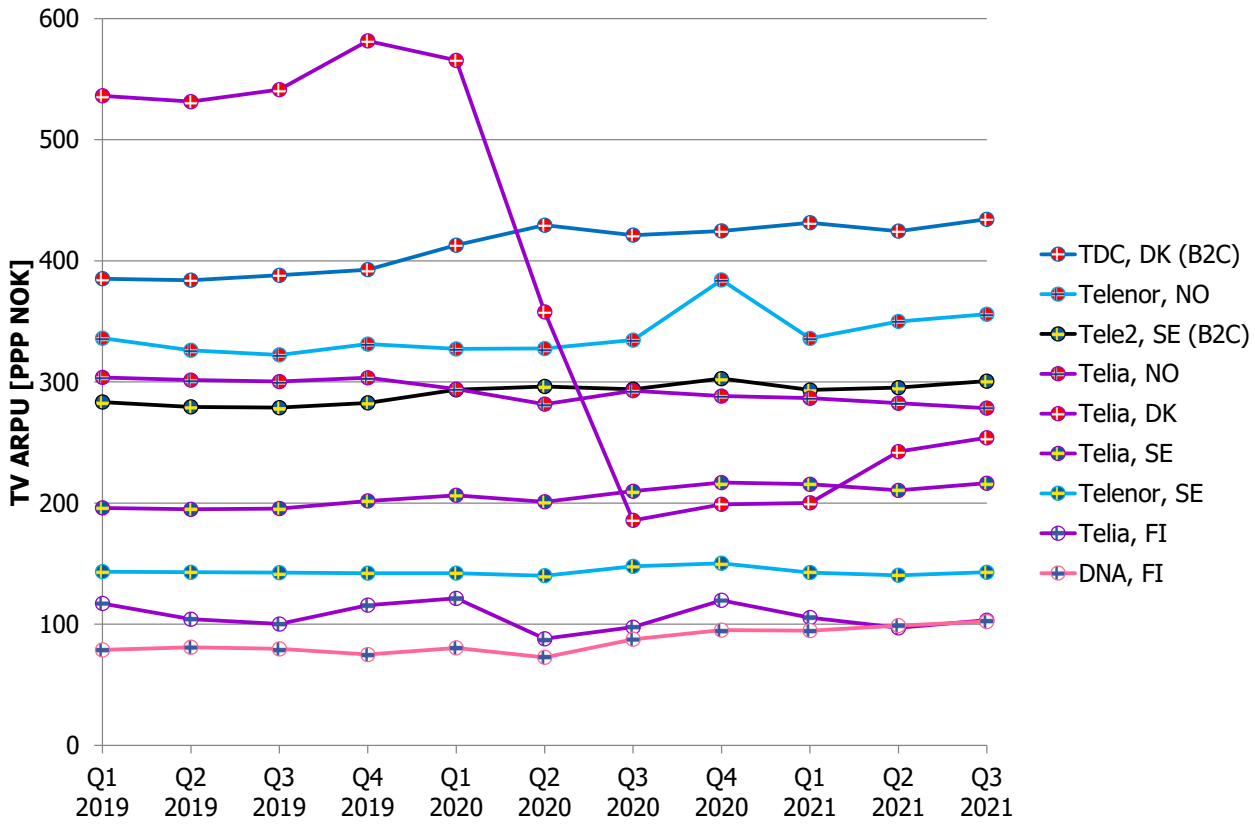


Figure 23. Comparison of reported TV ARPU in PPP NOK among providers in Norway, Denmark, Sweden and Finland [source: operators' financial reporting]. The PPP values for the respective full year are applied to each quarter in that year. The 2021 PPP values are preliminary [source: IMF].

In PPP terms, TDC has the highest TV ARPU among reporting operators in the region. Telenor Norway has the second highest[45] TV ARPU. Telia Norway is mid-ranked – approximately the same position as for fixed broadband. If comparing to the broadband ARPU (Figure 4), where Telenor Norway had the highest ARPU in PPP terms and Telia Norway a broadband APRU lower than median for the Nordics, Telenor's position is less extreme whilst Telia's is around the median. This speaks for that it's the broadband component rather than the TV component that explains Norway's position in the previous section (Figure 22).

[44] Since broadband and TV sometimes are bundled together, operators are distributing part of the bundle revenue into broadband ARPU and part into TV ARPU.

