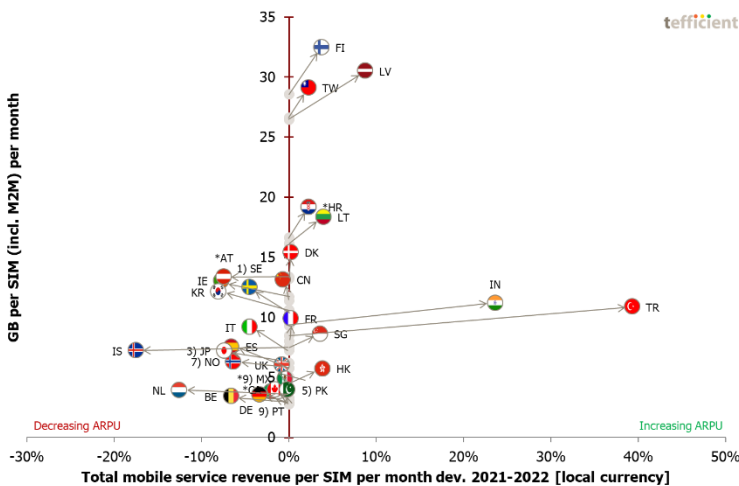


Industry analysis #1 2023

Mobile data – full year 2022

High data usage countries do better on ARPU development than low-usage countries



Tefficient’s 36th public analysis of the development and drivers of mobile data compares the trends of 46 countries globally.

In our previous analyses, we saw that the pandemic led to an increase in the mobile data usage. The demand for more mobile data has since slowed. Czechia experienced the fastest growth in mobile data usage in 2022: 56%. On the other end of the spectrum, Iceland and Austria witnessed a decrease in

usage. Malaysia, Qatar, Taiwan and Norway had some increase, but it was below 9%.

Data-only continues to define the average mobile data usage although the share of base is limited. Latvia’s average data-only subscription used 138 GB per month in 2022. In the FWA-only category, Australia had 271 GB and Sweden 250 GB.

Overall, mobile data has never been cheaper although the erosion in the revenue per gigabyte slowed compared to previous analyses. Spain had the fastest erosion, 28%, while Turkey and India had an increase.

The positive ARPU development seen in our [last-year analysis](#) did not continue in 2022. Usage grew at a slower rate, and a lower share of countries were able to improve ARPU. With high inflation now being present, we had hoped that the ARPU improvement trend from our 2021 analysis would continue. But we spot something new: The countries doing the best on ARPU development are often high-usage countries. The low ARPU performers are in the low-usage part of our Christmas tree.

Data usage is still growing in most, but not all, countries

Figure 1 shows the development of mobile data usage for 46 countries where regulators¹ report mobile data traffic. The usage is shown per SIM per month – and in Figure 1 we are including all² SIMs, also M2M/IoT SIMs.

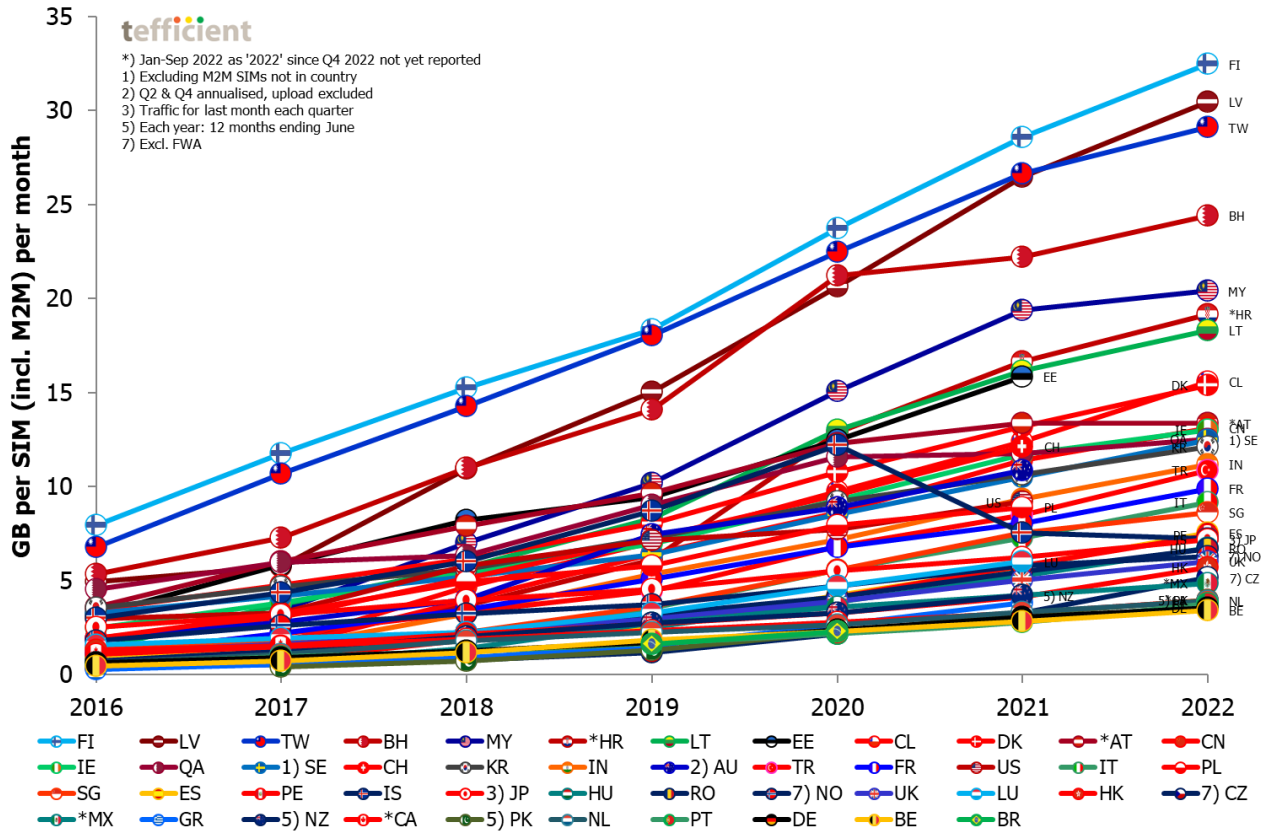


Figure 1. Development of mobile data usage per SIM (incl. M2M) per month – the legend shows the ranking³

Starting from the top of the chart, **Finland** is defending the world number one position when it comes to mobile data usage. **Taiwan** lost the number two position to **Latvia**. **Bahrain** is still fourth-ranked in data usage while **Malaysia** is fifth-ranked but seems to be threatened by Croatia for which Q4 2022 data isn't yet available.

¹ Exception: USA, where the data is from the industry body CTIA.

² All SIMs in a market included, even the SIMs that used no or little data. We think it provides a better comparison than usage per 'mobile broadband subscription' even if it lowers the average mobile data usage numbers somewhat.

³ Some countries have not yet reported 2022: USA, Poland, Australia, Estonia, Switzerland, Greece, Luxembourg, New Zealand and Brazil. For some *-marked countries, Jan-Sep 2022 figures are used as Q4 2022 isn't yet reported. Brazil has not even reported the full year of 2021 yet.

The average Finnish SIM card carried **32.5 GB** of data per month in 2022 (+3.9 GB vs. 2021). **71%** of the Finnish SIMs (M2M included) had **unlimited data volume** in December 2022. If excluding M2M: 84%. If also excluding voice-only SIMs: 88%. No other country is as unlimited as Finland.

The average Latvian SIM carried 30.5 GB per month (+4.0 GB vs. 2021). Unlimited is offered as a premium option in regular mobile in **Latvia** but, as we will show later in this analysis, the high usage is to a large extent explained by data-only subscriptions.

Going to Taiwan, the average SIM carried 29.1 GB per month (+2.5 GB vs. 2021). Unlimited is behind **Taiwan's** usage development as well. The Taiwanese operators – there are five MNOs⁴ – have cooled off the market by attempting to move the unlimited price points upwards while discontinuing unlimited for customers that have run out of binding. It initially worked so-so, but the relatively late (mid-2020) introduction of 5G provided the Taiwanese operators with the tool they needed to turn the ARPU erosion curves around when the two challenger MNOs couldn't follow pace in 5G. Unlimited is still very much a standard, but with 5G it comes with a tiered premium.

In **Bahrain** (24.4 GB), growth took off again in the first half of 2022 (+2.2 GB vs. 2021). **Malaysia's** usage just increased 1.0 GB to 20.4 GB from 2021 to 2022. Malaysia's unique national 5G wholesale network setup might have contributed negatively to Malaysia's growth in data usage.

The M2M reporting dilemma

Regulators' reporting of M2M/IoT SIMs continues to create a challenge for the comparability between countries. A growing problem is international M2M SIMs that are registered in one country but used somewhere else. **Sweden** is a good example. The country regulator, PTS, reports 23.2 million M2M SIMs – 57% larger than the regular SIM base of 14.8 million. We are therefore happy that PTS breaks out the number M2M SIMs that are active in Sweden; 6.1 million, i.e., just 23% of the total M2M base. This has allowed us to recalculate a more representative mobile data usage figure for Sweden when including M2M.

The same issue emerges in **Austria** where Deutsche Telekom group registers many of its international M2M SIMs. The number of 'Austrian' M2M SIMs as reported by RTR grew 28% in the nine months from January to September 2022 (Q4 not yet reported) – to 10.8 million. Similar to how it was for Sweden previously, Austria's average mobile data usage per SIM thus looks lower when including M2M SIMs than what it realistically is. Luckily Austria's regulator is one of those breaking out M2M SIMs in its reporting allowing a like-for-like comparison of mobile data usage per *non-M2M* SIM, see Figure 2 and Figure 4.

International SIMs are also behind the big swings in the number of reported M2M SIMs in **Iceland**. In 2021, the number of M2M SIMs grew from 112 to 1179 thousand – in a country with less than 400 thousand inhabitants. In 2022 the number fell from 1179 to 724 thousand.

Figure 2 is a variant of Figure 1 but with M2M SIMs *excluded*. As the M2M SIMs typically carry significantly less traffic than the regular SIMs, this makes the usage figures look higher.

