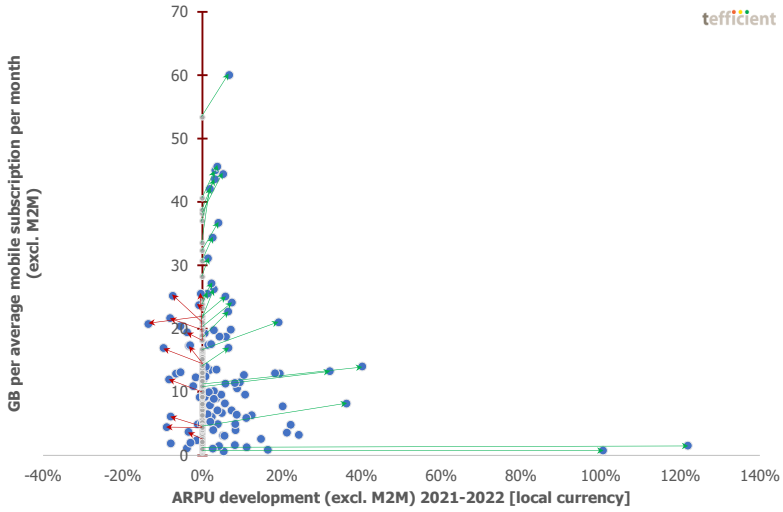
tefficient

Industry analysis #3 2023

Mobile data – full year 2022 and first half of 2023

Mobile operators demonstrate strengthened ability to improve ARPU on the back of data usage growth



Tefficient, in its 38th public analysis of mobile data trends, has ranked 116 operators based on metrics like average data usage per subscription, total data traffic and revenue per gigabyte. This issue covers the full year of 2022 and the first half of 2023.

Notably, 97% of operators witnessed an upswing in data usage per subscription in 2022, with 75% of them successfully translating this into increased ARPU.

The positive trajectory continued into the first half of 2023, as 96% of operators observed a rise in data usage per subscription. Among them, 75% managed to convert this heightened usage into ARPU growth.

Tefficient's well-known Christmas tree graphs vividly illustrate the operators that experienced ARPU improvements. This shift is significant, signalling a more rational approach by operators, as they leverage their pricing power in various markets.

This transition towards better monetisation of mobile data gains prominence against the backdrop of escalating inflation since spring 2022. This strategic pivot towards an ethos of 'more for more' is a timely and advantageous move for operators.

Methodology notes on M2M/IoT

The global proliferation of M2M (Machine-to-Machine) or IoT (Internet of Things) SIMs has resulted in rapid growth, with some mobile operators boasting an equivalent number of M2M SIMs as human SIMs. In our previous analyses, we incorporated data usage statistics inclusive of M2M. However, in this analysis, we have refined the data usage metrics to exclude M2M subscriptions. This adjustment enhances international comparability.

Certain mobile operators, particularly in Europe, now transparently disclose their count of M2M subscriptions in their reports. In contrast, operators like Vodafone and Telenor groups do not provide this breakout but specify that M2M subscriptions are not encompassed within their reported subscription totals. We find no methodological issue with either approach.

However, a noteworthy segment of operators does not clarify whether M2M subscriptions are included or excluded from their reported subscriber counts. This ambiguity is more prevalent in Asia, China, the Middle East and Africa. While some of these operators might possess minimal to no M2M subscriptions, we have assumed, for the purposes of this analysis, that they exclude M2M subscriptions from their reported subscriber counts.

A limited number of operators, such as Telekom Germany, MTN South Africa, and T-Mobile USA, solely report their mobile subscriber totals inclusive of M2M subscriptions (without distinct M2M breakdown). While they could theoretically be excluded from our analysis of data usage per non-M2M subscription, we have chosen to include them. However, to reflect their M2M-inclusive status, we have appended an "incl. M2M" label to their names.

More than half of the operators now above 10 GB per subscription per month

Figure 1 shows the average mobile data usage for 116 reporting or reported[1] mobile operators globally with values for the full year of 2022 or the first half of 2023.

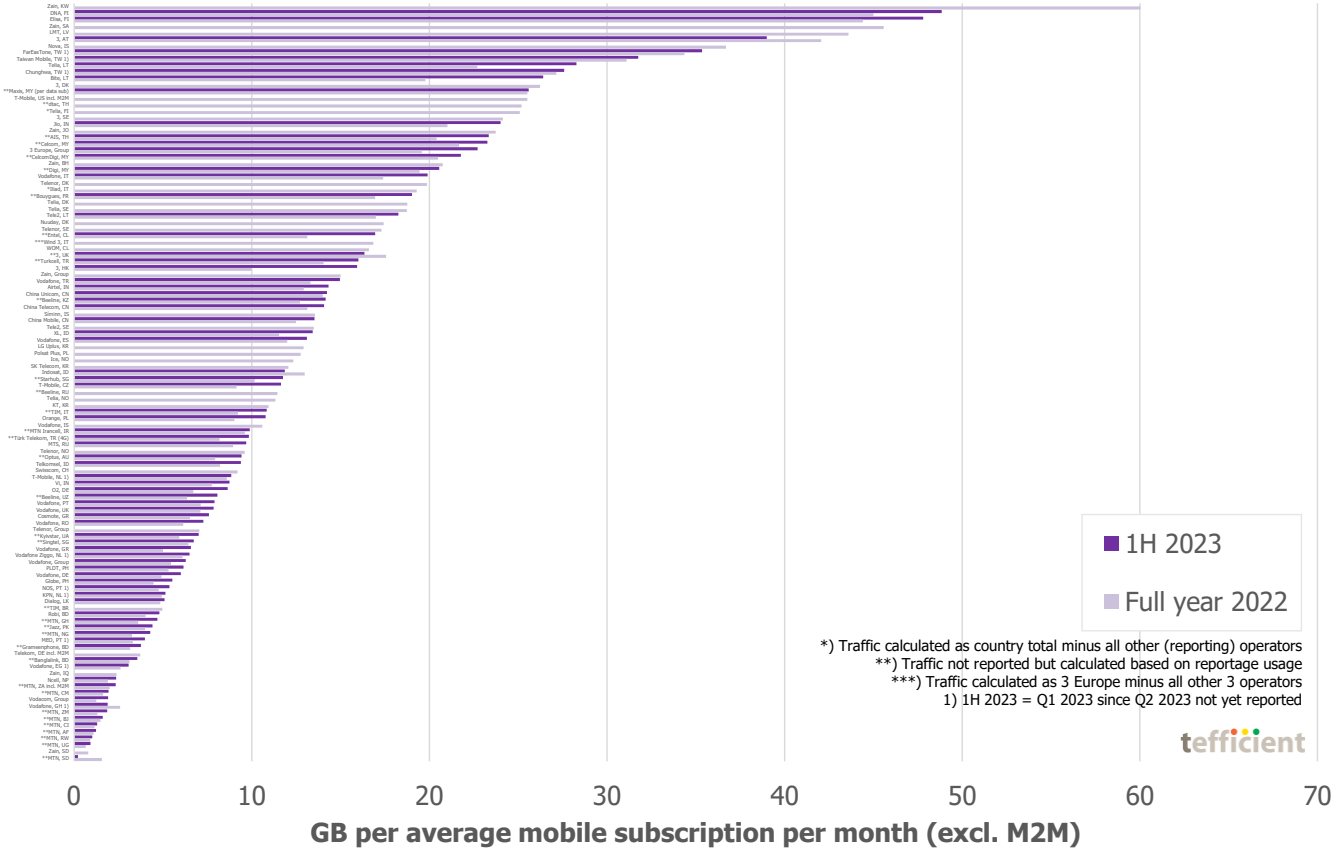


Figure 1. Average mobile data usage per subscription per month (excl. M2M) – all operators

As it's not easy to read Figure 1 we will break it down into three regions of the world, but let's first identify the **global data usage podium** – see Figure 2.

Zain Kuwait defends the gold medal from our previous analysis. Zain doesn't report mobile data traffic more than once a year, so the latest value is for 2022. Zain Kuwait's impressive **60.0 GB** per average SIM per month for 2022 comfortably grants it the number one position of the world. Zain launched **5G** in June 2019 and claimed 100% population coverage by end of 2021. The high usage comes from Zain selling smartphone plans with massive buckets – with **unlimited** as the ultimate tier. But Zain is also offering **5G fixed routers** with unlimited data volume whose popularity might explain some of the 13% usage growth (+6.7 GB per month) Zain Kuwait had in 2022.

[1] By regulators – if reported by 31 August 2023.

With **48.8 GB** per month for the first half of 2023, **DNA** from Finland grabs the silver medal once again. **Unlimited, speed-tiered, plans** – both for smartphones and data-only – form a key component of the Finnish market logic. DNA doesn't report how large share of its customer base that has unlimited plans, but for Finland as a whole, that share was **84%** of non-M2M subscriptions in December 2022. The Finnish operators all launched **5G** in 2019 and DNA claimed 'almost 90%' 5G population coverage in June 2023.

Elisa Finland wins the bronze medal this time with **47.8 GB** per month for the first half of 2023. As said, also Elisa launched **5G** in 2019 and claimed 'almost 90%' population coverage in July 2023.

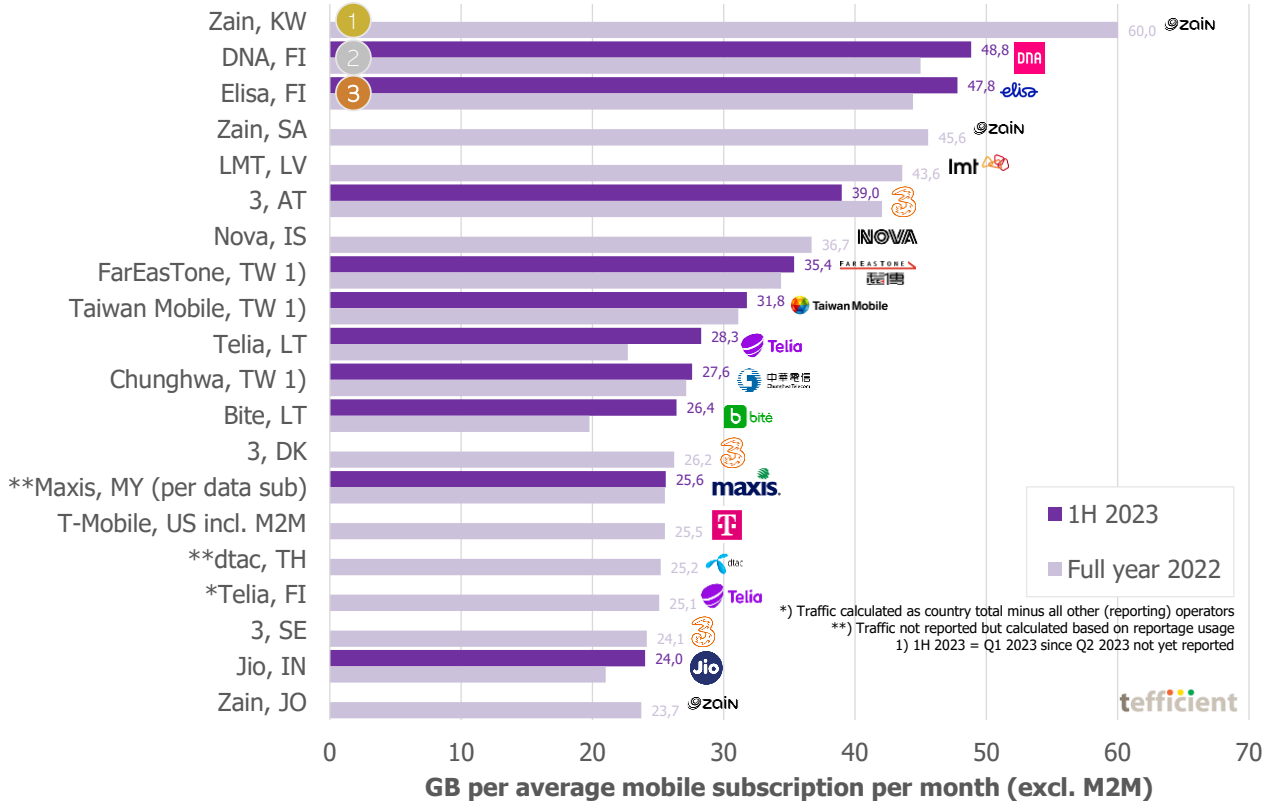


Figure 2. Average mobile data usage per subscription per month (excl. M2M) – top 20 operators

Below the podium we find **Zain** from Saudi Arabia as number four with 45.6 GB per month for 2022. Latvia's **LMT** climbs to position number 5 with 43.6 GB per month for 2022. **Drei** (3) from Austria is sixth with 39.0 GB which is a decrease compared to the full year of 2022[2]. **Nova** from Iceland is seventh-ranked with a regulator-reported 36.7 GB per month for 2022. The Taiwanese operator **FarEasTone** follows with 35.4 GB

[2] But an increase compared to the first half of 2022.

per month for the first quarter of 2023[3] – immediately followed by **Taiwan Mobile** with 31.8 GB. **Telia** from Lithuania has had good usage growth in the first half of 2023 and ends our top ten in usage.

