The price of progress: international 5G pricing plans

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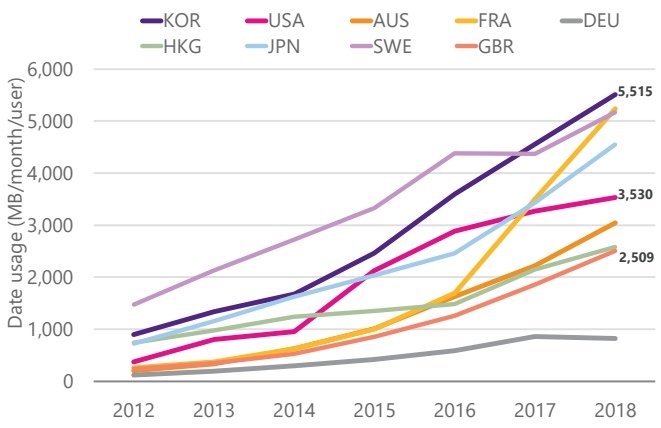
Commercial 5G services launched in April this year in South Korea and the US, and it is expected that 5G mobile services will have been launched by operators around the world by the end of 2019. A new style of mobile package is emerging; 5G packages seem to be characterised by substantial (or unlimited) data allowances which differentiate the data speed, rather than offering a capped monthly data allowance. Further, the overall price of 5G data packages is often not substantially higher than comparable existing data packages. In this paper, we analyse the 5G mobile plans that have been announced so far in South Korea, the US and the UK, and consider what these reveal about the mobile operators' expectations for 5G data growth and consumers' willingness to pay for 5G.

Commercial 5G: where is it now?

Mobile operators in South Korea and the US's Verizon have led the pack when it comes to launching commercial 5G mobile services[1]. In South Korea, over 260,000 subscribers signed-up for 5G in its first month from the launch on 3 April[2]; Verizon in the US launched 5G mobile services in selected cities on the same day, and is also offering 5G home broadband using fixed wireless. In the UK, EE and Vodafone have both announced their 5G packages (and prices), with EE launching their network at the end of May.

These operators are choosing to differentiate their new offerings from existing data plans, which only offer access to the best available 4G or 3G network. Comparing the allowances and prices of the new 5G plans against existing data plans is one way in which we can try to discern the operators' expectations on usage of 5G – these will be informed by existing growth in mobile data and the data usage characteristics of proposed 5G data applications.

Figure 1: International mobile data usage (2012-2018)[3]



Although the amount of data consumed has increased rapidly, as shown in Figure 1, the revenue from users has generally stayed constant or (in many countries) declined. Operators may hope to increase revenue if they think there is a clear demand for higher quality connections, but it is important to consider that these price propositions will also be balanced against the costs incurred from 5G network rollout and recent purchases of 5G spectrum.

As shown in Figure 1, South Korea has a very high average monthly data usage per subscriber, and data consumption has increased rapidly throughout the period. In contrast, average monthly data consumption is significantly lower in the US; the estimated average monthly data usage for 2018 is approximately 65% of that for South Korea. The UK is even lower. Given this, it may be expected that operators will have different predictions of the demand for data usage over 5G, particularly given the potential step-change in data usage due to 5G applications such as VR/AR and higher-quality video which will be driven by countries' propensity to take up new technologies.

Future focus in South Korea

South Korean operators announced their 5G price plans in early-April 2019 following approval by the Ministry of Science and ICT. These are shown in Figure 2 overleaf.

Government regulation of tariffs has, in fact, dampened proposals for 5G pricing. The Ministry rejected SKT's initial proposal to set its cheapest 5G package at 72,000 won ($62) per month, with the Government suggesting an entry-price of 55,000 won ($48) in order to ensure that consumer choice was not restricted[4]. The entry-price has been replicated for all operators, offering similar terms and allowances.

The entry-level *Lite* or *Slim* packages offer 8 or 9 GB per month; this is significantly less than the operators' other 5G packages. Whilst it is possible that the entry-level packages have been introduced to satisfy the Government's appetite for a (financially) accessible 5G package, they may also appeal to early-adopters of 5G smartphones that do not want to commit

to punchy 5G data packages before the applications (and subsequent data usage) are clear.