⁴ Taiwan Mobile is however in process to acquire Taiwan Star (TStar) and FarEasTone in the process to acquire APT (Gt). The mergers have been conditionally approved by the regulator, NCC, but would require approval also from the Fair Trade Commission.

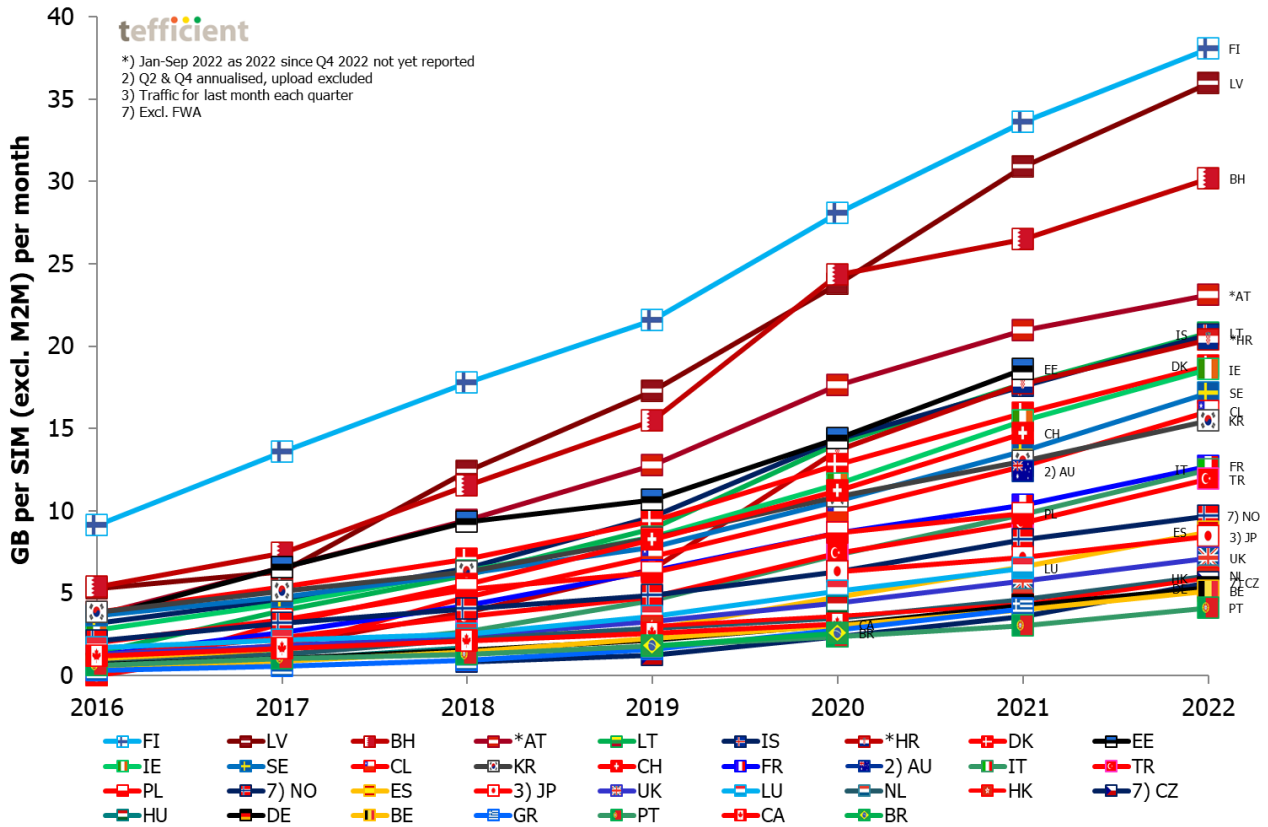


Figure 2. Development of mobile data usage per SIM (excl. M2M) per month – the legend shows the ranking⁵

Since only a fraction of the countries separate out the data traffic associated with M2M SIMs in their reporting (kudos to Norway, Sweden, Czech, Bahrain, Greece, Australia and the UK), the assumption for most of the countries in Figure 2 is that the M2M data usage is zero. This is of course not correct and as we could expect M2M/IoT SIMs to carry more traffic in future, we think that Figure 1 provides the most accurate comparison.

With **38.1 GB** per non-M2M SIM per month (+4.5 GB vs. 2021), **Finland** tops also Figure 2. **Latvia** follows with 36.0 GB (+5.1 GB vs. 2021) and **Bahrain** with 30.2 GB (+3.7 GB vs. 2021). Taiwan and Malaysia have disappeared from the top five here as the M2M SIM number isn't broken out in these countries.

The legends of Figure 1 and Figure 2 show the ranking of the 46 studied countries. But since it's difficult to spot them all, Figures 3 and 4 offer an easier visualisation. First including M2M:

⁵ Countries for which the regulator doesn't break out the M2M SIMs have been excluded.

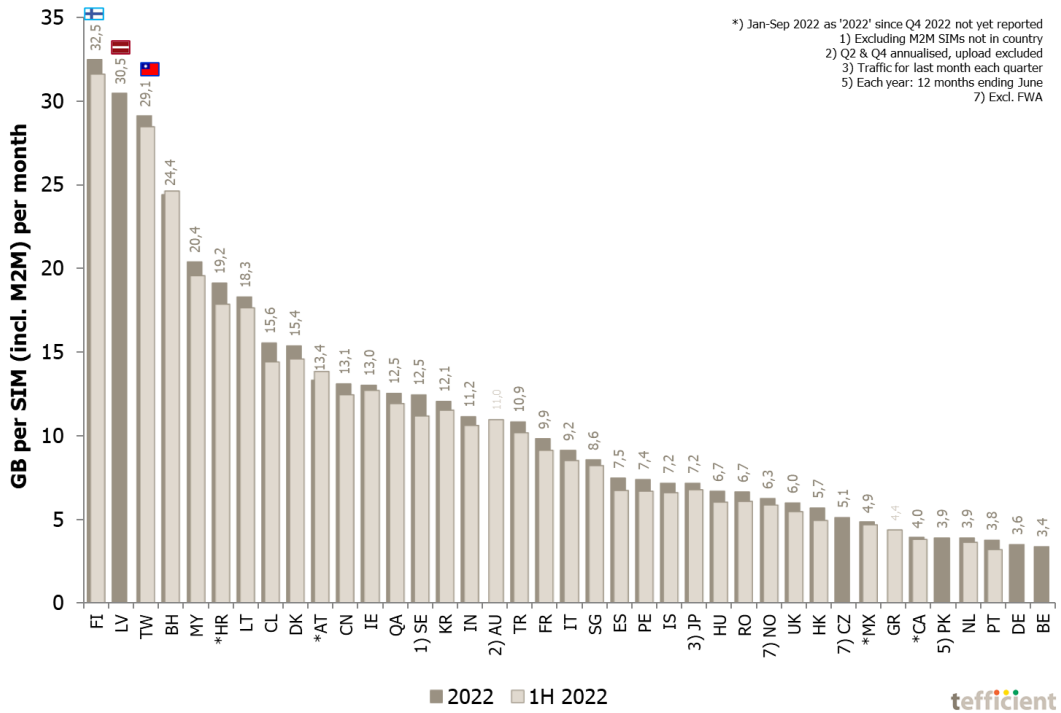


Figure 3. Mobile data usage per SIM (incl. M2M) per month, 2022 and 1H 2022

And in Figure 4 excluding M2M:

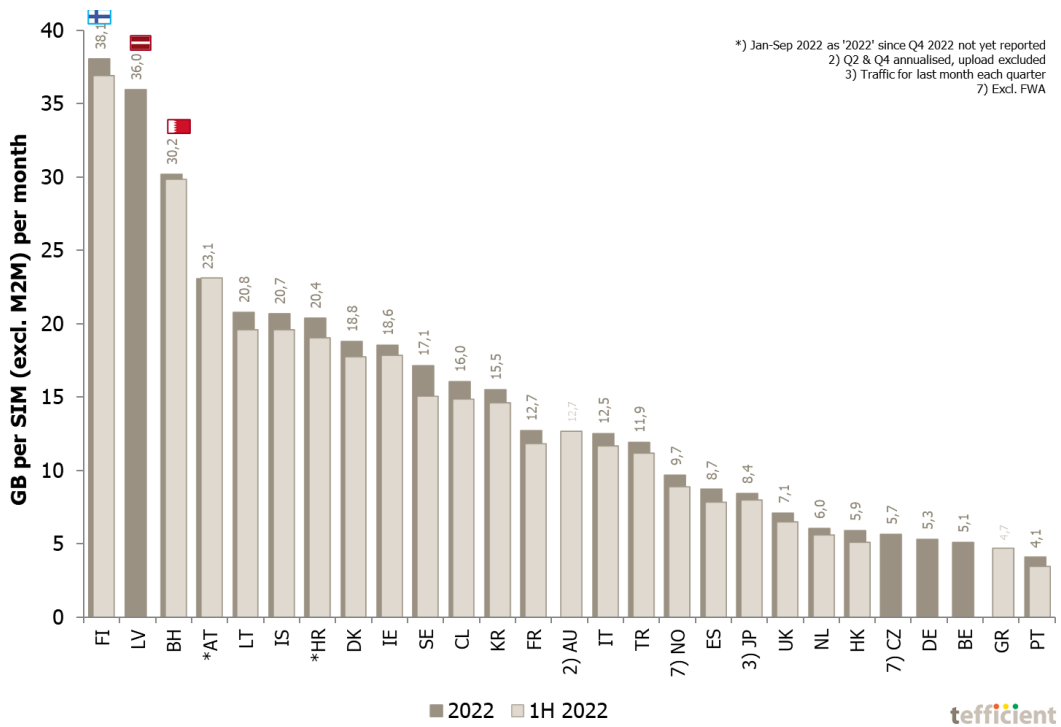


Figure 4. Mobile data usage per SIM (excl. M2M) per month, 2022 and 1H 2022

In comparison to previous reports there's not much dark grey on top of the 1H 2022 light grey bars which shows that for most markets, there was little usage growth in the second half of 2022.

The countries with the lowest data usage in Figure 3 and Figure 4 are **Portugal, Belgium, Germany, Pakistan, Czech Republic**⁶ and the **Netherlands**. **Hong Kong** and **Greece** are low ranked if excluding M2M.

Figure 5 is a zoom-in on the lower end of Figure 1.