The rest of Figure 2 consists of Taiwan's **Chunghwa**, Lithuania's **Bite**, **3** Denmark and Sweden, Malaysia's **Maxis**[4], **T-Mobile** USA (including M2M), Thailand's **dtac**[5], **Telia** Finland, India's **Jio** and **Zain** Jordan.

[3] Taiwan's regulator has not yet reported Q2 2023.
[4] Maxis's usage is per data subscription: Maxis no longer reports the number of data subscriptions, so Maxis's usage number is likely slightly exaggerated vs. the local peers.
[5] dtac has now merged with True.

Europe: Nordic & Baltic operators and '3' dominate the top

Now to the first of three breakdowns: Europe. The number 2, 3 and 5 of the world, **DNA**, **Elisa** (both from Finland) and **LMT** Latvia, form the European podium.

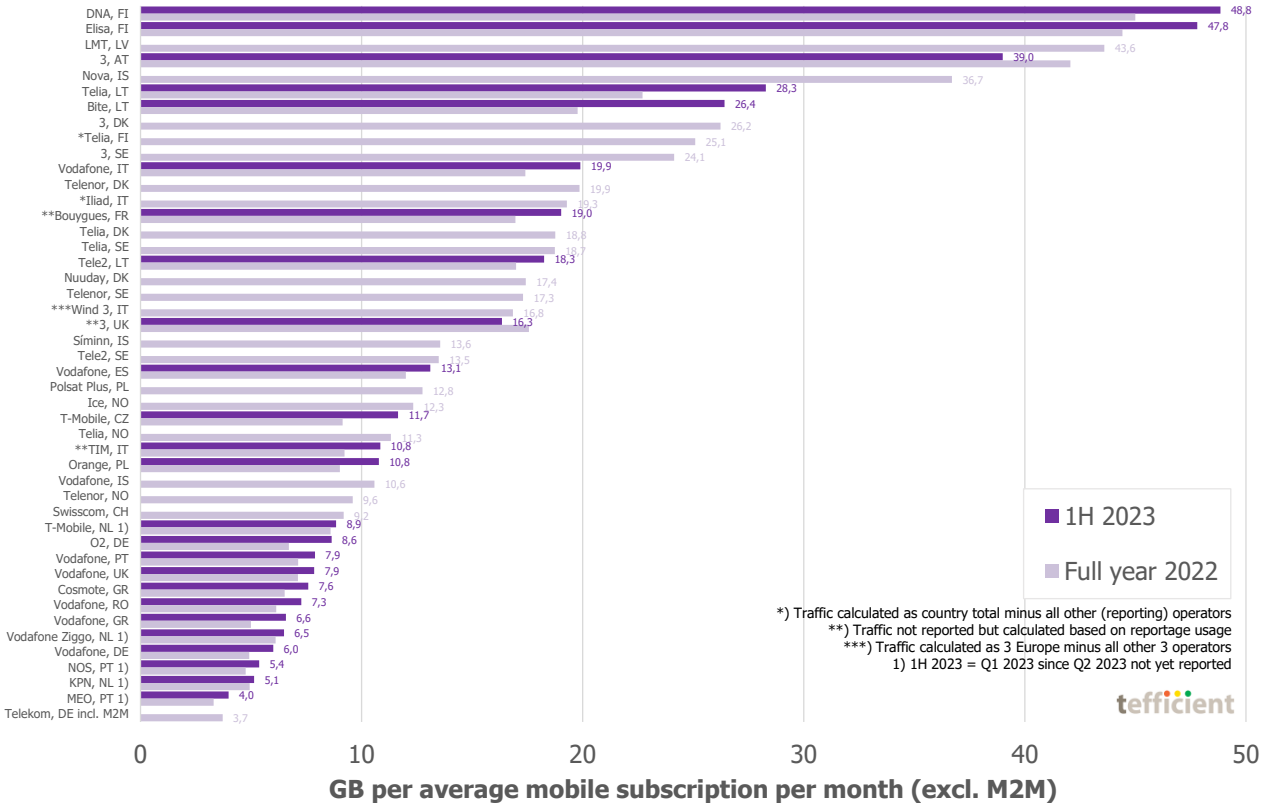


Figure 3. Average mobile data usage per subscription per month (excl. M2M) – European operators

3 (Drei) Austria is ranked as number four. Iceland's **Nova** is number five based on a figure for 2022. **Telia** from Lithuania is number six immediately followed by its competitor **Bite**. **3** Denmark is number eight (with a 2022 value) followed by **Telia** Finland. Since Telia doesn't report its mobile data traffic, we have assigned the country residual to Telia (after having deducted Elisa's and DNA's reported traffic). **3** Sweden finishes the European top ten.

The bottom six operators are from the low usage markets[6] of **Germany** (Telekom incl. M2M, Vodafone), **Portugal** (MEO, NOS) and the **Netherlands** (KPN, Vodafone Ziggo).

Who had the fastest usage growth in Europe? Let's look at Table 1.

[6] See our latest country data usage report: https://tefficient.com/arpu-growth-almost-always-slower-than-inflation/.

Fastest	1H 2023 vs. 1H 2022		2022 vs. 2021	
Vodafone, GR	+2.6 GB	+64%	+1,5 GB	+44%
Telia, SE	n/a	n/a	+6.8 GB	+57%
Bite, LT	+8.2 GB	+45%	+4.2 GB	+27%
3, AT	+3.9 GB	+11%	+8.5 GB	+25%
Slowest	**1H 2023 vs. 1H 2022**		**2022 vs. 2021**	
T-Mobile, NL 1)[7]	+0.4 GB	+5%	+1.2 GB	+17%
NOS, PT 1)	+1.0 GB	+23%	+0.7 GB	+17%
Tele2, SE	n/a	n/a	+0.7 GB	+6%

Table 1. Operators with fastest and slowest usage growth in 2022 and in 1H 2023 – European operators

If measured in percent, it was **Vodafone Greece** with 64% in the first half of 2023. In 2022, it was **Telia Sweden** with 57%. The latter is surprising when noting that Telia's competitor **Tele2** had the slowest growth in 2022, just 6%. Unless there's a reporting mistake in the regulator PTS's figures, the explanation might be that Telia in 2022 started to address the broadband market more eagerly with FWA.

It was **T-Mobile Netherlands** that had the slowest annual growth in 1H 2023, 5%. Note that the regulatory data for Q2 2023 is not yet available for the Netherlands, so this could change.

In absolute, GB, terms, it was **Bite Lithuania** that had the fastest annual usage growth in 1H 2023 (+8.2 GB per month). In 2022, **3 Austria** had the fastest growth, +8.5 GB per month. The usage growth of 3 Austria slowed considerably in 1H 2023.

The position of the slowest absolute growth in mobile data usage was for 1H 2023 with **T-Mobile Netherlands** (+0.4 GB) whereas **NOS Portugal** has the slowest growth in 2022, +0.7 GB per month.

[7] As in the graph the 1) notion shows that the 1H 2023 value is for Q1 2023 as Q2 2023 isn't yet reported.

Asia and China: Taiwan fills the podium – Malaysia challenged by Thailand & India

As in our previous reports, the three Taiwanese operators **FarEasTone**, **Taiwan Mobile** and **Chunghwa** hold the top three usage positions in Asia and China. A total of five operators[8] offering cheap unlimited plans continue to drive Taiwan's traffic although the operators finally seem to have become more rational with regards to pricing. **5G** was launched relatively late – in 2020 – but the operators have built coverage very fast. According to the latest global 5G Experience report from Opensignal – issued in June 2023 – Taiwan ranks high in download speed and very high in 5G availability – just after well-known 5G leaders South Korea, Kuwait, USA and Singapore.

The rest of the top ten consists of Malaysia's leading operators **Maxis**, **Celcom** and **Digi** (and the newly merged entity, **CelcomDigi**) together with Thailand's **dtac** and **AIS** as well as India's **Jio**.

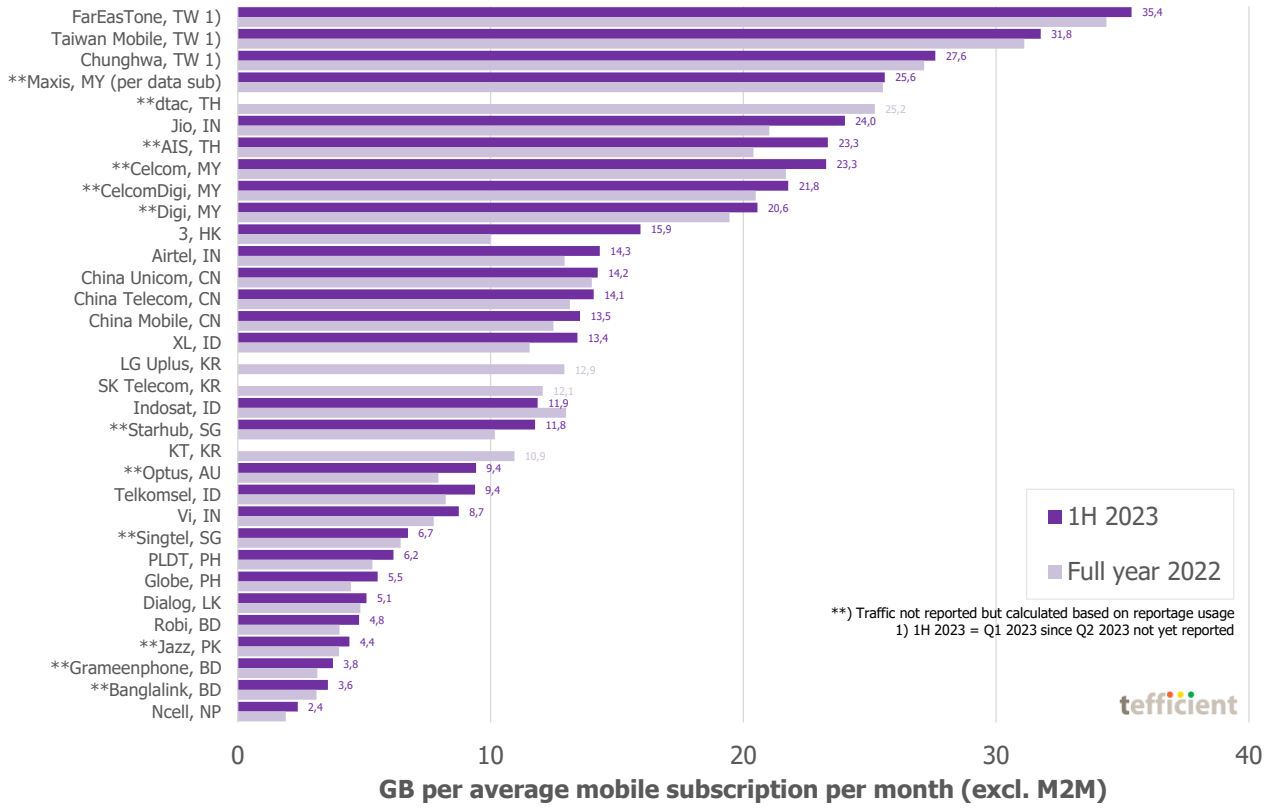


Figure 4. Average mobile data usage per subscription per month (excl. M2M) – Asian and Chinese operators

Whereas 5G already is rolled out to a high extent in Thailand, the Indian 5G spectrum auction ended as late as in August 2022. In **Malaysia**, 5G rollout was delayed when the government decided to create a state-

[8] The operators aren't reporting their mobile data traffic themselves; it is being reported by the regulator with a certain delay. There are two other Taiwanese operators, T Star and Gt (about to merge with Taiwan Mobile and FET respectively), but they are just reported together as 'other' and hence not shown here.

controlled wholesale company, Digital Nasional Berhad (DNB), who would be responsible for all 5G in Malaysia. The mobile operators were instructed to sign agreements with DNB, but it took time. This 5G hiccup has affected the mobile data usage growth in Malaysia: It is no longer as fast as it used to be.

The Asian/Chinese operators with the fastest and slowest annual growth in mobile data usage in 1H 2023 and 2022 are:

Fastest	**1H 2023 vs. 1H 2022**		**2022 vs. 2021**	
3, HK	+8.6 GB	+118%	+2.9 GB	+40%
Indosat, ID	-1.0 GB	-8%	+3.9 GB	+43%
AIS, TH	+4.2 GB	+22%	+4.9 GB	+32%
Slowest	**1H 2023 vs. 1H 2022**		**2022 vs. 2021**	
Indosat, ID	-1.0 GB	-8%	+3.9 GB	+43%
Maxis, MY[9]	+0.9 GB	+4%	+1.7 GB	+7%

Table 2. Operators with fastest and slowest usage growth in 2022 and in 1H 2023 – Asian and Chinese operators

3 Hong Kong had massive growth in its reported annual average mobile data usage in 1H 2023: +118% or 8.6 GB. Hong Kong has traditionally been a very competitive market – data buckets are very large given the low price points – and the 5G penetration reached 25% in May 2023 according to the regulator, OFCA.