Figure 2: South Korea 5G mobile plans (in US$)

Operator	5G offerings
KT*	8 GB data (after which 1 Mbps): *5G Slim* – $48 Unlimited data, roaming speed 100 kbps: *Basic* – $69 Unlimited data, roaming speed 100 kbps: *Special* – $86 Unlimited data, roaming speed 3 Mbps: *Premium* – $112
LGU+	9 GB data (after which 1 Mbps): *5G Lite* – $48 150 GB data (after which 5 Mbps): *5G standard* – $65 250 GB data (after which 7 Mbps): *5G premium* – $82
SKT**	8 GB data – $48 150 GB data – $65 200 GB data (after which 10 Mbps)+ – $82 300 GB data (after which 10 Mbps)+ – $107

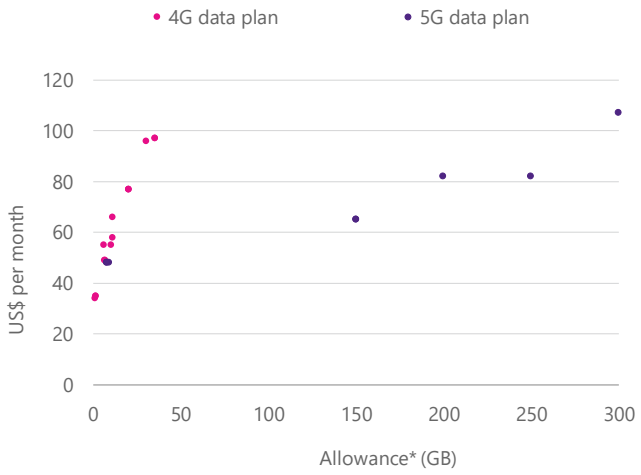
Note: KT, LGU+ and SKT packages offer unlimited calls & texts; * KT package offers unlimited international roaming in 185 countries; ** Information from SKT offerings is inferred from multiple sources. + SKT offering unlimited data allowance until June 2019 before introducing cap on 200 GB and 300 GB per month packages for subscribers signing up to 24-month contract.

There is a significant step-up in both price and allowance from the 5G entry-level plans to the other 5G plans. The second-level packages, which are referred to by KT and LGU+ respectively as *Basic* and *5G standard*, offer a minimum of 150 GB; KT is offering an unlimited data allowance for all non-entry-level packages. In comparison, the top-tier 4G packages offer a maximum allowance of 30-35 GB per month. Apart from the significant jump in data allowance being offered to consumers, there is little differentiation between low-, mid- and top-tier 4G and 5G prices. The entry-level 5G packages offering 8-9 GB have a similar price to a 6.5 GB 4G package; a top-tier 5G package offering at least 200 GB retails at approximately $82, which is only $10 more than a 4G package with 10% the data allowance (20 GB). SKT have also introduced unlimited data plans for 89,000 won ($49) which are only available until the end of 2019[5].

The design of 5G packages also mark a new direction for the classic 'data, calls and texts' bundle. KT and LGU+'s packages do not have restrictive data allowances or caps; KT offers unlimited data and LGU+ throttles data speed after the large bundled allowance is consumed.

However, the price points of these new packages seem to suggest that subscribers may not be willing to pay more for 5G. Figure 3 shows the monthly price of the new 5G plans compared to existing data packages in South Korea.

Figure 3: Comparison of Korean 4G and 5G data plans



Note: * 5G data allowance is allowance at best performance speed, before data throttling applies. Excludes KT 5G unlimited data plans.

The move towards large (or unlimited) data allowances indicates that Korean operators are expecting the growth in data traffic to continue and for this to be bolstered by upcoming 5G applications. Offering large 5G data allowances at little-to-no increment in price is essential to signal and encourage subscribers to consume more data with 5G; in turn, this will increase the operators' efficiency and profit by reducing the cost per GB on their own network. On the other hand, offering more data in the high-tier 5G bundles without significantly upwardly revising price will have the long-term implications of significantly lowering the price per GB of mobile data.

Operators may benefit from introducing large 5G data allowances by being able to offload high-usage subscribers onto 5G networks and spectrum. We assume that high-usage subscribers would become early-adopters to access the faster data speeds of 5G enhanced mobile broadband. Moving high-usage subscribers to 5G will also free capacity on existing LTE networks.

Awaiting trial in the US?