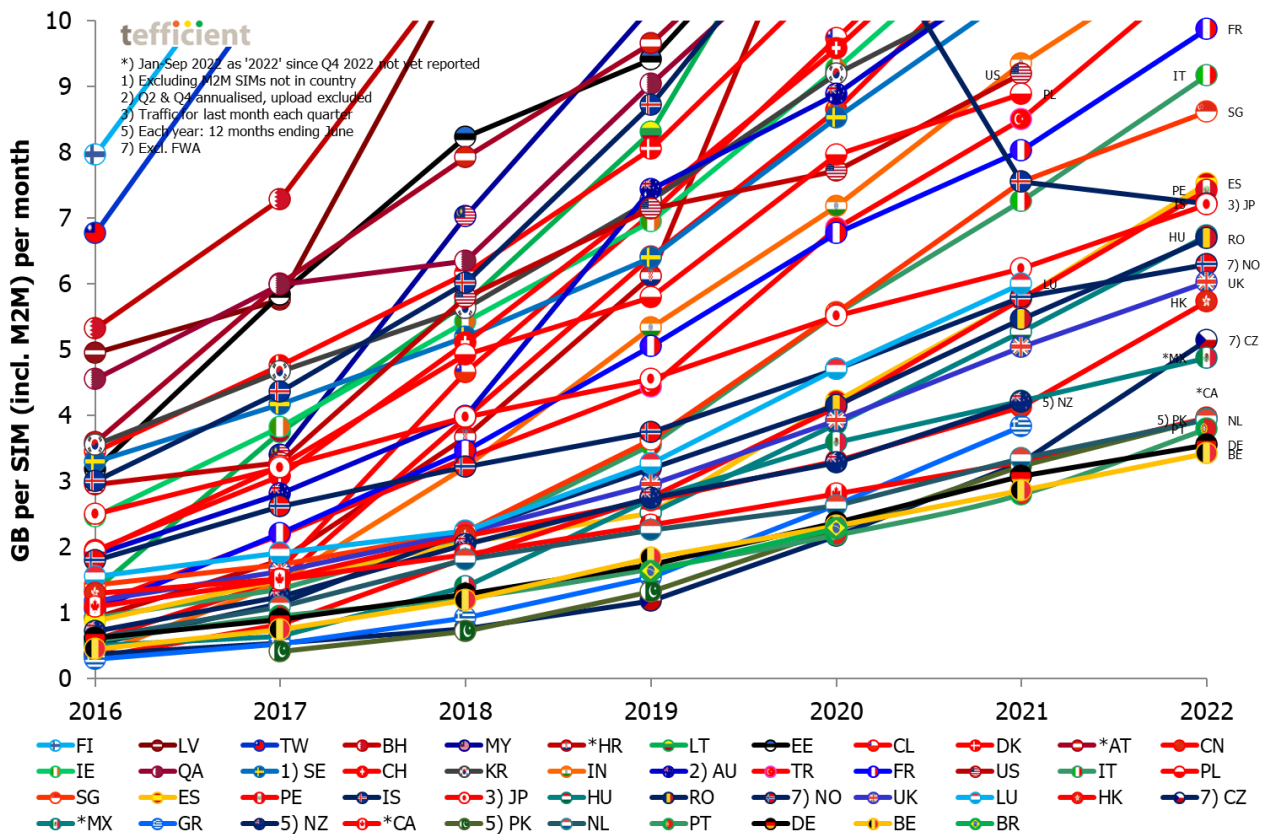


Figure 5. Development of mobile data usage per SIM (incl. M2M) per month [zoom-in on low end]

Albeit in the lower usage range, **Germany**, the **Netherlands**, **Mexico** (up to Q3 2022 as Q4 not yet reported) and **Norway** had quite modest usage growth in 2022. Faster growth then in e.g. Hong Kong, Hungary, Peru, Spain, Italy and France. Iceland continues down due to the influence of the international SIMs.

⁶ Note that FWA (fixed wireless access) traffic is excluded from the reported mobile data traffic of the regulator CTU. To make it comparable with other markets, we would have added it, if only CTU reported it.

Data usage growth fastest in Czechia

Figure 6 shows the growth in average usage per SIM (incl. M2M) between 2021 and 2022.

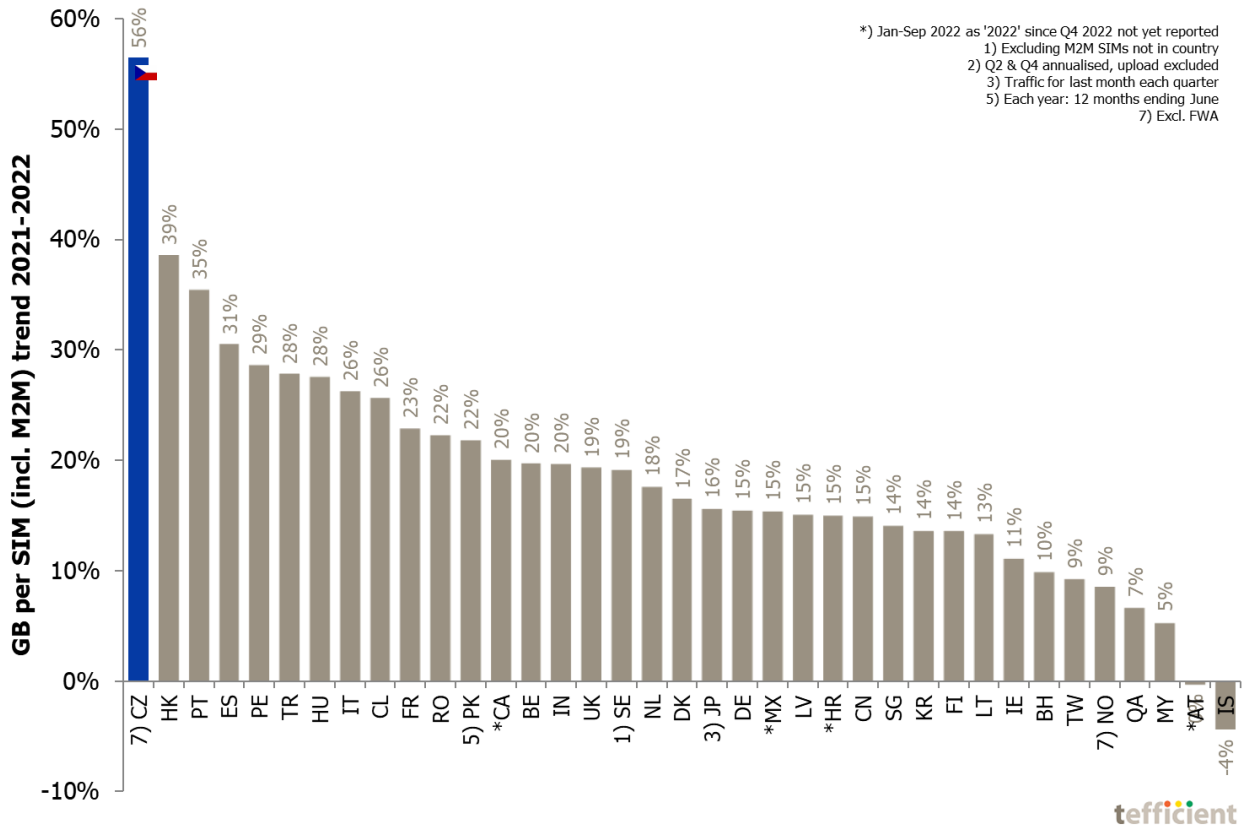


Figure 6. Development of mobile data usage per SIM 2021-2022

Czechia had the fastest growth in mobile data usage (excluding non-reported FWA traffic). With **56%**, Czechia beats all other markets quite comfortably. **Hong Kong** is the number two in growth with 39% while **Portugal** is number three with 35%.

Spain, Peru, Turkey and **Hungary** follow with 28-31%.

Iceland is again a special case due to the impact of the international SIMs. If excluding M2M SIMs, Iceland’s data usage would have grown 18% – a typical value.

But this time we have another country with no growth in the average mobile data usage: **Austria** (although Q4 2022 isn’t yet reported). International M2M SIMs play a role here, but not as significantly as in Iceland. If excluding M2M SIMs, Austria’s data usage would have grown 10% - a decline from 2021’s 19%.

Iceland, Austria, Malaysia, Qatar and Norway had the slowest usage growth.

The slowing growth rate is a bit disappointing since Austria was one of Europe’s mobile data usage pioneers with many data-only subscriptions replacing slow fixed broadband. It could be that the rollout of fibre

broadband in Austria eventually started to substitute some of these data-only subscriptions. Neither **Malaysia, Qatar** nor **Norway** (without non-reported FWA traffic) had impressive growth rates in the average mobile data usage.

Data-only rarely more than 20% of base, but defines usage

Although **fixed wireless access** (FWA) experiences a renaissance with 5G in the US with T-Mobile and Verizon collectively having recruited over 5 million FWA customers in the past two-and-a-half years (read on), using mobile networks to substitute fixed broadband isn't something new. In some markets, like Finland and Austria, this was around for long. The take-up can be significant if the FWA/data-only offers are reasonably charged and without usage caps. It also helps if the fixed broadband offering is weak with much DSL in the mix.

In the second half of 2021, the Finnish regulator, Traficom, started to report also fixed data traffic, allowing a comparison with the mobile data traffic it had reported for long, see Figure 7.