Indonesia's **Indosat** is, interestingly, the operator with the fastest usage growth in percent in 2022, 43%, but also the operator with the *slowest* usage growth in 1H 2023, -8% (-1.0 GB per month). To compare, Indosat's competitor, Telkomsel, had much more stable usage growth, 23% in 1H 2023 and 22% in 2022.

AIS from Thailand had the fastest absolute usage growth in 2022, +4,9 GB per month.

Maxis from Malaysia had the slowest usage growth in 2022, 7% (+1.7 GB). Maxis' growth in 1H 2023 is yet slower.

[9] Reported per data subscription only.

RoW: Zain dominates the top

The rest of world ranking combines Latin American and Russian/CIS operators with operators from Middle East, Turkey, Africa and reporting international groups, see Figure 5.

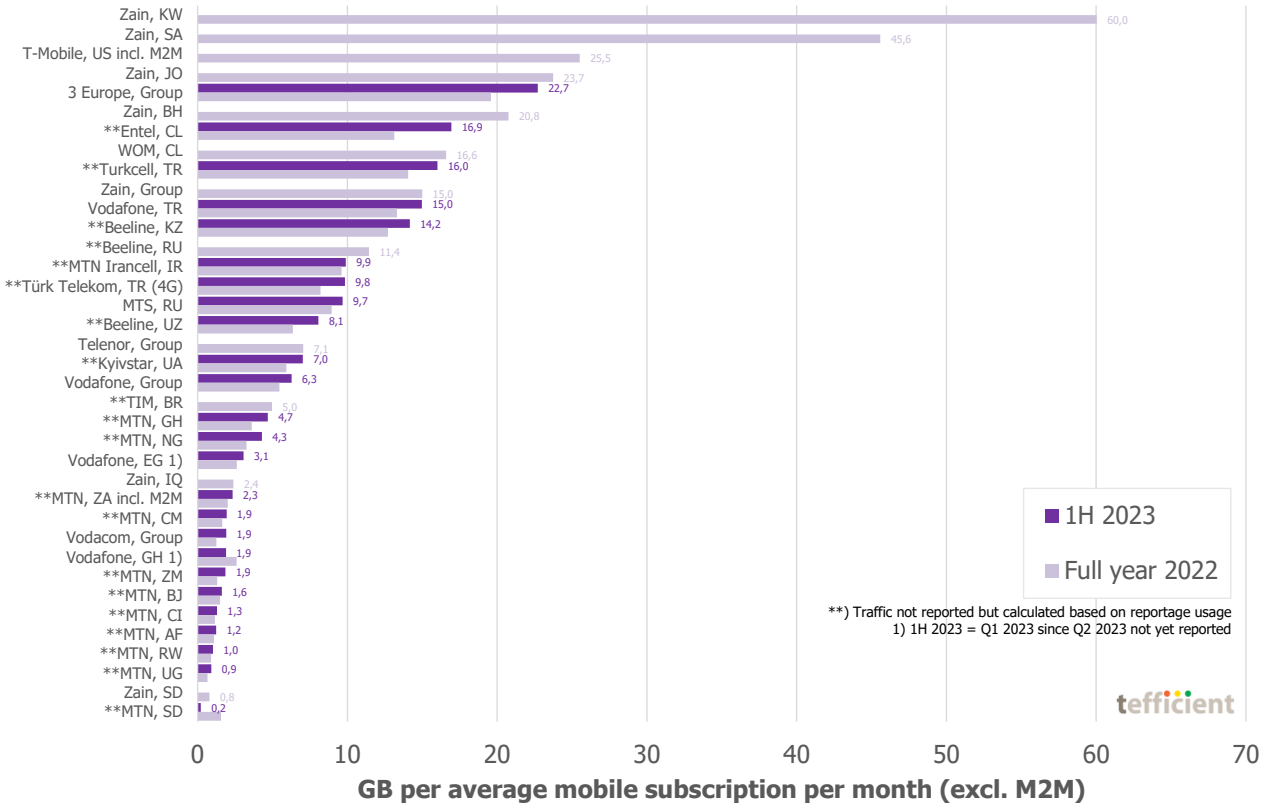


Figure 5. Average mobile data usage per subscription per month (excl. M2M) – RoW operators

The world number 1, **Zain Kuwait**, obviously tops this chart too. **Zain Saudi Arabia** is number two, **Zain Jordan** number four, **Zain Bahrain** number six and the whole of **Zain group** number ten. Two Zain operations, Iraq and Sudan, pull that group average down significantly.

For years there was no representation of North America in our operator analysis. The simple reason being that US and Canadian operators do not report their mobile data traffic or usage. But last year we finally managed to – via energy consumption figures in the annual corporate responsibility report – crack one of the three US carriers, **T-Mobile**[10]. Being the first operator to reintroduce unlimited into the US market, one can suspect that the average usage of a T-Mobile customer could be higher than that of Verizon and AT&T; T-Mobile's mobile data usage per average (incl. M2M) is calculated to be **25.5 GB** per month for 2022 which gives T-Mobile the third position in the RoW chart.

[10] The same can't regretfully be done for AT&T and Verizon as they include also fixed network traffic in their energy KPIs.

3 Europe Group is ranked as number five and it's easy to see why; in the European comparison (Figure 3), several operations of '3' are ranked high: Austria, Denmark, Sweden and the UK.

Chilean operators are – led by operators' 5G push and huge allowances – making it to the top. **Entel** is number seven and the challenger operator **WOM** number 8. Turkey's **Turkcell** is number nine.

African operators are – together with Zain Iraq – having the sixteen lowest monthly data usage positions in our RoW sample.

These are the RoW operators with the fastest and slowest growth in mobile data usage in 1H 2023 and 2022:

Fastest	**1H 2023 vs. 1H 2022**		**2022 vs. 2021**	
Beeline, UZ	+2.5 GB	+44%	+2.3 GB	+58%
Zain, IQ	n/a	n/a	+1.1 GB	+87%
3 Europe, group	+5.3 GB	+30%	+4.4 GB	+29%
Zain, SA	n/a	n/a	+8.6 GB	+23%
Slowest	**1H 2023 vs. 1H 2022**		**2022 vs. 2021**	
MTN, SD	-1.3 GB	-86%	+0.3 GB	+19%
Zain, BH	n/a	n/a	-1.2 GB	-5%

Table 3. Operators with fastest and slowest usage growth in 2022 and in 1H 2023 – RoW operators

Beeline Uzbekistan had the fastest annual usage growth in 1H 2023, 44%[11]. In 2022, the fastest growth was with **Zain Iraq** with 87%.

In absolute growth terms, it was **3 Europe group** that had the fastest annual usage growth in 1H 2023, +5.3 GB per month. In 2022, Zain **Saudi Arabia** added 8.6 GB per month on average.

MTN Sudan's average mobile data usage collapsed in 1H 2023, -86%. The reason is of course the civil war that broke out in 2023. In 2022, **Zain Bahrain** had the worst usage development, -5% or -1.2 GB per month.

[11] It might appear as if Vodacom group had the fastest growth in 1H 2023 but that's only because Vodafone group included Egypt into it in 2023.

Traffic growth continued – but not everywhere

We have seen that the average data usage varies much between different operators in different countries. If we instead compare the total data traffic, the large population differences between the countries make the spread even wider, see Figure 6.

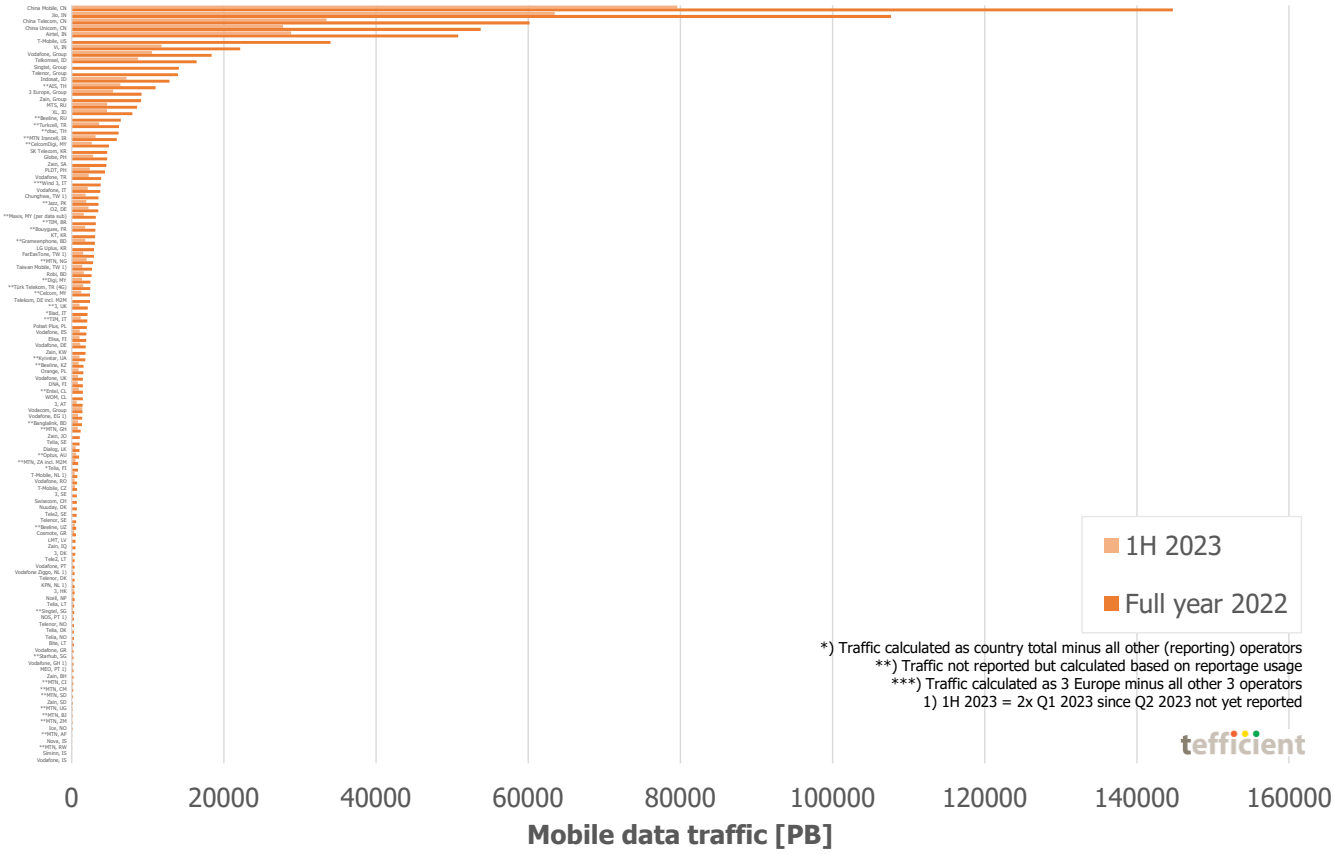


Figure 6. Total mobile data traffic – all operators

As it's difficult to read Figure 6 we will in a bit break it down into the three regions of the world, but let's first identify the **global data traffic leaders** – see Figure 7.

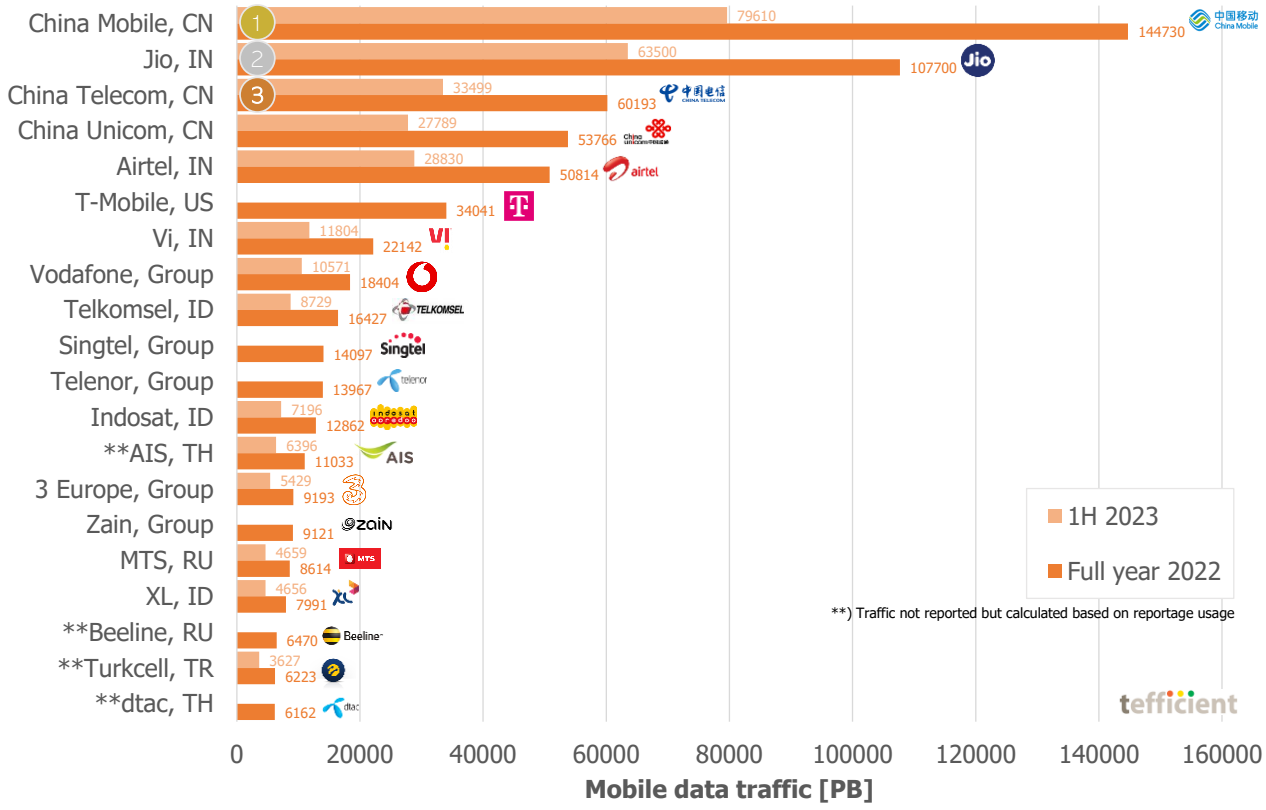


Figure 7. Total mobile data traffic – top 20 operators

China Mobile had 985 million mobile subscribers in June 2023 (of which 40%, 393 million, are on its 5G network having 1,761,000 base stations) and is, by far, the largest operator in the world in mobile data traffic. Its total traffic grew **17%** from 1H 2022 to 1H 2023 (and 16% from 2021 to 2022).