[45] In the original analysis from 2021, the presented TV ARPU was regretfully incorrect for Telenor Norway, Telenor Sweden and DNA Finland due to Tefficient having picked incorrect input data. That led to incorrect conclusions. That mistake is now corrected.

Although out of our focus here, we need to comment on the development of the TV ARPU for Telia Denmark as it seems dramatic. According to Telia's reported figures, the operator increased its TV subscriber base with 57% in Q2 2020 – from a low level – and these added TV customers seem not to have brought any revenue to Telia.

After purchasing power adjustment, Telenor Norway has the second highest TV ARPU among reporting Nordic operators. Telia Norway is at a lower level – close to the Nordic median.

19. Summary and conclusion

This analysis is a one-year-later update of an original analysis, dated 23 February 2021. Although numbers have changed, it establishes the findings from last year. A few trends can be observed, though:

- **Broadband prices** have increased somewhat in Norway, but also in the other three markets
- The **fibre adoption** has increased somewhat in Norway and also in the other three markets
- The **FWA with external antenna take-up** has been very fast in Norway – and although no apple-to-apple comparison exists, it's likely been faster than in the other three markets[46]

The findings of the analysis are:

Fixed broadband: Subscription fee, PPP

- Norwegian plans are generally – with few exceptions – more expensive than same-speed plans in Denmark, Sweden and Finland

Fixed broadband: ARPU, PPP

- Telenor Norway has the highest fixed broadband ARPU among reporting Nordic operators
- Telia Norway has a much lower level – more comparable with Denmark, Sweden and Finland

Fixed broadband: Regional differences in monthly subscription fees, Norway

- Norwegian fees for 100/100 Mbit/s fibre broadband are relatively homogeneous at around 700 NOK per month
- Consumers in certain municipalities have access to cheaper providers
- The national pricing applied by 'national' providers likely serves as benchmark for many smaller, regional, providers
- Only 50% of Norway's households have a choice between two or more broadband providers – even when including FWA
- The differences between the regions are quite significant with Oslo standing out as the region with the widest choice of providers

Fixed broadband: One-time fee – new build, PPP

- Norwegian new build one-time fees are very reasonable in comparison to the Swedish and Finnish examples
- Only Denmark seems to generally operate with lower new build one-time fees than Norway

Fixed broadband: One-time fee – existing connection, PPP

- Some Norwegian one-time fees for existing connections are higher than in Denmark, Sweden and Finland
- Since these fees are quite modest in comparison to subscription fees over a longer period, it's not a very important cost component in the bigger picture, though

[46] Finland however has a large FWA market *without* external antenna, a solution not provided in Norway

Fixed broadband: Total 5 year fee – new build, PPP

- The Norwegian new build customer will pay a lower amount than a Swedish customer and a similar amount as a Finnish customer
- Denmark operates with the lowest total fees

Fixed broadband: Total 5 year fee – existing connection, PPP

- The Norwegian existing connection customer will generally, with few exceptions, pay a higher amount than customers in Denmark, Sweden and Finland

Fixed broadband: Actual throughput

- Norway has fixed broadband networks with high median throughput, but so have Sweden and especially Denmark
- With Norway's generally higher subscription fees, the willingness to pay for a faster throughput tier might not be as present as in Denmark

FWA: Subscription fee, PPP

- Norwegian FWA plans are more expensive than same-speed plans in Denmark, Sweden and Finland
- Finnish FWA plans are very reasonably priced which could explain their popularity

FWA: One-time fee – new build, PPP

- Norwegian new build FWA with external antenna one-time fees are comparable to the Danish and Swedish examples – and generally lower than in Finland
- The new build FWA without external antenna one-time fees are significantly lower, but so far no such options are offered in Norway

FWA: Total 5 year fee, PPP

- The Norwegian FWA customer with external antenna will always pay a higher amount than all Danish and Finnish customers for the same speed after purchasing power adjustment
- Norwegian FWA plans are limited to 2000 GB of full-speed data per month – a restriction compared to fixed broadband plans
- Providers in Sweden and Finland haven't made that restriction; also FWA plans are unlimited
- Norwegian FWA plans are, although more limited in data volume and likely in actual speed, almost always priced with a premium over same-speed fibre plans

Broadband & TV bundle: Subscription fee, PPP

- Norwegian bundled broadband & TV plans almost always come with a higher average monthly subscription fee than similar plans in Sweden, Finland and Denmark

TV: ARPU, PPP

- Telenor Norway has the second highest TV ARPU among reporting Nordic operators
- Telia Norway is at a lower level – close to the Nordic median

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