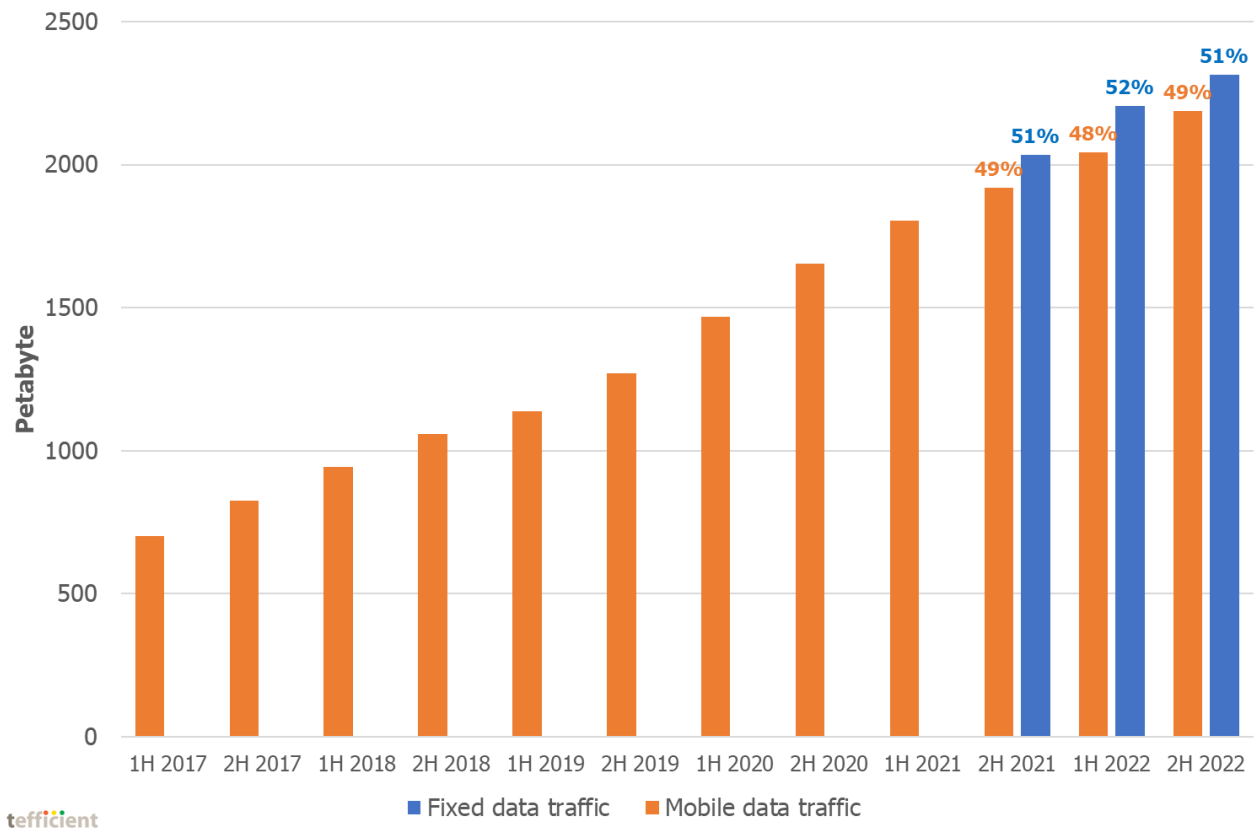


Figure 7. Development in reported mobile and fixed data traffic in Finland, 1H 2017-2H 2022

The mobile data traffic represented **49%** of the total data traffic in **Finland** in 2H 2022 whereas fixed data traffic represented 51%. It's the most even distribution between fixed and mobile networks among our 46 markets. **Austria**, in comparison, had **38%** over mobile vs. 62% over fixed in Jan-Sep 2022. Not to speak about **Germany** where it's **5%** over mobile and 95% over fixed.

This takes us to Figure 8. It plots the average data usage per SIM vs. the data-only share of a country's SIM base.

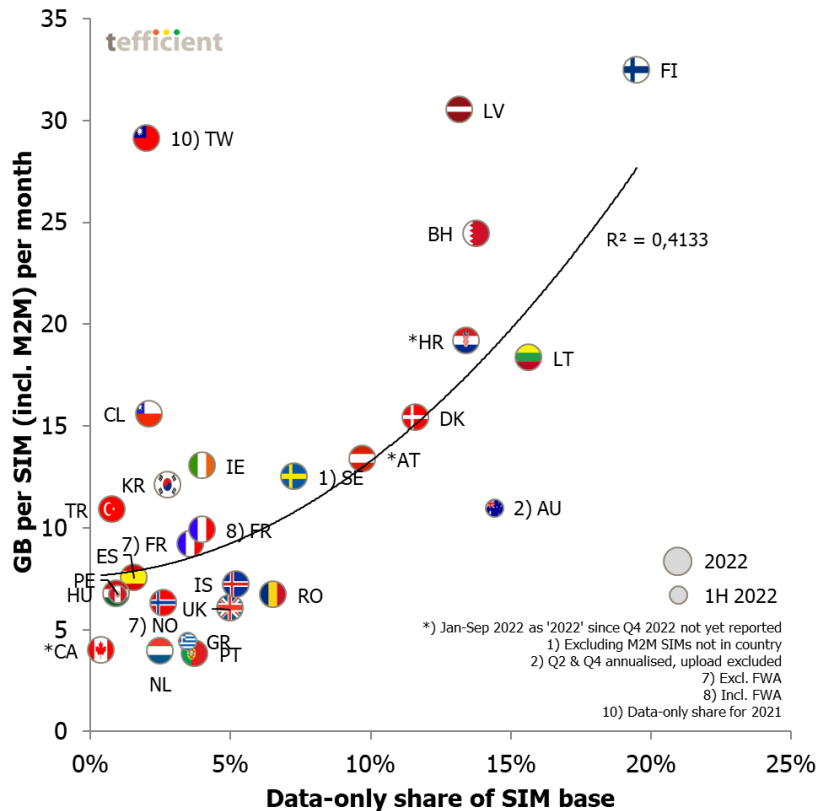


Figure 8. Mobile data usage vs. data-only share

In December 2022, **20%** of the SIM base in Finland was data-only. That makes **Finland** the leader in data-only share of base – and the average mobile data usage is also the highest. In **Lithuania**, data-only represented 16% of the base and the usage was lower than in Finland. **Australia** and **Bahrain** had a high data-only share too – 14%. **Croatia** and **Latvia**⁷ are at 13%.

Taiwan is an exception to the overall trend: Its 2022 mobile data usage is very high although the data-only share of base was just 2% in December 2021⁸. At a lower usage level, also Chile, South Korea and Turkey have low data-only share of base.

Despite these exceptions, the adherence to the regression line is relatively strong. As in all previous reports we therefore conclude that **data-only penetration is a significant driver of the average mobile data usage**.

The easiest way for low-usage countries to grow data usage and expand the mobile market would be to **start addressing and monetising the data-only segment**. This seems to be effective particularly in markets where fast fixed broadband networks (FTTH, FTTB or HFC) aren't already available to a substantial share of the households.

⁷ The Latvian regulator reduced its reported data-only base significantly in 2022.

⁸ A figure for 2022 has not yet been reported.

The US wireless market leader **Verizon** launched its first **5G** branded service in December 2018 to support a fixed wireless access (FWA) use case. **T-Mobile** has since followed. And it seems to work well sales-wise as FWA since the beginning of 2022 totally dominates the overall broadband subscriber growth, see Figure 9.

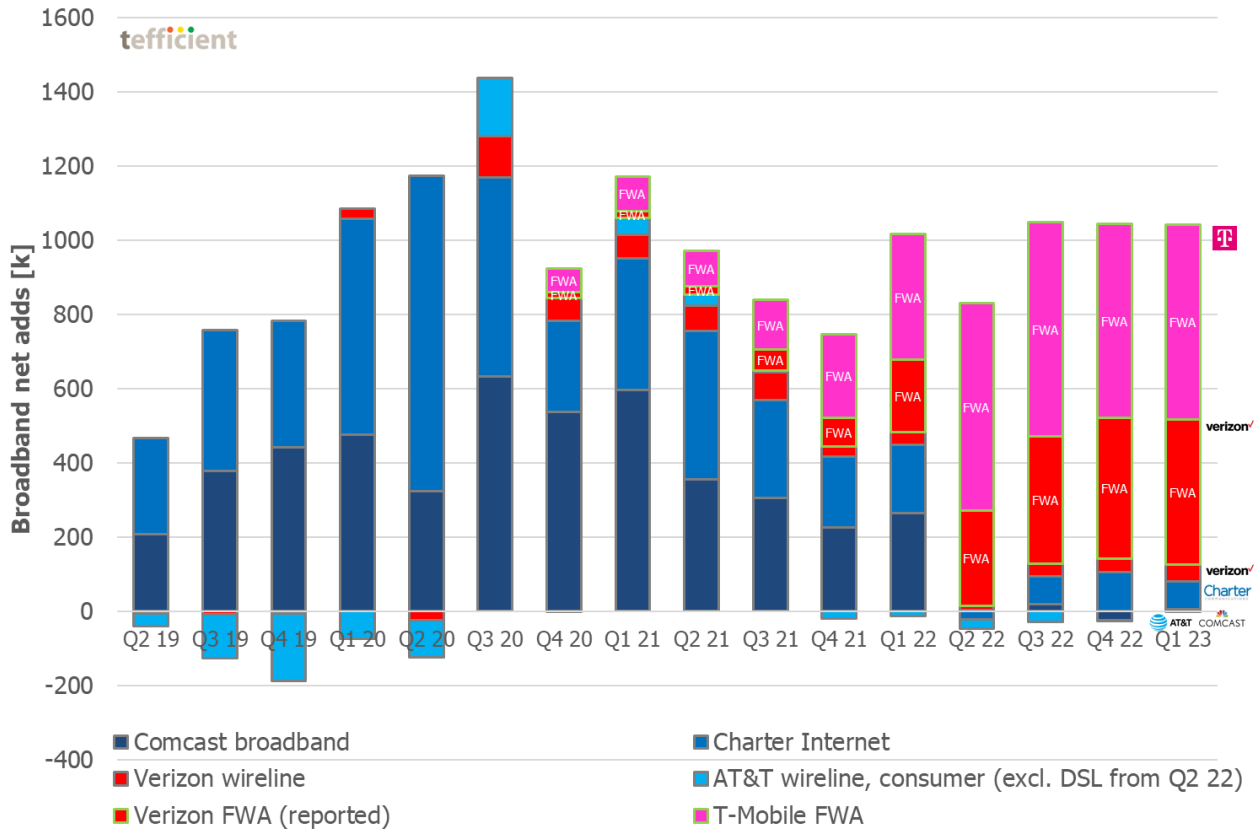


Figure 9. Broadband – fixed (grey outline) and FWA (green outline) – net adds per quarter per provider, USA

In March 2023, T-Mobile had accumulated close to **3.2 million FWA subscribers** (4G and 5G) across the US. Since Verizon offers fibre broadband in parts of the country, it doesn't sell FWA everywhere. Verizon still had close to 1.9 million FWA subscribers (again across 4G and 5G) in March 2023, representing **20%** of Verizon's total broadband (fixed+FWA) base.