India's **Jio** is the operator with the largest subscriber base in India – 449 million in June 2023. Jio's data traffic growth in the year to June 2023 was **26%** (and 29% from 2021 to 2022). In the first half of 2023, Jio's competitor Airtel India (ranked #5) had an annual traffic growth of **20%** whereas the troubled Vi (ranked #7) had **11%**. Given the late, 2022, licensing of 5G in India, 5G has not yet had a major impact on the Indian traffic.

China Telecom has the fastest traffic growth in China: **18%** 1H 2022-1H 2023 and 28% 2021-2022. It doesn't report the number of 5G network customers, but 73% of its customers subscribed to 5G packages in June 2023 (of which more than half likely are on the 5G network).

With a good 48% growth in traffic in 2022, **T-Mobile USA** defends the global number six position, breaking the historical Chinese-Indian dominance of the top. If Verizon and AT&T would report their mobile data, they would likely be at a level similar to T-Mobile.

Europe: Italy, Germany, France and the UK take the first eight positions

First to the European breakdown: Since the highest ranked European operator is just number 28 in our global ranking, we could generally conclude that the European countries are less populated than the global leaders. And it's not the operators that you necessarily would suspect (with the largest SIM base) that are in the top of Figure 8.

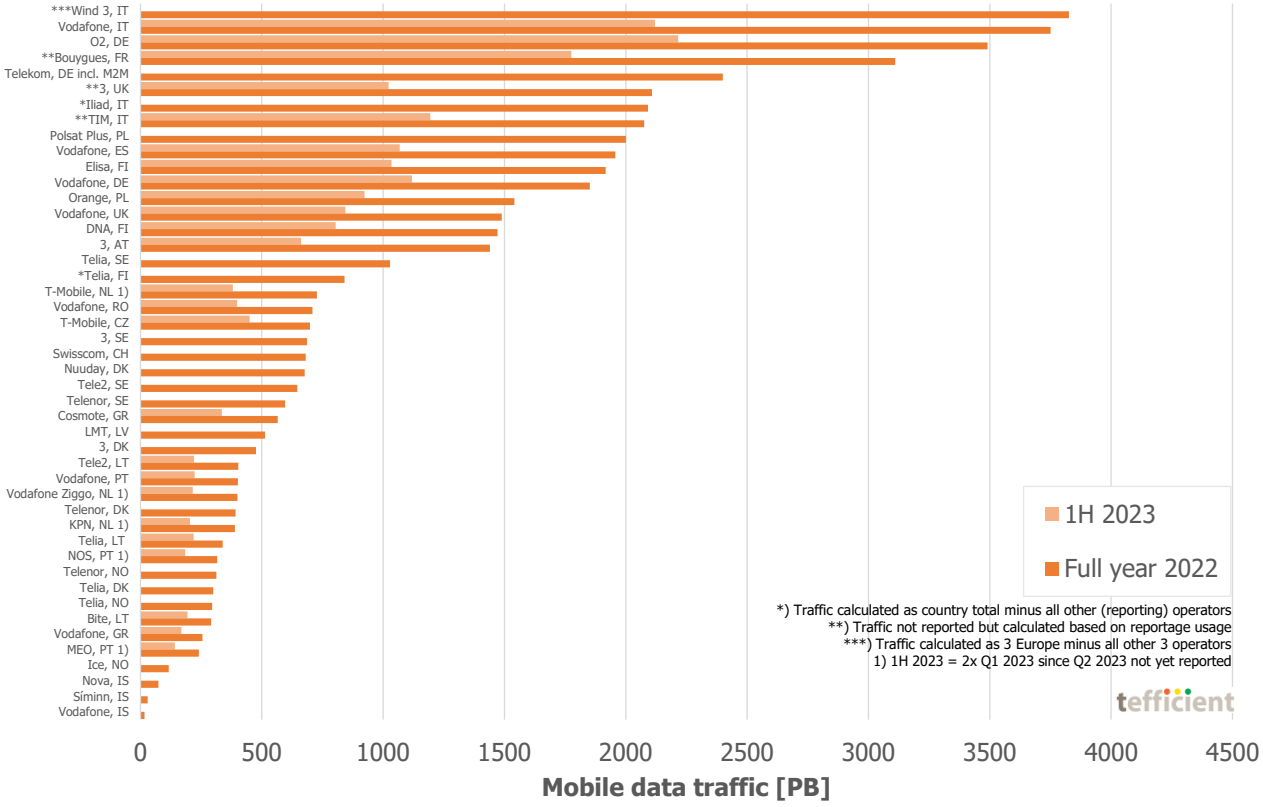


Figure 8. Total mobile data traffic – European operators

Italy's **Wind 3** is no longer reporting but based on our calculation[12] we believe Wind 3 is the new number one in Europe, closely followed by **Vodafone Italy**. Italy has had an explosion in mobile data usage ever since the new fourth operator, Iliad, launched 30 GB for 5.99 EUR in May 2018 – which all of competition copied. **Iliad** is ranked #7 and **TIM Italy** #8.

O2 Germany takes the European bronze medal after a strong 41% traffic growth 1H 2022-1H 2023 (and 48% 2021-2022) driven by an ambitious 4G (at last!) and 5G rollout plus a modernisation of its mobile plans. Telekom is ranked #5 while Vodafone Germany is just #12.

[12] CK Hutchison has taken over the full ownership of Wind 3 and as it was their previous shareholder VEON that reported data usage, we miss input from Wind 3. In this analysis we have assigned the residual traffic of 3 Europe Group after having subtracted the calculated traffic of UK, Denmark, Austria, Sweden and Ireland to Wind 3.

The French operator **Bouygues** is number four[13]. **3 UK** is number six. The Polish operator **Polsat Plus** is number nine and the top ten ends with **Vodafone** Spain.

These are the European operators with the fastest and slowest growth (in %) in mobile data traffic in 1H 2023 and 2022:

Fastest	**1H 2023 vs. 1H 2022**	**2022 vs. 2021**
Vodafone, GR	+64%	+47%
Cosmote, GR	+61%	+52%
Slowest	**1H 2023 vs. 1H 2022**	**2022 vs. 2021**
T-Mobile, NL 1)[14]	+7%	+20%
Tele2, SE	n/a	+7%

Table 4. Operators with fastest and slowest data traffic growth in 2022 and in 1H 2023 – European operators

After many years of being a European mobile data laggard, **Greece** is obviously improving its position having had the fastest traffic growth (in %) in Europe.

Tele2 Sweden, who also had slow usage growth (see previous section) was the European operator with the slowest traffic growth in 2022. To compare, Tele2's competitor Telia had 51%, 3 had 27% and Telenor 23%.

T-Mobile Netherlands – who recently changed owner from Deutsche Telekom to private equity – had the slowest traffic growth so far in 2023. Since the regulator ACM not yet has reported Q2 2023, the position of T-Mobile assumes that the Q2 2023 traffic equals Q1 2023.

[13] Orange, SFR and Free could have been high ranked as well but aren't reporting data traffic or usage. Free used to do it but has regretfully stopped.
[14] As in the graph the 1) notion shows that the 1H 2023 value is 2x Q1 2023 since Q2 2023 isn't yet reported.

Asia and China: Substantial traffic growth in petabyte, but slowing growth rates

We find the five global traffic leaders in the top of the Asian/Chinese comparison: **China Mobile**, **Jio**, **China Telecom**, **China Unicom** and **Airtel**. The annual growth rates have come down for these operators (7%-26%), but in absolute petabyte terms, the growth was still massive.

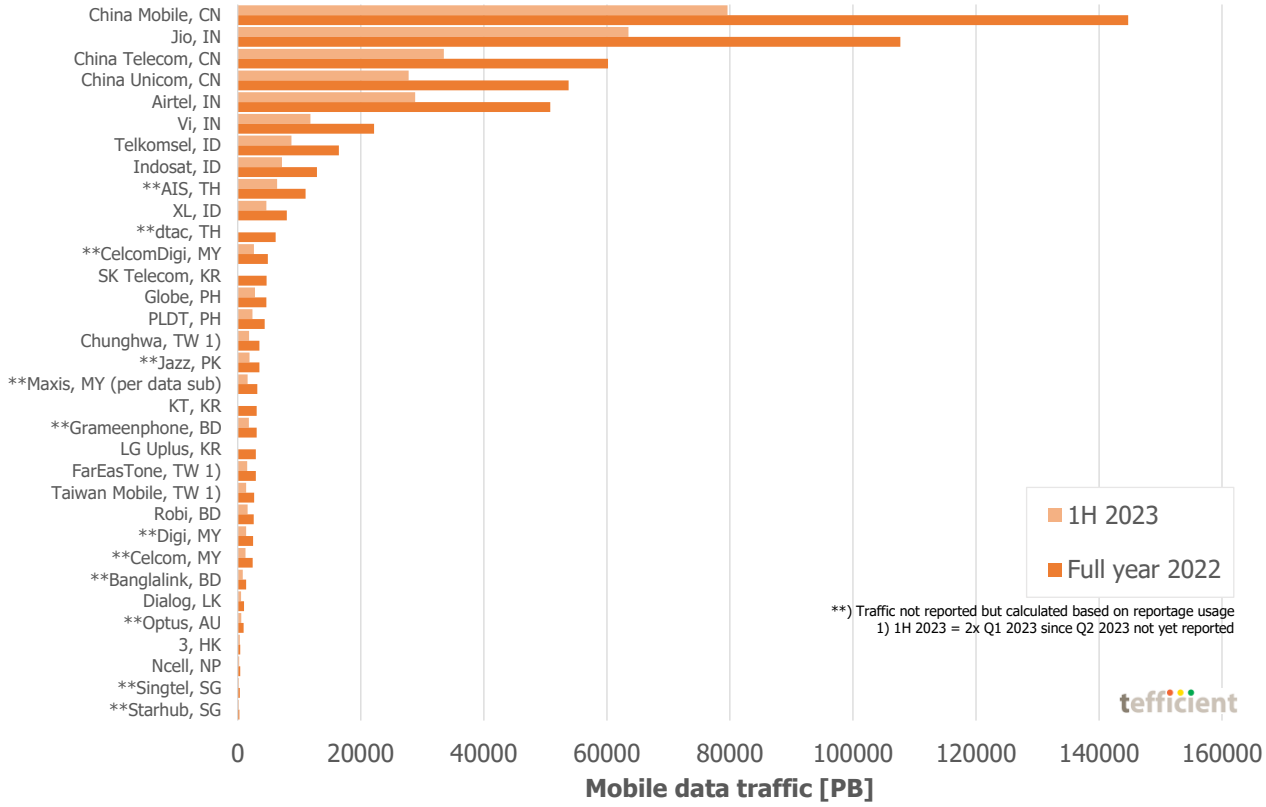


Figure 9. Total mobile data traffic – Asian and Chinese operators

India's **Vi**, the **Indonesian** operators (Telkomsel, Indosat, XL) and the Thai operators **AIS** and **dtac**[15] follow.

[15] dtac merged with True in 2023 but the new company does not, like True prior to the merger, report mobile data usage.