US operator Verizon is following closely behind, switching on its 5G network and connecting customers only two hours after the Korean launch. Subscribers of Verizon's Unlimited mobile plans will be able to add 5G for an extra $10 per month[6]; Sprint customers who currently pay $60 a month for unlimited data will face a $20 higher bill if they switch to 5G. AT&T and T-Mobile have plans for commercial launch in the second half of 2019, though neither have formally announced the price of the 5G packages[7]; T-Mobile's proposed merger with Sprint may impact on the prices available in the market.

A comparison of the US operators' proposed 5G plans is outlined in Figure 4.

Figure 4: US 5G mobile propositions

Operator	5G offering
Verizon	*Go Unlimited:* $85 per month, throttled speed *Beyond Unlimited:* $95 per month with 22 GB unthrottled *Above Unlimited*: $105 per month for 75 GB unthrottled
Sprint	*Unlimited Premium*: $80 per month, 100 GB unthrottled One additional mobile line is $60 per month Any mobile line after two is $20 per month
AT&T	Initial (or entry-level plan) to be more expensive than similar 4G hot spot but offers more data: 4G plan $50 per month for 10 GB against 5G plan $70 per month for 15 GB[8]. Indications that prices for 5G packages will be tiered based on speed.
T-Mobile	Pricing in line with existing 4G plans. Several press statements that New T-Mobile will not charge more for 5G than existing 4G plans; however, no statement on data allowance offered in bundles[9].

Note: 5G home broadband plans have been excluded. *New T-Mobile* refers to the operators from the proposed T-Mobile and Sprint merger.

It appears that operators in the US are facing the same pressure as those in South Korea; unwilling to raise prices significantly beyond those of existing data plans whilst also promising more data. Instead, US operators are significantly increasing data allowances, with both Sprint and Verizon throttling data speeds after an initial allowance and indications that AT&T's packages will tier by speed. However, there is a key difference between the US and South Korea 5G packages: the initial allowance of unthrottled data. Verizon's mid-tier *Beyond Unlimited* package gives 22GB before data speed is restricted, that is significantly less than LGU+'s mid-tier *5G standard* package which offers 150 GB allowance before speed throttling. The unthrottled data offered in Verizon's top-tier package is only 30% of that offered by LGU+'s top-tier package (75 GB compared to 250 GB). Sprint's offering of 100 GB before throttling is more in line with South Korean operators, but the price is significantly higher.

Indeed, all announced 5G packages in the US are considerably more expensive than South Korean packages. This is partly explained by the nature of the US mobile market, which historically has had less effective price competition than international comparators[10], and is a market characterised by non-price competition. Existing data plans are also considerably more expensive than those in South Korea.

Unlike Korean operators, Verizon's and Sprint's initial 5G bundle prices do not commit them – or other US operators – to significantly lower 'per GB' prices in the long-term. Stagnant data growth in the US may explain why 5G data prices do not undercut 4G price 'per GB' to the same extent as Korea, as shown in Figure 5; indications of future US data traffic suggest that the US may not have the same data growth to support significantly lower prices.

Figure 5: Comparison of US 4G and 5G plans

Note: * 5G data allowance is allowance at best performance speed, before data throttling applies. Excludes Verizon *Go Unlimited* plan (all speed throttled).

Launching in the UK

In the UK, operators have been promising to launch 5G from mid-2019. Vodafone were the first to announce that their 5G network would be going live in July 2019[11]; a week later EE announced that their 5G network would launch on 30 May.

EE's price announcement revealed that they plan to offer more than just higher data speeds. EE's 5G *Smart Plan* customers will have a choice of additional benefits or passes. These include data passes for video, music, gaming or roaming data service passes, including services such as Netflix, Amazon Prime, Pokémon Go or Apple Music[12]. EE's SIM-only 5G plan offers 20 GB of data for £32 ($40) per month; roughly £12 ($15) more than the equivalent 4G SIM-only package. EE's high-tier Samsung Galaxy S105G device-included package is offering a data allowance of 120 GB for £89 ($113) per month, which includes 5G device cost and three benefit passes.

By contrast, Vodafone has announced that its 5G packages will not cost any more than existing data packages, and 5G customers will be able to benefit from the same entertainment packages that are available with 4G plans[13]. Vodafone is offering moderately lower data allowances across its packages than EE; the lowest entry-tier packages offer 5GB for £50 to £58 ($63 to $74) per month depending on 5G device choice. Top tier packages offer 100 GB per month (20 GB less than EE's top tier package) for £69 to £77 ($87 to $98) per month[14]. It is interesting to note that the range of data allowances being offered in Vodafone's 5G packages are the same as existing plans; it appears that Vodafone is not expecting a significant increase in data use.