Figure 8 shows that even a relatively low share of such data-only subscriptions could lift the average data consumption significantly.

Some of the countries in Figure 8 are also reporting the data-only traffic. For these countries, we can compare the data-only penetration of the SIM base to its share of the total mobile data traffic, see Figure 10.

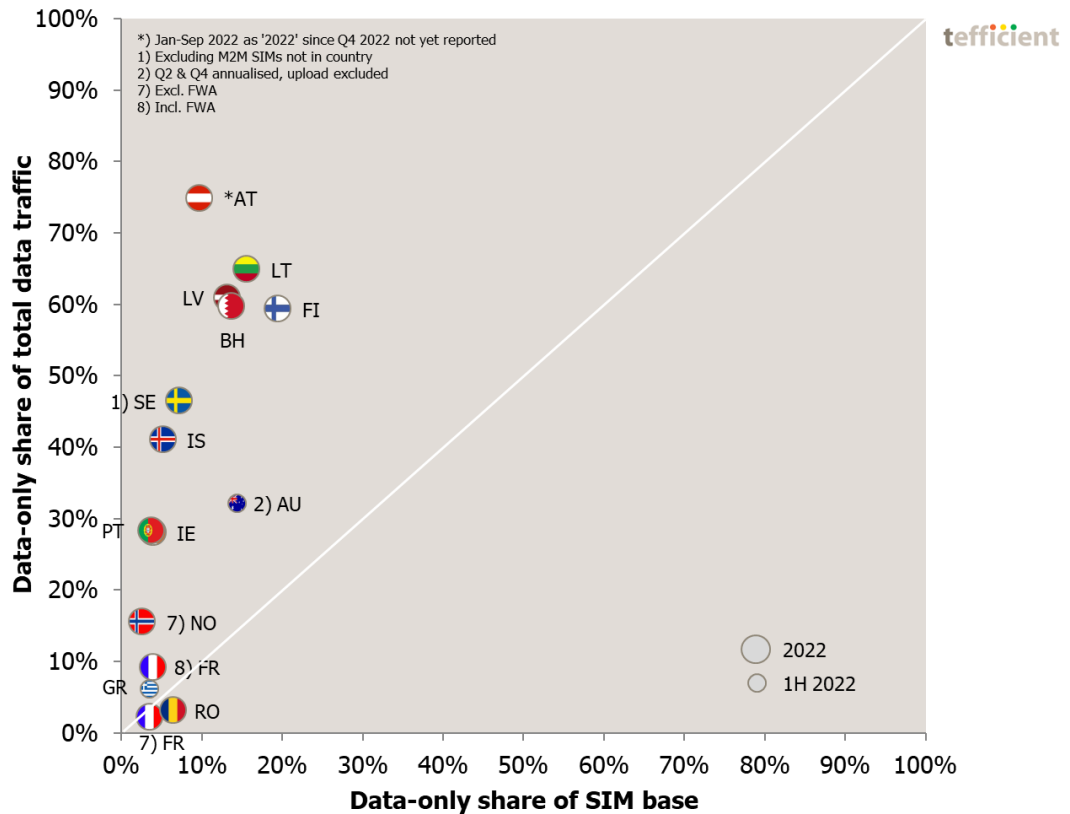


Figure 10. Data-only share of total traffic vs. data-only share of SIM base

Except for Romania, data-only SIMs carry a disproportionately high share of the data traffic:

- Iceland **7.9x** higher traffic per data-only SIM vs. any SIM
- Austria **7.7x**
- Portugal **7.6x**
- Ireland **7.0x**
- Sweden **6.4x**
- Norway (excl. FWA) **5.9x**
- Latvia **4.6x**
- Bahrain **4.3x**
- Lithuania **4.1x**
- Finland **3.0x**
- France (incl. FWA) **2.3x**
- Australia **2.2x**
- Greece **1.8x**
- Romania **0.5x**

For the countries that are reporting both data-only traffic and the number of data-only subscriptions, we can compare the average usage per *data-only* subscription, see Figure 11.

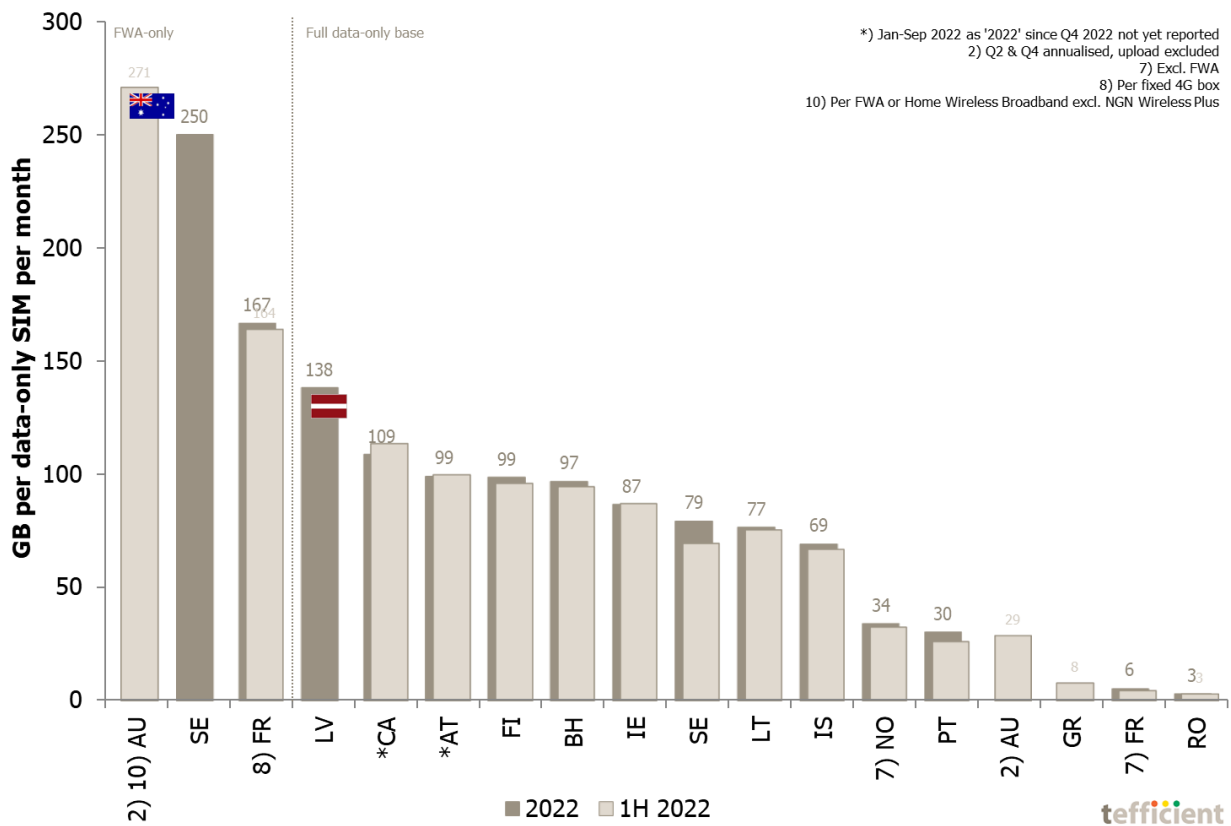


Figure 11. Mobile data usage per data-only SIM per month, 2022 and 1H 2022

Starting from the left, the average FWA and Home Wireless Broadband subscription in **Australia** carried **271 GB** of mobile data per month in the first half of 2022⁹. New on the FWA-only part of the chart is second-ranked **Sweden** with 250 GB per month for the whole of 2022. At the end of the short FWA-only top list, we have **France** where the average '4G box' carried **167 GB** of mobile data per month in 2022.

If instead looking at the whole data-only base (not just the FWA segment), **Latvia** leads with the average mobile data consumption per data-only SIM of **138 GB**. **Canada** follows with 109 GB for the first nine months of 2022. **Austria** and **Finland** both had 99 GB. **Bahrain** follows with 97 and **Ireland** with 87 GB.

In comparison to previous reports, there's not much dark grey on top of the 1H 2022 light grey bars which shows that for most markets, there was little usage growth in the second half of 2022. In some cases, like Canada, Austria and Ireland, the average data-only usage was even decreasing.

The average Latvian data-only subscription consumed 138 GB per month in 2022

⁹ A figure for 2022 has not yet been reported.

If **5G** should become the fibre-over-radio solution that T-Mobile and Verizon suggest, the data-only FWA usage figures of Australia and Sweden give a taste of the usage that the solution must at least manage. Fixed broadband usage is yet higher – often reaching 400 GB per month.

5G adoption a driver of data usage – or?

5G has been in commercial operation for four years by now and it would be high time to **correlate mobile data usage with 5G adoption**. Too few regulators (and operators for that sake) are however reporting 5G traffic – and 5G base – to make a sensible correlation graph for 5G. We strongly encourage regulators to see to that 5G numbers are reported.

Figure 12 below gathers all 5G information reported for our 46 markets in 2022 (or 1H 2022).