These are the Asian/Chinese operators with the fastest and slowest growth (in %) in mobile data traffic in 1H 2023 and 2022:

Fastest	**1H 2023 vs. 1H 2022**	**2022 vs. 2021**
3, HK	+134%	+40%
Indosat, ID	+17%	+92%
Slowest	**1H 2023 vs. 1H 2022**	**2022 vs. 2021**
Maxis, MY	+4%	+9%
Vi, IN	+11%	+5%

Table 5. Operators with fastest and slowest data traffic growth in 2022 and in 1H 2023 – Asian and Chinese operators

We commented **3 Hong Kong**'s very fast growth in 1H 2023 in the previous, usage, section. In 2022, it was Indonesia's **Indosat** that had the fastest growth. But that growth picture totally changed in the first half of 2023 where Indosat's traffic growth was limited to 17%.

Malaysia's **Maxis** had the slowest traffic growth (in %) in 1H 2023 whereas India's **Vi** had the slowest growth in 2022, just 5%.

RoW: T-Mobile USA larger than all reporting groups

Figure 10 collects operators from the rest of the world, but also a few reporting international groups.

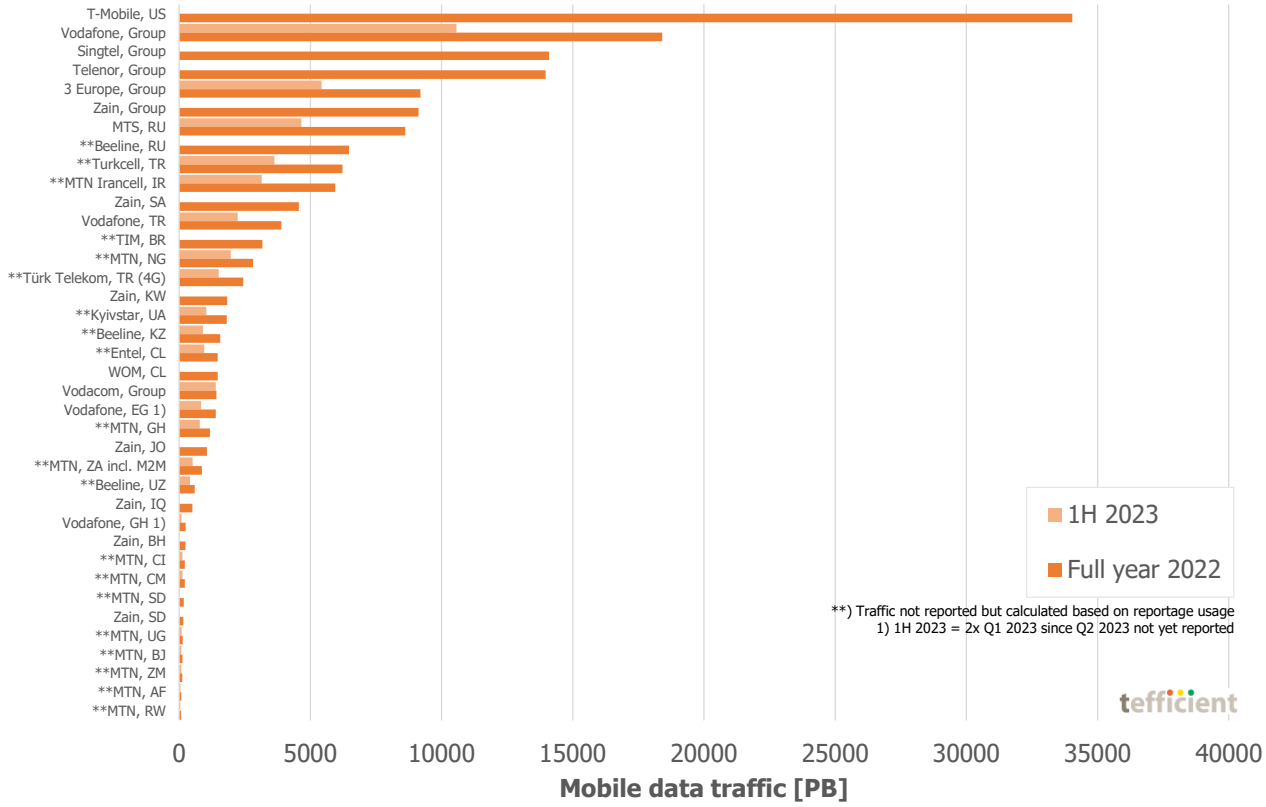


Figure 10. Total mobile data traffic – rest of world operators

Our North American operator, **T-Mobile**, tops this chart, followed by **Vodafone group**, **Singtel group** and **Telenor group** in this RoW ranking. The other two groups, **3 Europe** and **Zain**, are ranked as number five and six. (Vodacom Group is number 21, but already part of Vodafone Group).

The Russian operator **MTS** is number seven with the local competitor **Beeline** as number eight. **Turkcell** and **MTN Irancell** end the top ten.

These are the RoW operators with the fastest[16] and slowest growth in mobile data traffic (in %) in 1H 2023 and 2022:

[16] It might appear as if Vodacom group had the fastest growth in 1H 2023 but that's only because Vodafone group included Egypt into it in 2023.

Fastest	1H 2023 vs. 1H 2022	2022 vs. 2021
Beeline, UZ	+65%	+77%
Zain, IQ	n/a	+100%
Slowest	**1H 2023 vs. 1H 2022**	**2022 vs. 2021**
MTN, SD	-87%	+18%
Zain, SD	n/a	-2%

Table 6. Operators with fastest and slowest data traffic growth in 2022 and in 1H 2023 – RoW operators

Beeline Uzbekistan had the fastest growth in 1H 2023 while **Zain Iraq** had it in 2022. The slowest growth in traffic (a decline) was regretfully again in **Sudan** due to the civil war, at least for 2023.

How much money can you make on mobile data?

The way we calculate revenue per gigabyte – *total* mobile service revenue per carried gigabyte – will resonate with mature markets where operators generally aren't attempting to monetise voice and SMS based on usage. Instead, they have made voice and messaging allowances unlimited and included them in a flat fee.

In *maturing* markets, usage-based monetisation is still used to a higher degree. This is true also for voice and messaging. With our calculation method, one might think that the operators ending up with the highest effective revenue per gigabyte would thus be operators from maturing markets. This is only partly true: Mixed with operators from **Sudan**, **Uganda** and **Benin** are European operators with equally high revenue per GB: **Swisscom**, **Telenor and Telia Norway**, **KPN**, **Telekom** and **Vodafone Portugal**.

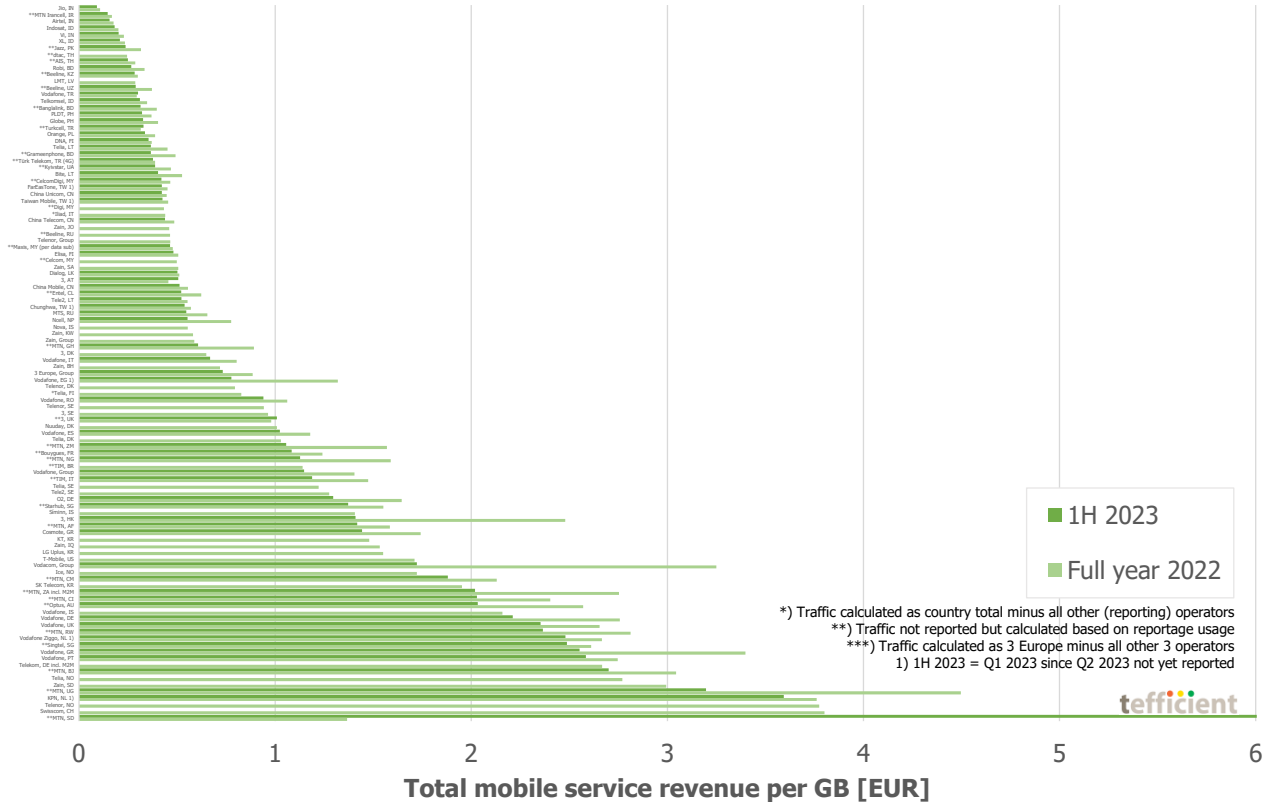


Figure 11. Total mobile service revenue per gigabyte – all operators[17]

We will – for readability reasons – soon break Figure 11 down into Europe, Asia/China and RoW, but let's first look into a disclaimer with regards to operators marked with * or **.

[17] Who also report mobile service revenue. For visibility reasons, the graph was truncated at 6 EUR per GB although one operator, MTN Sudan, had a higher value in 1H 2023.

When reporting mobile data traffic, take inspiration from Vodafone and Axiata

Most graphs in this analysis carry this legend:

*) Traffic calculated as country total minus all other (reporting) operators
**) Traffic not reported, but calculated based on reported usage

There are a few operators globally that, in their regular easy-to-use Excel sheets, report their **total mobile data traffic** quarter by quarter. Of the larger operator groups, **Vodafone** and **Axiata** are good examples. We encourage all operators to follow it.

Some operators are instead reporting – or occasionally indicating – **data usage**. These are the operators marked with **. The problem here is that many operators aren't defining what a user is – sometimes it is all users, sometimes "active data users" (whatever that is), sometimes smartphone users, sometimes branded smartphone users, sometimes postpaid users, sometimes 4G users. Typically, these usage numbers are stated to impress, i.e. they are representative only for a smaller, high-usage, segment of the subscriber base. Exceptions to that operators reporting usage aren't reporting the number of associated users are e.g. **VEON** Group, **MTN** Group and **AIS** that report the usage per mobile data customer *and* the number of such mobile data customers (a subset of the total customer base). Well done.

Most operators are still not reporting anything, though. Orange Group and Telia Company are such examples. And, of course, most North American carriers. In some cases, country regulators are helpful in reporting a breakdown per operator. But in most cases, the country regulator is just reporting the total. On such occasions – and if also all other operators report data traffic or at least usage – we have calculated the country residual and assumed that this traffic equals that of the non-reporting operator. These are the operators marked with *.

It's not necessarily so that a regulator and the reporting operators use the same definition when reporting data traffic. Traffic via MVNOs or roaming traffic can e.g. disturb the comparability. Where the error risks being the largest, though, is in countries where the country residual has been assigned to a *-marked operator while, at the same time, one or several of the other operators are **-marked operators, i.e. have not explicitly reported the total data traffic but some type of usage.

So, if any operator (*-marked or **-marked) is unhappy with its calculated data traffic, the solution is simple: Start to report your total mobile data traffic.

Having explained this, let's now from Figure 11 identify the ten operators that have the *lowest* total mobile service revenue per gigabyte in the world:

	Full year 2022	1H 2023
1. **Jio**, India	0.11 EUR	0.09 EUR ↓
2. **MTN Irancell**, Iran**	0.17 EUR	0.15 EUR ↓
3. **Airtel**, India	0.18 EUR	0.16 EUR ↓
4. **Indosat**, Indonesia	0.20 EUR	0.18 EUR ↓
5. **Vi**, India	0.23 EUR	0.20 EUR ↓
6. **XL**, Indonesia	0.23 EUR	0.21 EUR ↓
7. **Jazz**, Pakistan**	0.32 EUR	0.24 EUR ↓
8. **dtac**, Thailand**	0.24 EUR	n/a
9. **AIS**, Thailand**	0.29 EUR	0.25 EUR ↓
10. **Robi**, Bangladesh	0.33 EUR	0.27 EUR ↓

Table 7. Operators with the lowest total mobile service revenue per consumed gigabyte

These operators are active in maturing high data usage markets and/or in highly competitive markets. As before, you also find MTN Irancell in the list.

Unlike our previous analysis, none of the bottom ten operators was this time able to increase their revenue per gigabyte.