The UK pricing approach to 5G is different again to that in South Korea or the US. Most notably, additional data outside of the

initial allowance will cost extra; there is no unlimited data access even at throttled speeds – an emerging characteristic of the Korean and US offerings. In many ways, the UK approach is based on the existing non-5G data offerings, replicating the data allowances of existing packages and tying these to the new 5G-handsets. The range of in-package data for 5G and non-5G is exactly the same for Vodafone (a minimum of 5 GB to a maximum of 100 GB per month allowance), and EE's top tier package is only offering an additional 20 MB.

One reason for this lower differentiation may be that existing non-5G packages already offered high data allowances, and therefore operators do not feel the need to introduce new packages specifically to cope with explosive growth from 5G data consumption. Data allowances included in the UK's top-tier existing data already exceed the data allowance (before speed cap applies) of the US's 5G packages. Given that the 5G bundles only reflect the difference in 5G and non-5G device costs, it is therefore very difficult to identify UK operators' 5G expectations.

What comes next?

Our analysis of the 5G offerings shows that there are as many emerging trends as disparities. Operators in South Korea and the US are substantially increasing their data allowances beyond existing data packages and diversifying packages by available top-line data speed. At the same time, these operators are imposing a premium price to customers wanting to access new 5G services. In contrast, UK operators are already offering high data allowances, and – whilst highlighting that 5G will provide customers with faster data speeds – their 5G-device packages do not vary by data allowance.

Operators in South Korea, the US and the UK are not the only ones planning to launch commercial 5G services within the year. For example, in South Africa, communications provider Rain has launched 5G home broadband services in several cities and is planning to enter the 5G mobile market.

As more operators launch 5G services internationally, it may be that the Korean-style packages that offer unlimited (or unprecedentedly large) data speed-differentiated packages emerges as the predominant standard for data allowances and we break from the traditional data allowance-based mobile package. However, the speed-differentiated design may raise further questions as to whether mobile subscribers are well-enough informed to understand the data services they use and the data speed they require to support these services. This might raise questions for regulators that aim to ensure consumers make welfare maximising purchase decisions. It may also raise questions about guaranteed minimum quality of service and have implications on existing universal service obligations (USO) that are relevant to mobile broadband networks.

In any case, it is clear that there is no single design of data package that will be rolled out around the world, and analysis will need to take into account both historical pricing and predicted demand when looking at the appropriate pricing schedules for any one market.

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[1] These operators have launched commercial services before the ITU-R has fully approved the candidate technologies proposed by 3GPP (the industry standards group) within its agreed IMT-2020 standards. Early 5G deployments will likely be based on the enhanced LTE and 5G technologies that are yet to be formalised within the ITU-R's forthcoming 5G NR standards.

[2] See https://www.totaltele.com/502794/South-Korea-clocks-up-260000-5G-subscriptions-in-first-month

[3] Source: Plum analysis and NRAs/government statistics

[4] See http://telecoms.com/496704/south-korean-consumers-will-get-5g-service-starting-from-48-a-month/

[5] See http://www.koreaherald.com/view.php?ud=20190403000655

[6] See https://arstechnica.com/information-technology/2019/03/verizon-to-charge-10-extra-for-5g-but-wont-do-any-throttling-for-now/

[7] While AT&T launched a '5GE' service in December 2018, this was purely a marketing name for LTE-Advanced technology.

[8] See https://www.tomsguide.com/us/t-mobile-5g-price-launch-date,news-29519.html

[9] See https://www.pcmag.com/news/366792/t-mobile-pledges-unlimited-5g-aims-at-first-half-of-2019

[10] See https://www.wsj.com/articles/u-s-wireless-industry-is-finally-competitive-fcc-says-1505145979

[11] See https://www.bbc.co.uk/news/technology-48265421

[12] See https://www.pocket-lint.com/phones/news/ee/148131-ee-5g-plan-prices-revealed

[13] See https://www.pocket-lint.com/phones/news/vodafone/148148-vodafone-announces-5g-phones-and-prices

[14] The monthly prices we quote include handset cost but exclude upfront payments at start of contract.