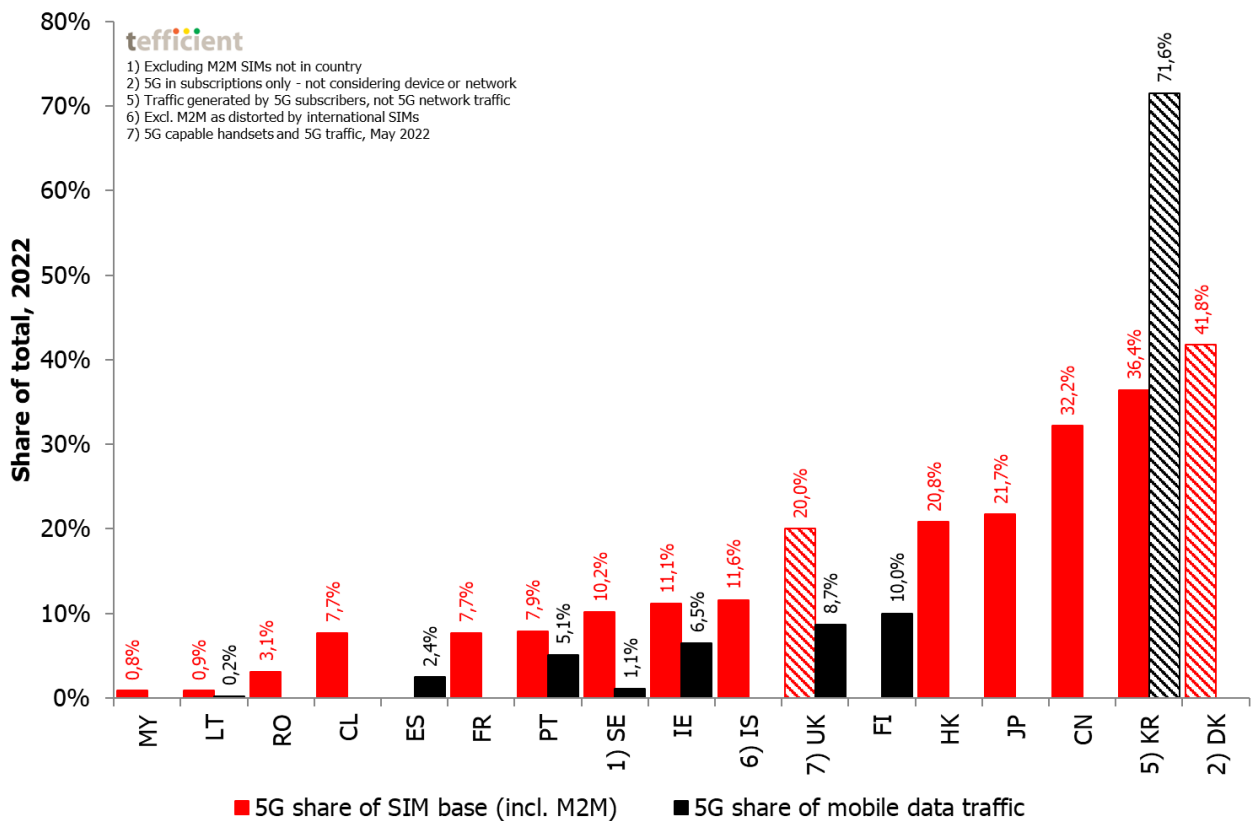


Figure 12. 5G share of base and 5G share of total mobile data traffic – reporting countries

From left in Figure 12: 0.8% of **Malaysia’s** mobile subscriber base was 5G in December 2022, which means that Malaysia had the lowest share of 5G base among reporting countries. **Lithuania** is slightly ahead: 0.9% of the mobile base was 5G in December 2022 and 5G’s share of total mobile data traffic in 2022 was 0.2%. In **Romania**, 3.1% of the subscriber base was 5G in December 2022. In **Chile**, it was 7.7%.

In 2022, a mere 2.4% of the total mobile data traffic in **Spain** was carried by 5G. **France** had 7.7% of its mobile subscriber base on 5G in December 2022. **Portugal** was one of the last countries in western Europe to launch 5G, but in December 2022, 7.9% of the mobile subscriber base was on 5G and 5.1% of the mobile data traffic was over 5G in 2022, i.e. double compared to its neighbour Spain.

Sweden had a yet higher share of the total mobile subscriber base on 5G in December 2022: 10.2%. But the delayed rollout of 5G – triggered by a last-minute authority decision to couple the frequency licenses with a requirement not to use equipment from Huawei or ZTE – has taken its toll on traffic: In 2022, only 1.1% of Sweden's mobile data traffic was carried by 5G networks. Of reporting countries only Lithuania is lower.

Ireland had much more of its mobile data traffic over 5G in 2022: 6.5%. The Irish 5G subscriber penetration was 11.1% in December 2022. 5G represented 11.6% of **Iceland**'s mobile subscriber base¹⁰ in December 2022. The figures of the **UK** are from May 2022. Whereas the 5G share of subscriber base can't be directly compared to the other countries since it shows the share of handsets being 5G capable, 5G's share of traffic was fairly high in May 2022: 8.7%.

With 10% of the traffic in 1H 2022, **Finland** might be the European leader in 5G share of traffic. We have however not seen an update on this figure from the Finnish regulator, Traficom, in 2H 2022 and can't therefore give a full year 2022 figure.

The following four markets in Figure 12 are all in Asia: 20.8% of **Hong Kong**'s mobile subscriptions were 5G in December 2022. 21.7% of **Japan**'s mobile subscriptions were 5G in December 2022. In **China** yet higher: 32.3%. But highest is of course **South Korea** where 36.4% of mobile subscriptions were 5G in December 2022. In 2022, 5G subscriptions generated **71.6%** of South Korea's total mobile data traffic. Not all that traffic is necessarily on the 5G networks, though: Unlike other countries, all traffic generated by 5G subscribers (even when on 4G networks) is included.

South Korea: 72%
of the mobile data
traffic was
generated by 5G
subscribers in 2022

The last country in Figure 12 is **Denmark** where the regulator SDFI reported that a whopping 41.8% of mobile subscriptions were 5G in December 2022. If it would have been a comparable figure, Denmark would be world-leading in 5G adoption. But the Danish regulator reports the share of subscriptions that are 5G enabled – not considering if these subscribers have 5G devices or are in 5G coverage. In reality, we believe that Denmark is close to its Nordic friends Sweden, Iceland and Finland.

So South Korea should still be considered as the global 5G leader. The Korean government reports monthly stats which allows us to plot the monthly development for the subscriber and traffic adoption, comparing 5G with 4G, as in Figure 13.

¹⁰ Here excluding M2M due to the large number of international M2M SIMs that can't be separated from the true Icelandic M2M base.

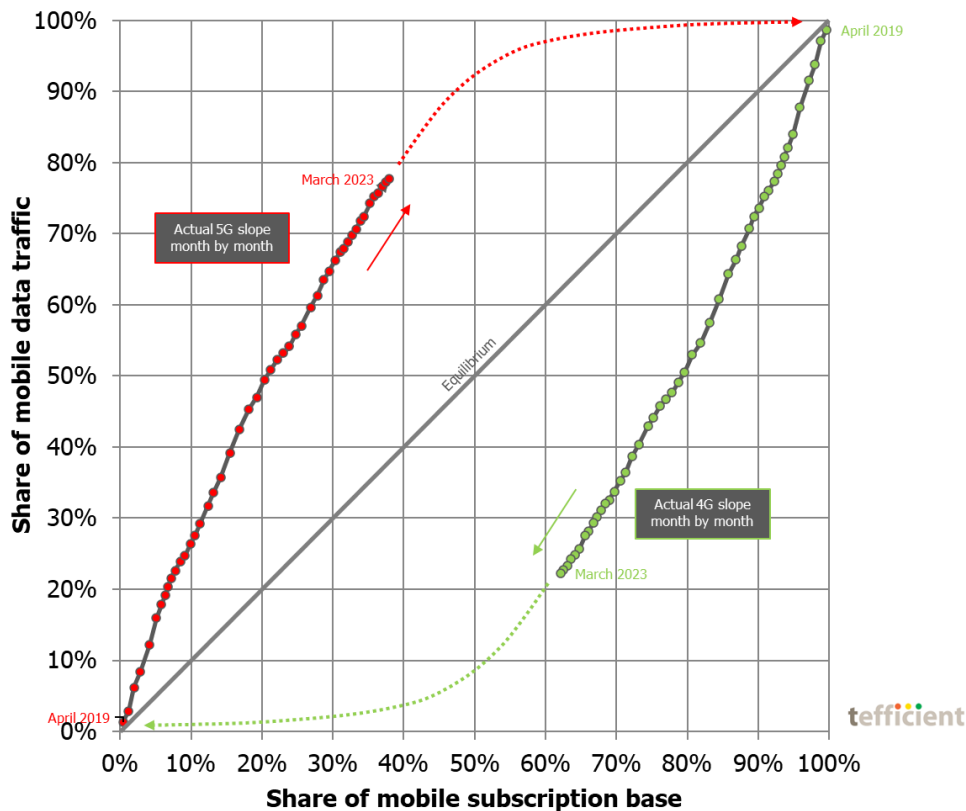


Figure 13. 5G share of total traffic vs. 5G share of SIM base and 4G share of total traffic vs. 4G share of SIM base – Korea per month since 5G launch

In March 2023, **78%** of the mobile data traffic in South Korea was generated by 5G subscribers. 5G represented 38% of the total SIM base, indicating that the average mobile data usage per 5G subscriber is far higher than for non-5G subscribers in South Korea.

The usage figures for March 2023 are:

- 5G: **28.8 GB** per month
- 4G: **7.9 GB** per month

Although 4G still represents 62% of the mobile subscriber base in South Korea, these 4G subscriptions only generate 22% of the mobile data traffic – as shown by the latest green dot in Figure 13.

It's important to point out that it's not 5G as such that alone explains the higher mobile data usage in 5G: Korea's operators are offering **unlimited** data plans more widely in 5G compared to what they did in 4G. But even if comparing apples to apples – unlimited to unlimited – 5G still seems to drive usage: In March 2023, the average unlimited 5G subscription generated **51.1 GB** whereas the average unlimited 4G subscription generated much less – **27.5 GB**.

A gigabyte has never been cheaper

Most mobile operators in mature markets aren't attempting to monetise voice and SMS based on usage any longer; they have instead made these allowances unlimited and included them in a flat fee. This means that the last price-defining parameter for most mobile users is **data volume**. Even though more and more operators introduce unlimited propositions, these are often the last step in a tiered data plan¹¹ – which means that price still, essentially, is about data volume.

Figure 14 plots the *total* mobile service revenue per consumed gigabyte¹² against the average mobile data usage per SIM and month.