The ten operators that have the *highest* total mobile service revenue per gigabyte in the world are:

		Full year 2022	1H 2023
1.	**MTN**, Sudan**	1.4 EUR	10.2 EUR ↑
2.	**Swisscom**, Switzerland	3.8 EUR	n/a
3.	**Telenor**, Norway	3.8 EUR	n/a
4.	**KPN**, Netherlands 1)[18]	3.8 EUR	3.6 EUR ↓
5.	**MTN**, Uganda**	4.5 EUR	3.2 EUR ↓
6.	**Zain**, Sudan	3.0 EUR	n/a
7.	**Telia**, Norway	2.8 EUR	n/a
8.	**MTN**, Benin**	3.0 EUR	2.7 EUR ↓
9.	**Telekom**, Germany	2.7 EUR	n/a
10.	**Vodafone**, Portugal	2.7 EUR	2.6 EUR ↓

Table 8. Operators with the highest total mobile service revenue per consumed gigabyte

MTN Sudan's entry into the top ten list is regretfully explained by the civil war.

In our mature market focused country analysis you can identify Switzerland, Norway, the Netherlands, Germany and Portugal as some of the country markets (of the covered) with the highest revenue per gigabyte – so this list seems plausible.

We conclude that there in 2022 was **42x difference** between the operator with the highest total service revenue per gigabyte (MTN Uganda) and the operator with the lowest (Jio India). In the first half of 2023, the multiplier was **39x**[19]. These multipliers are essentially unchanged compared to last year's analysis.

[18] 1) = Q1 2023 for 1H 2023 as Q2 2023 not yet reported by the regulator, ACM.
[19] If disregarding MTN Sudan and instead using the second highest, KPN.

Europe: Widespread revenue per GB – increasing in a couple of instances

Figure 12 shows the European breakdown. Since European operators played both in the bottom and some close to the top of the global chart, the spread is almost as large as in the global view.

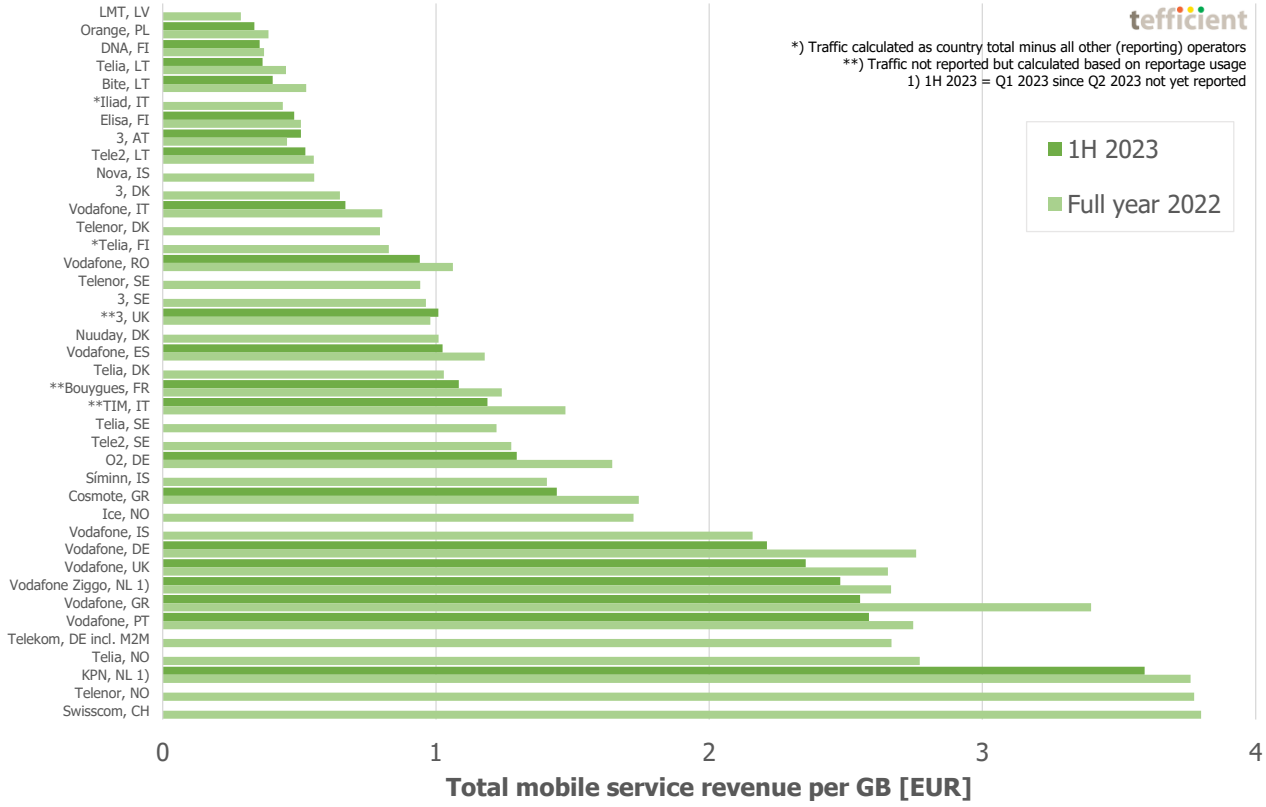


Figure 12. Total mobile service revenue per gigabyte – European operators

Swiss, Norwegian, Dutch, German and Portuguese operators play in the bottom of the graph – where the total service revenue per consumed gigabyte is high. In the other end of the scale – where the revenue per gigabyte is low – we find operators from **Latvia**, **Poland**, **Finland**, **Lithuania**, **Italy**, **Austria** and **Iceland**.

Two European operators had higher revenue per GB in 1H 2023 than in 2022: **Drei** (3) Austria and **3** UK.

Asia and China: Revenue per GB no longer decreasing fast

Figure 13 shows the Asian and Chinese operators. Indian, Indonesian, Pakistani, Thai and Bangladeshi operators had the lowest revenue per gigabyte whereas Singaporean, Australian, South Korean and operators from Hong Kong had the highest revenue.

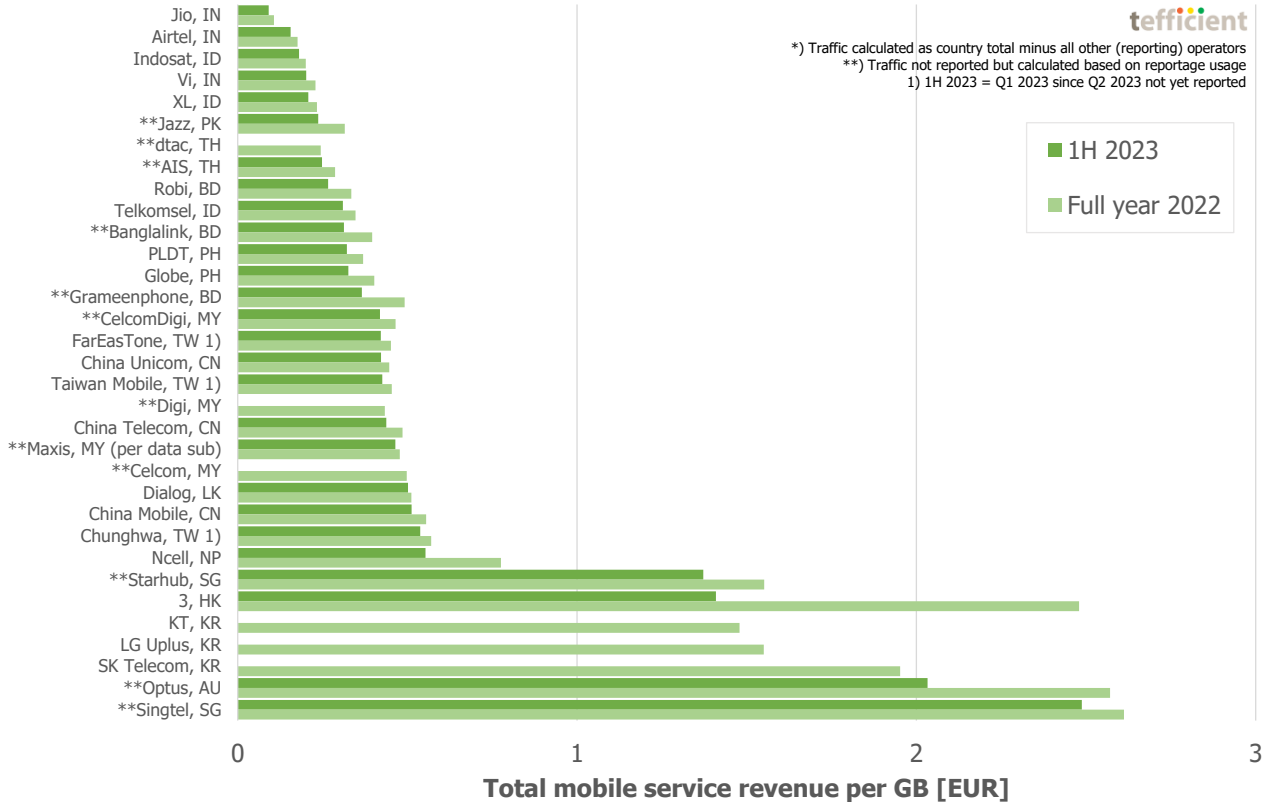


Figure 13. Total mobile service revenue per gigabyte – Asian and Chinese operators

The erosion in revenue per gigabyte in Asia/China is again not at all as quick as it was in our previous reports. And unlike our last analysis, no operator in Asia and China could this time show growth in the revenue per GB.

RoW: Erosion in the revenue per GB – but not everywhere

We are ending this section with Figure 14 – showing the operators in the rest of the world alongside a few groups that separate out mobile service revenue in their reporting.

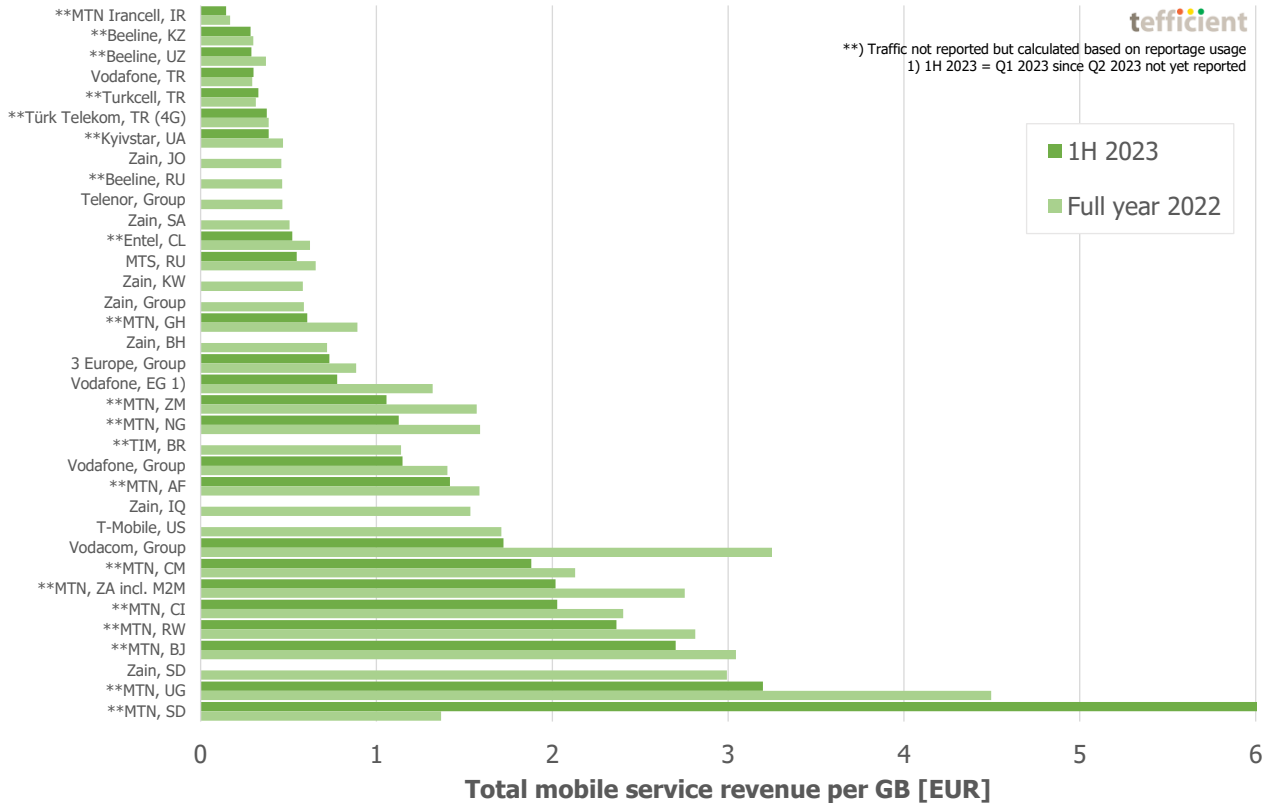


Figure 14. Total mobile service revenue per gigabyte – rest of world operators

MTN Irancell, Beeline Kazakhstan and Uzbekistan, Turkish operators, Kyivstar Ukraine, Zain Jordan, Beeline Russia and Telenor group form the top of the chart where revenues are the lowest per gigabyte. **Sub-Saharan operators** populate the bottom of the graph – alongside Zain Iraq Sudan and T-Mobile USA.