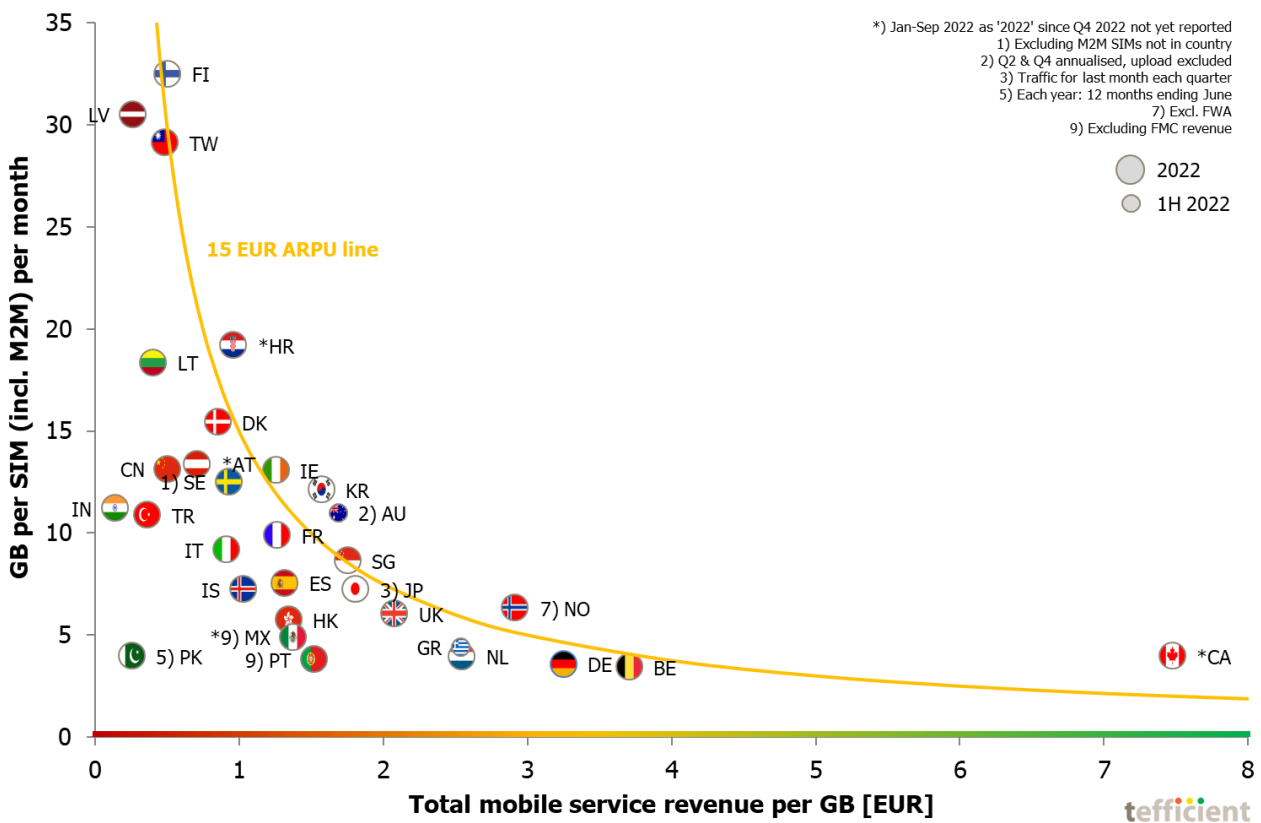


Figure 14. Mobile data usage vs. total mobile service revenue per consumed GB

The amber line shows where **15 EUR of ARPU** is earned. Countries below it had an ARPU lower than 15 EUR, countries above an ARPU higher than 15 EUR.

¹¹ There are exceptions to this – where the price-defining parameter instead is data throughput – e.g. Finnish operators, Swisscom, O2 Germany, Norwegian operators and Vodafone in Spain, the UK and most other European Vodafone markets (except Germany). There are also operators mixing several parameters such as volume, throughput, policy, zero-rating, video resolution, service bundling etc.

¹² Attributing zero value to voice and messaging

There's one country, **Canada**, where operators enjoy very high total revenue per consumed gigabyte¹³. In previous reports, we have seen that operators in New Zealand, Luxembourg and Czechia have had good revenue per GB too, but neither of these countries have reported 2022 revenue statistics yet.

Without these countries in the chart, **Belgium** is the runner-up when it comes to revenue per GB. **Germany** takes the bronze medal and **Norway** is number four¹⁴.

It's important to point out that our analysis looks at what the mobile operator industry de facto makes on end-users, not what the best offer on the market currently is. Most users are on old price plans because they are still locked in by a contract – or because they have not bothered to find the best deal.

In the other end of the scale, we find the markets where operators get the lowest revenue per consumed gigabyte: **India, Pakistan, Latvia, Turkey, Lithuania, Taiwan, Finland** and **China**.

Looking at Figure 14 we can conclude – as in all our previous analyses on this topic – the key explanation to high mobile data usage is low effective revenue per gigabyte: **Bigger data buckets lead to lower revenue per GB – which, on the other hand, increases usage**. At least when customers can use those big buckets also within the data-only segment, see Figure 8.

Indian operators have the lowest total revenue per GB – Canadian operators the highest

But we also said that a gigabyte has never been cheaper. More correctly put is that operators never had lower total service revenue per gigabyte than what they currently have – which is true for all countries but **India** and **Turkey**. Figure 15 shows the revenue development from 2021 to 2022.

¹³ Based on statistics for the January-September 2022 period since Q4 2022 isn't reported yet.

¹⁴ FWA not included in the revenue nor the data traffic due to the reporting of the regulator, Nkom.

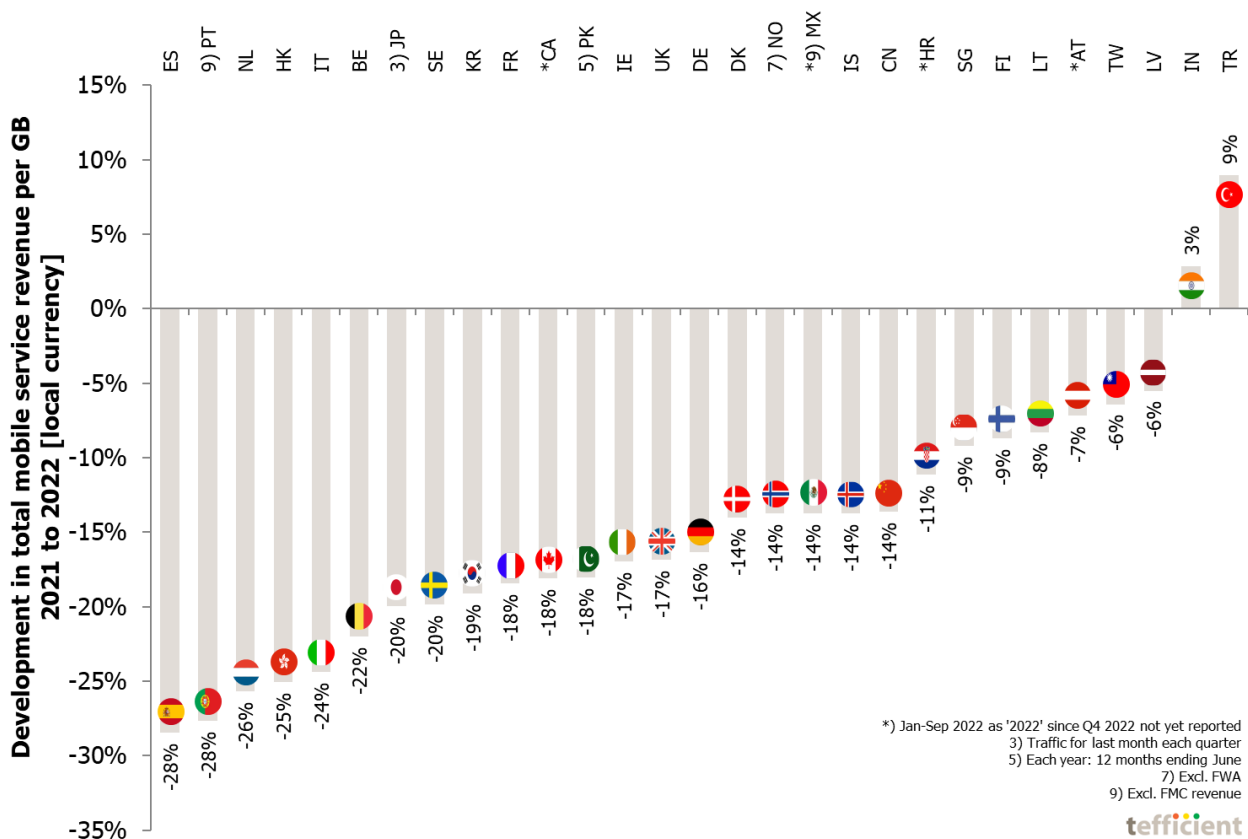


Figure 15. Development in total mobile service revenue per consumed GB – 2021 to 2022

The prerequisite to appear in Figure 15 is of course that the statistics have been reported both for 2021 and 2022. Of these markets, **Spain** had the fastest revenue erosion, 28%. **Portugal** had 28%, the **Netherlands** 26% and **Hong Kong** 25%.

In **Turkey**, the revenue per GB **increased with 9%** - in local currency – between 2021 and 2022. But where inflation generally increased in the world in 2022, Turkey had *hyperinflation*: It was 64% in December 2022, making Turkey an international outlier.

But **India** too had an increase in the revenue per GB. It was slower than Turkey's, +3% between 2021 and 2022, but as India didn't have any unusual inflation rate, the effect on the Indian operators was likely much more positive than in Turkey.

Markets with a slow erosion in the revenue per GB are **Latvia, Taiwan, Austria, Lithuania, Finland** and **Singapore**.

No correlation between data usage and ARPU

Figure 16 is a variant of the revenue per GB chart – it plots the usage against the average revenue per SIM, i.e. the ARPU.

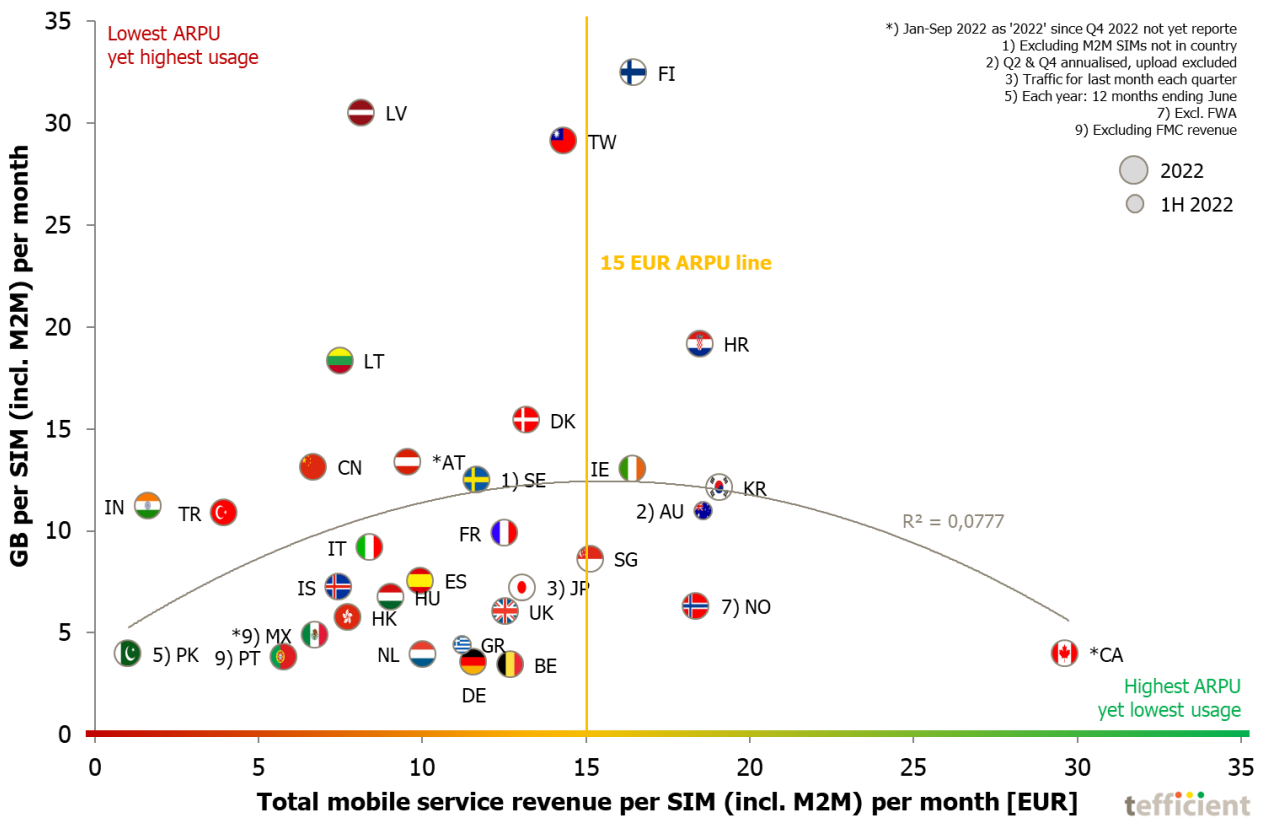


Figure 16. Mobile data usage vs. total mobile service revenue per SIM

Canada (Jan-Sep 2022) has the highest ARPU among our markets. The mobile data usage is increasing averagely fast in Canada but is still low given the high ARPU. Awaiting 2022 data from USA, Luxembourg, New Zealand and Switzerland, Canada becomes isolated in Figure 16.

Operators in the upper left corner – **Finland, Taiwan, Latvia, Lithuania, China, Turkey and India** – are the most generous with mobile data considering their ARPU. These countries form a nice imaginative trend line suggesting that operators could expect to get rewarded with higher ARPU as usage grows.

But that’s regretfully not to overall trend: The adherence to the grey regression line is weak but it’s not pointing in the north-easterly direction one would like to see – with more usage leading to higher ARPU. But maybe we see a trend shift – read on.

Dressing the Christmas tree based on ARPU development

Now to our Christmas tree graph which we continue to be immensely proud of. It's the graph were we like to see the branches stretch to the right – since that means that the ARPU grew in the past year. That would demonstrate that the operators of a country have been able to monetise the growth in data usage.

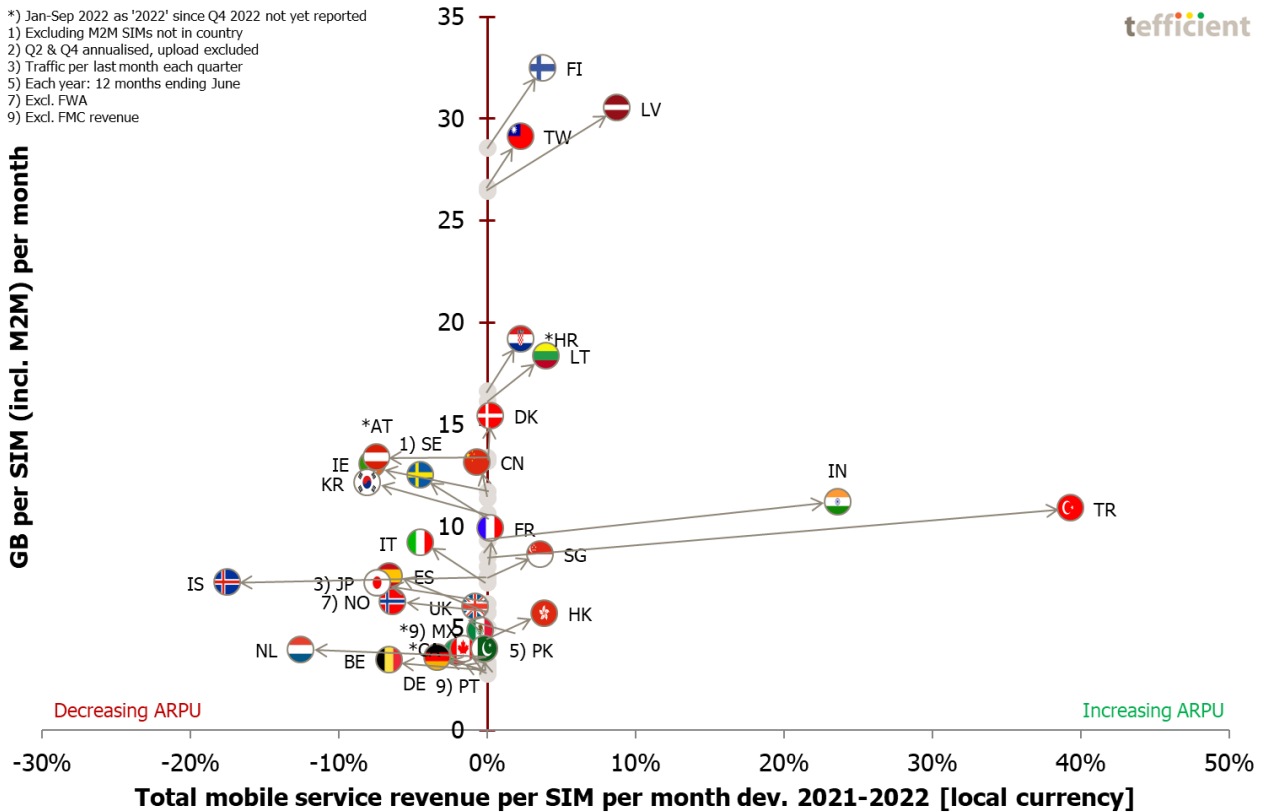


Figure 17. Development in mobile data usage vs. the development in ARPU – 2021 to 2022

The branches stretch right in **11 of 29 markets**¹⁵ (38%). These are – from the top – **Finland, Latvia, Taiwan, Croatia, Lithuania, Denmark, India, Turkey, France, Singapore and Hong Kong**. In 17 markets (61%), the branches stretch left meaning that even though data usage generally grew, ARPU fell. This time, the ARPU erosion in the **Iceland** is the fastest; 17%. The **Netherlands** follows with 13%.

We are still missing 2022 reporting from a few countries, but the 2022 Christmas tree so far represents a deterioration compared to our [2021 report](#). A larger share of countries is again to the left.

But we believe we can spot a new trend in the new Christmas tree graph: **The countries doing the best on ARPU development are often high-usage countries**. The low ARPU performers are all in the bottom half of the Christmas tree.

¹⁵ The 29 markets for which regulators have reported the necessary underlying stats to date.

With that in mind, the solution to “fix” ARPU seems simple: Let customers use more mobile data – but do not forget to charge something for it. And, please, do not forget to address FWA and data-only segments.

Conclusion

With few exceptions, the mobile data usage is still growing although the growth rate has now stabilised at lower rates following the increase in demand during the pandemic.

As usual, **Finland** tops the charts – with 32.5 GB per average SIM per month in 2022. If excluding M2M, the usage was 38.1 GB per month. But despite **84%** of non-M2M SIMs being **unlimited** and three 5G networks covering 80% of the population in December 2022, the data usage growth rate wasn't particularly high in Finland – 14%. Usage in **Czechia** grew 56%. But in absolute terms, the data usage grew 3.9 GB in Finland and just 1.9 GB in Czechia.

Our analysis shows strong correlation between the **data-only share** of a country's SIM base and the average data usage. **Finland** and **Lithuania** are the data-only powerhouses of the world. Official Finnish statistics show that mobile networks carried 49% of the total data traffic in the second half of 2022 – fixed networks just slightly more, 51%.

5G – or the monetisation model changes associated with 5G – seems to drive data usage in countries where operators have rolled out much 5G on dedicated frequency bands. Such as South Korea. Here traffic generated by 5G subscribers surpassed the traffic generated by 4G subscribers in March 2021 and has represented a majority of the mobile data traffic since April 2021. The data consumption per 5G subscription was 28.8 GB per month in March 2023 – about **3.6 times** that of the average 4G subscription.

Regardless of technology, data usage could be elevated by an increased data-only penetration through fixed-line substitution. But a prerequisite for this – and for high data usage in general – is that the **total revenue per gigabyte** is low.

This is the case in **India, Pakistan, Latvia, Turkey, Lithuania, Taiwan, Finland and China**. In the absence of reported 2022 data from a few other countries, **Canada** represents the other end.

Low usage doesn't necessarily mean low ARPU, though. Market ARPU is uncorrelated with usage. **Canada** has much higher ARPU than other countries without having high usage.

What is disappointing is that only **11 of 29 markets could grow ARPU** on the back of the data usage growth. That's no longer a majority of the markets and it thus represents a softening compared to the end of 2021 (which, in turn, was an improvement compared to the start of the COVID period).

But we spot a new trend: **The countries doing the best on ARPU development are often high-usage countries**. The low ARPU performers are all in the low-usage part of our Christmas tree.

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