Apart from MTN Sudan (graph truncated), two of the RoW operators had higher revenue per GB in 1H 2023 compared to 2022 when measured in EUR: **Vodafone and Turkcell Turkey**. This is not surprising given the hyperinflation in Turkey. We come back to this in the ARPU trend section.

The revenue per GB vs. usage chart

Let us now combine the revenue per gigabyte with the usage. Those of you that have read our data usage and revenue analyses before are familiar with the **revenue per GB vs. usage** chart. Figure 15 shows it for all operators where we have values for both axes for 2022.

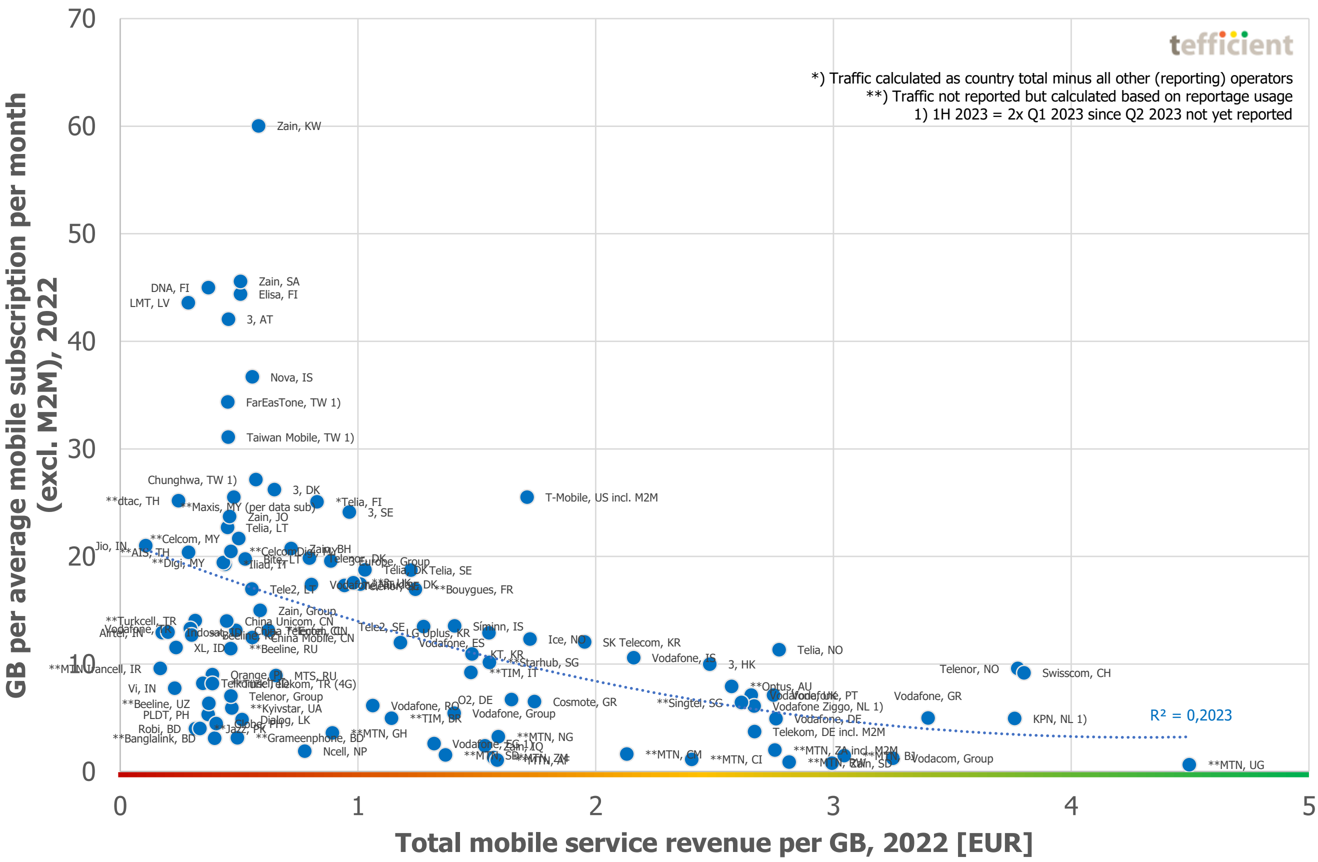


Figure 15. Mobile data usage vs. total mobile service revenue per gigabyte – 2022

With all those markers, readability is so-so. Let's therefore highlight some of the outliers.

- The operators with the highest revenue per GB in 2022 are – from right – **MTN Uganda**, **Swisscom, Telenor Norway** and **KPN**.
- The operators with the lowest revenue per GB are – from left – **Jio**, **MTN Irancell**, **Airtel** India, **Indosat** and **Vi**.
- The operator with the highest usage is – from the top – **Zain** Kuwait.
- The operator with the lowest usage is – from the bottom – **MTN Uganda**.

The ARPU vs. usage chart

One could criticise the previous chart for comparing the number of gigabyte with something that relates to it – the revenue per gigabyte. Our next chart, Figure 16, is therefore comparing the number of gigabyte with the revenue per subscription, i.e. the ARPU. And that is perhaps even more interesting.

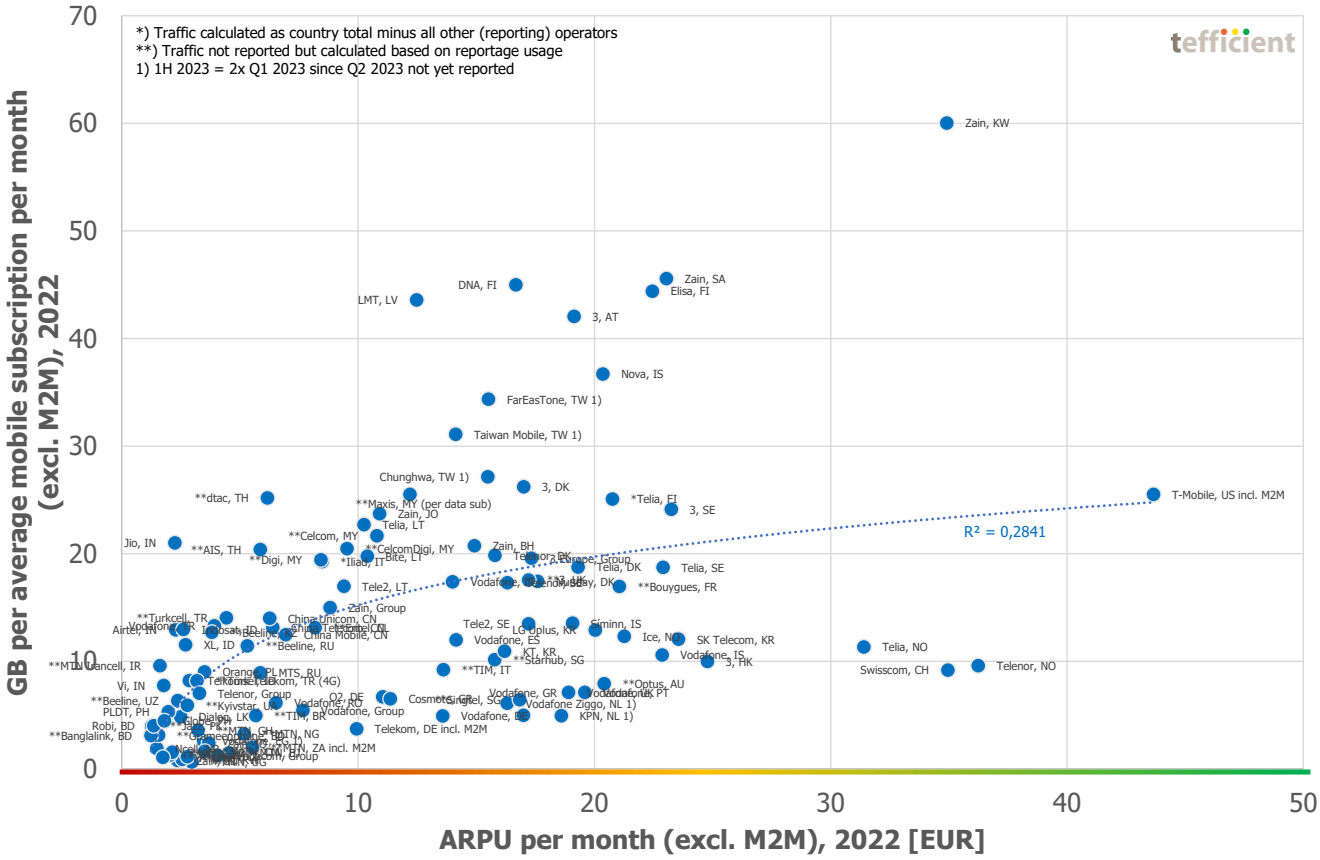


Figure 16. Mobile data usage vs. ARPU[20] – 2022

Of all the operators there are five (from right) – **T-Mobile** USA, **Telenor** Norway, **Swisscom**, **Zain Kuwait** and **Telia** Norway – that enjoy much higher ARPU than all other operators. But in the case of Zain, the data consumption is also the highest in the world. T-Mobile's customers use relatively much data, but neither Telenor Norway's, Swisscom's or Telia Norway's customers are keen data users – yet the ARPU is high.

In the middle upper part of the graph is a cluster of operators with very high average data usage but moderate ARPU between 12 to 23 EUR. Here we find the **Finnish** and the **Taiwanese** operators together with **Drei** (3) Austria, **Zain** Saudi Arabia, **Nova** from Iceland and **LMT** from Latvia.

[20] ARPU is calculated as the reported total mobile service (non-equipment) revenue incl. interconnect & roaming divided with the average number of reported subscriptions excl. M2M. It can differ from the definition of operator reported ARPU.

India's **Jio** continues to be an outlier. Its ARPU isn't the lowest – and it's growing – but considering an average data usage of close to 21 GB per month, Jio is still the affordability leader of the world.

The dotted regression line suggests that **operators with higher data usage have higher ARPU**.

To moderate this, one must realise that the adherence to this line (shown by a R^2 value below 1) isn't perfect. And we should also remember that the line visualises an international – not a national – trend: It is quite difficult to find national examples showing that operators with higher data usage enjoy higher ARPU. If anything, it's rather the opposite. It's typically the challenger operator that has the customers with the highest data usage and challenger operators tend to have lower ARPU than incumbents.

International trend: Operators with higher data usage tend to have higher ARPU

Dressing the Christmas trees

Absolute ARPU aside, how many of the operators have been able to deliver on "**more for more**" i.e. been able to increase ARPU while increasing data usage? And how many are just following the "more for less" stream, giving users more data but not being able to charge anything more?

2022: Data usage grew for 97% of operators

ARPU grew for 75% of operators

This is all shown by our Christmas tree graph. Let's start with the trends from 2021 to 2022 first since we have data from a larger number of operators for that time series. And the Christmas tree graph looks great: The data usage grew for 97% of the operators and **75% of operators could grow ARPU** (with branches growing to the right) – only 25% could not. This is an improvement compared to our analysis of last year.

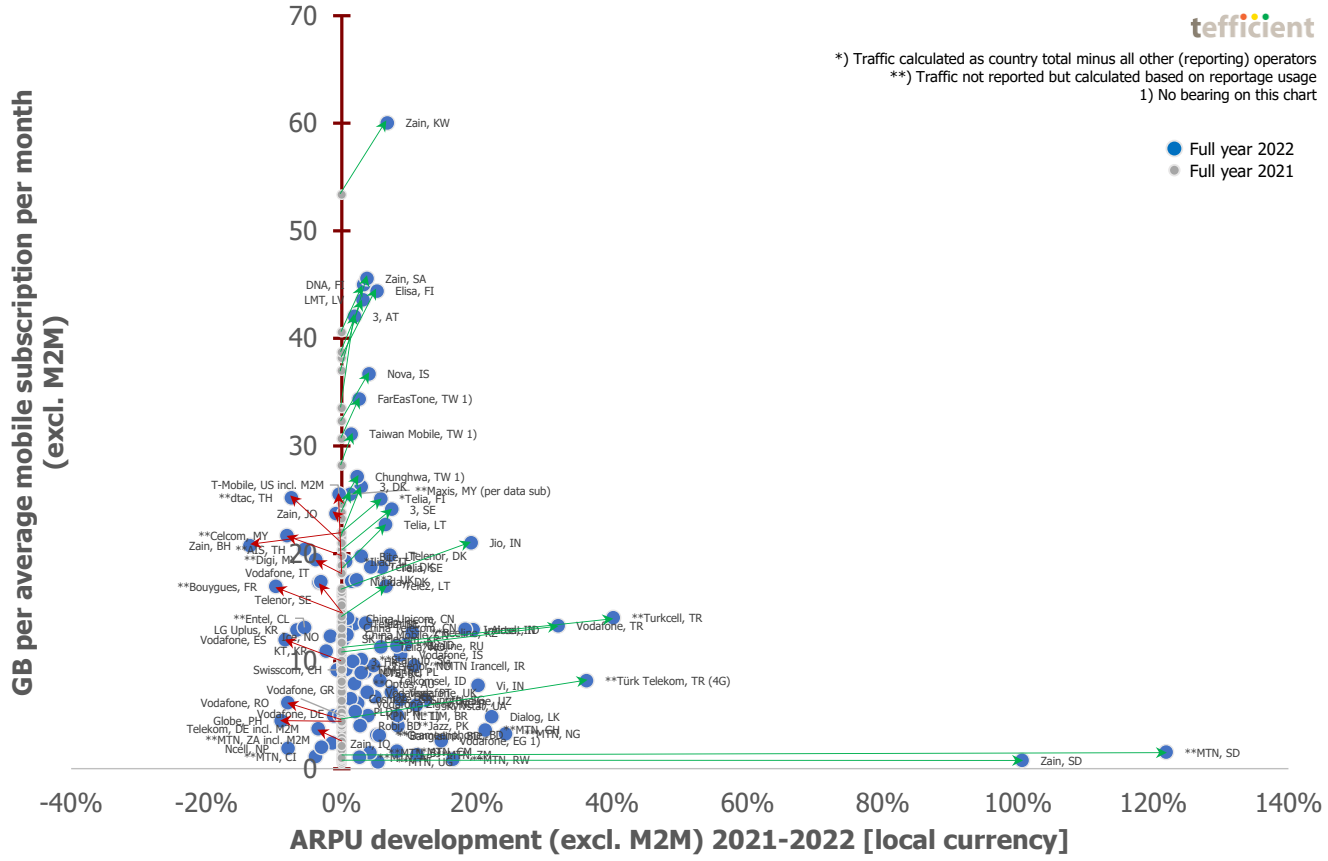


Figure 17. Mobile data usage development vs. ARPU[21] development – 2021 to 2022

[21] ARPU is calculated as the reported total mobile service (non-equipment) revenue incl. interconnect & roaming divided with the average number of reported SIMs. It can differ from the definition of operator reported ARPU.

Let's highlight a few best practices of successful "more for more" operators in 2022:

- Our global usage leader, **Zain** Kuwait, could grow ARPU following an explosion in data usage likely following onto increased take-up of 5G and 5G fixed routers. **Zain** Saudi Arabia has had a similar development.
- The Finnish operators **DNA** and **Elisa** have been able to grow ARPU thanks to more customers upgrading to faster (and more expensive) speed tiers on their unlimited plans. **Telia** too had a similar development albeit based on much lower calculated usage.
- The Austrian operator **Drei** (3) could grow its ARPU significantly when data usage increased.
- All the three major operators in Taiwan – **FarEasTone, Taiwan Mobile and Chunghwa** – could grow ARPU when data usage continued to increase.
- **Telia, Tele2 and Bite Lithuania** all had good growth in both ARPU and data usage.
- **Jio** continued to improve its ARPU in 2022. **Airtel and Vi** improved too.

We do not highlight the development in Turkey and Sudan as best practices although ARPU grew massively in local currency since the inflation was higher than the ARPU increase. Turkey had an inflation rate of 72% in 2022 while Sudan had 139%.

Amongst the 25% unfavourable operators who could not grow ARPU in spite of data usage growth in 2022, we find Thai and Malaysian operators and several Vodafone affiliates in Europe.

Let's now look at the Christmas tree for the **first half of 2023**. It's good looking too.

The number of operators is lower, but we get very similar shares as in 2022: The data usage grew for 96% of the operators and **75% of operators could grow ARPU** (with branches growing to the right) – only 25% could not.

The monetisation improvement from our analysis of last year thereby continued in 2022 and in the first half of 2023.

1H 2023: Data usage grew for 96% of operators

ARPU grew for 75% of operators

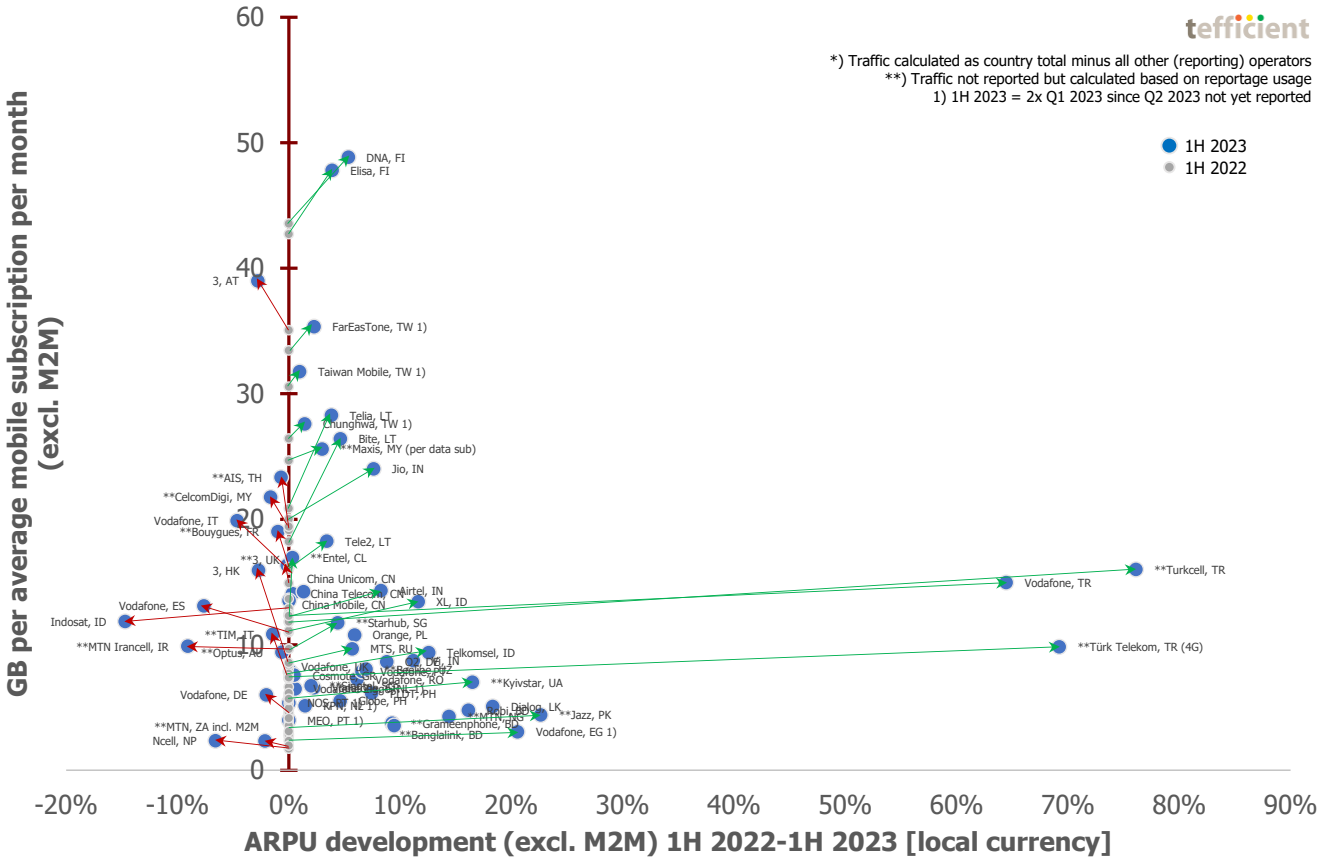


Figure 18. Mobile data usage development vs. ARPU development – 1H 2022 to 1H 2023

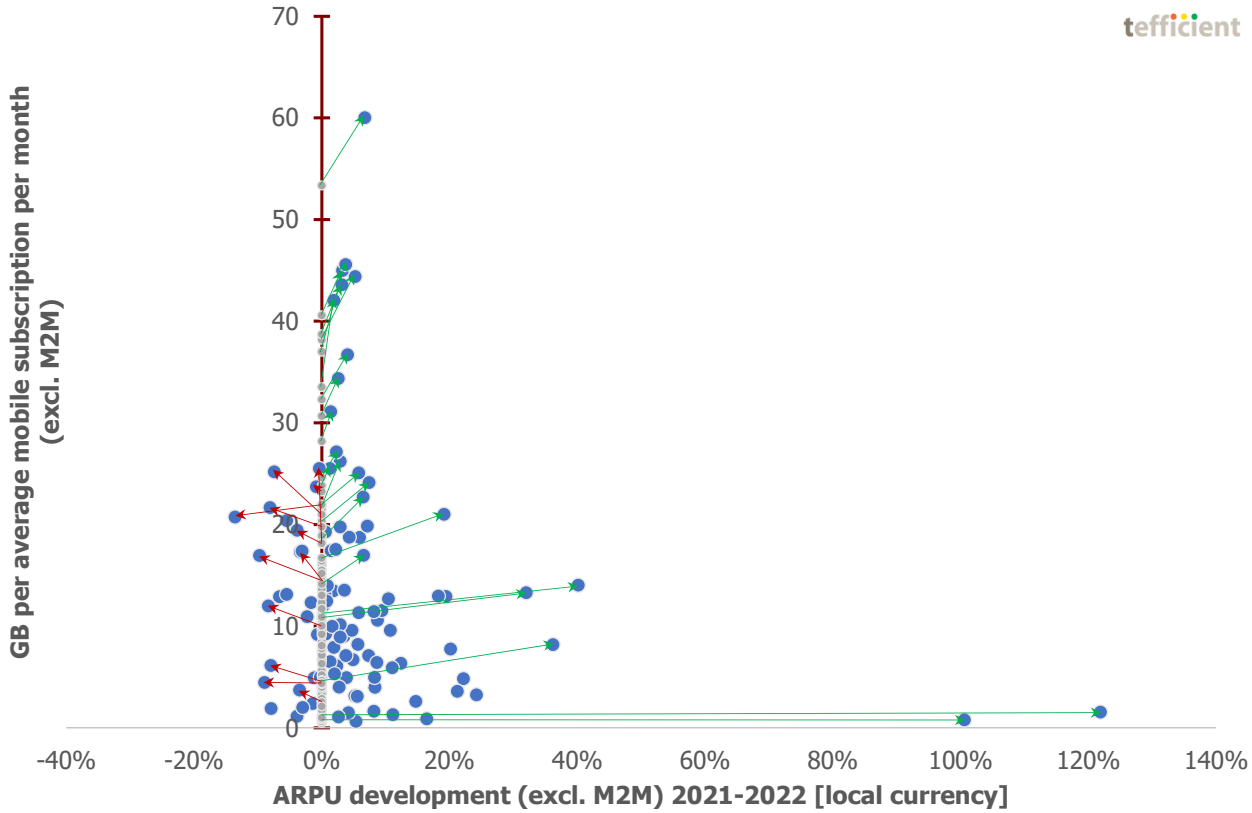
Although Figure 18 isn't as populated as the 2022 Christmas tree, let's still highlight a few best practices of successful "more for more" operators in the first half of 2023:

- The Finnish operators **DNA** and **Elisa** have again both been able to grow ARPU thanks to more customers upgrading to faster (and more expensive) speed tiers on their unlimited plans.
- All the three major operators in Taiwan – **FarEasTone, Taiwan Mobile and Chunghwa** – could continue to grow ARPU when the data usage continued to increase – but at a slower rate.
- **Telia, Tele2 and Bite Lithuania** again all had good growth in both ARPU and data usage.
- **Jio** continued to improve its ARPU in 2022. **Airtel and Vi** improved too.
- **XL and Telkomsel Indonesia** could grow ARPU when data usage increased – whereas Indosat experienced a strong decline in ARPU after lowered data usage.
- For the first time, the three Turkish operators **Turkcell, Vodafone and Türk Telekom** could grow ARPU faster than the inflation (which was about 38% in June 2023)

Amongst the 25% unfavourable operators who could not grow ARPU in spite of data usage growth in 1H 2023, we find Vodafone Italy, Spain and Germany.

Conclusion

In this analysis, we have presented fourteen updated ranking charts and four updated correlation plots. These visual aids serve to illuminate the global trajectory of mobile data usage, traffic and service revenues. In line with expectations, data usage and traffic exhibited a notable surge. However, what stands out is that a significant milestone has been reached – 75% of operators have effectively translated this growth into tangible increases in ARPU.



The highlight of our analysis, the cherished Christmas tree graph (featured above in its 2022 iteration), vividly illustrates that data usage expanded for an impressive 97% of operators. Even more striking is that among these operators, 75% succeeded in harnessing this to drive ARPU upwards. This achievement is a manifestation of the "more for more" commitment being fulfilled. Notably, this share represents an improvement compared to our 2021 operator report, underscoring the sector's progress. Remarkably, this figure remained consistent at 75% during the initial half of 2023.

Kudos are in order for cellular companies. The imperative for enhanced monetisation of mobile data has become paramount, particularly in the face of inflation's impact on cost structures.

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