

Region in Focus

North America, Q2 2019

US recovery accelerates as the 5G era begins in earnest

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 - Citizens Radio Broadband Service (CBRS)
 - Satellite

US operators bounce back in the first half of 2019

- US operators had a strong start to 2019, with mobile service revenue improving 3.2% and 2.7% year-on-year in the first two quarters. This marks a stark contrast to 2018 when year-on-year mobile service revenue growth was negative in every quarter. The improved performance reflects the success of US operators in upgrading more customers to unlimited and postpaid plans, as well as reduced pressure from the reseller market. With the 5G era now upon us, this growth provides further impetus to US operators.
- The Federal Communications Commission (FCC) and the US Department of Justice have provided clearance for the merger of T-Mobile and Sprint – though the transaction is still pending as T-Mobile and Sprint attempt to settle a multistate lawsuit aiming to block the merger. The deal, if successful, would create a mobile operator with the scale, investing power and spectrum on level with AT&T and Verizon. This will be a pivotal development as 5G investment grows rapidly.
- Despite the upheaval from the merger, T-Mobile's trading performance remains impressive. The operator now has the lowest branded postpaid churn (though Verizon still has the lowest branded postpaid phone churn) and continues to lead the retail prepaid market. However, sustained ARPU growth remains elusive, highlighting the challenge for T-Mobile to grow margins in tandem with its subscriber base.

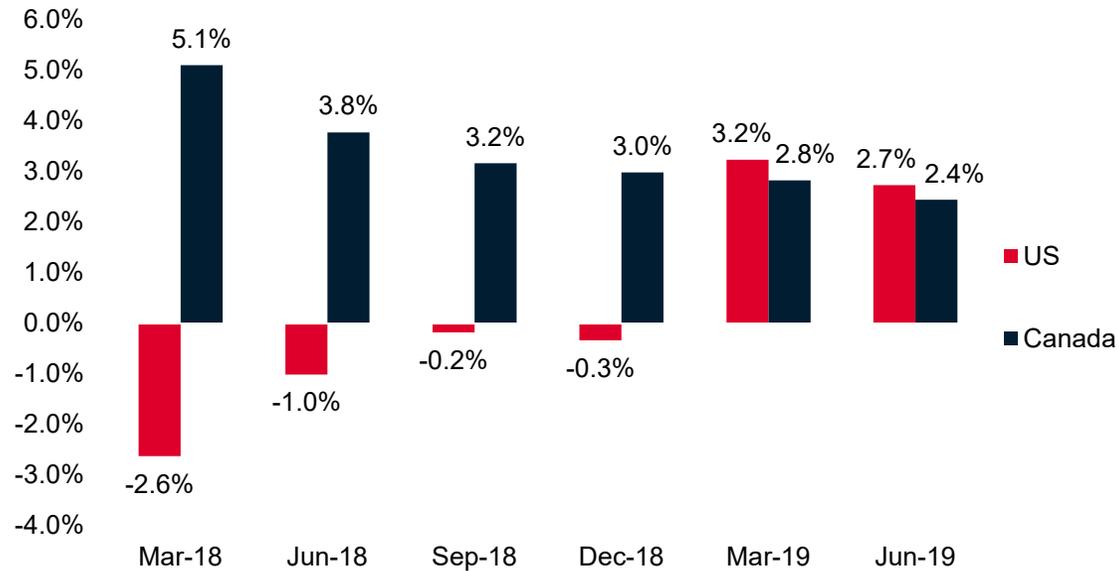
Canada's mobile market remains strong as disruption lurks, while growing 4G adoption is the priority in the Caribbean

- Mobile service revenue growth in Canada has remained strong, growing by 2.6% year-on-year in the first half of 2019. The end of the period saw changes abound in Canada, as Rogers became the first national mobile operator to launch unlimited LTE data plans, in addition to device financing options. In a bid to prevent Rogers gaining an advantage, Bell and Telus have responded with their own take on these propositions.
- 4G adoption remains low in parts of the Caribbean, such as Jamaica and Puerto Rico. In these markets, challenges persist around the affordability of services among low-income segments. Improvements to mobile coverage in Puerto Rico and smartphone adoption in Jamaica should accelerate 4G take-up.

Satellite communications and CBRS: new players and new opportunities

- Resurging interest in satellite communications and the upcoming commercial launch of the CBRS initiative brings new players to North America's connectivity market.
- It also provides opportunities for mobile operators. New satellite deployments can support hybrid networks for IoT connectivity (e.g. AT&T's Satellite Dual Mode). In addition, the CBRS initiative can boost mobile broadband capacity and enable further fixed wireless deployments.

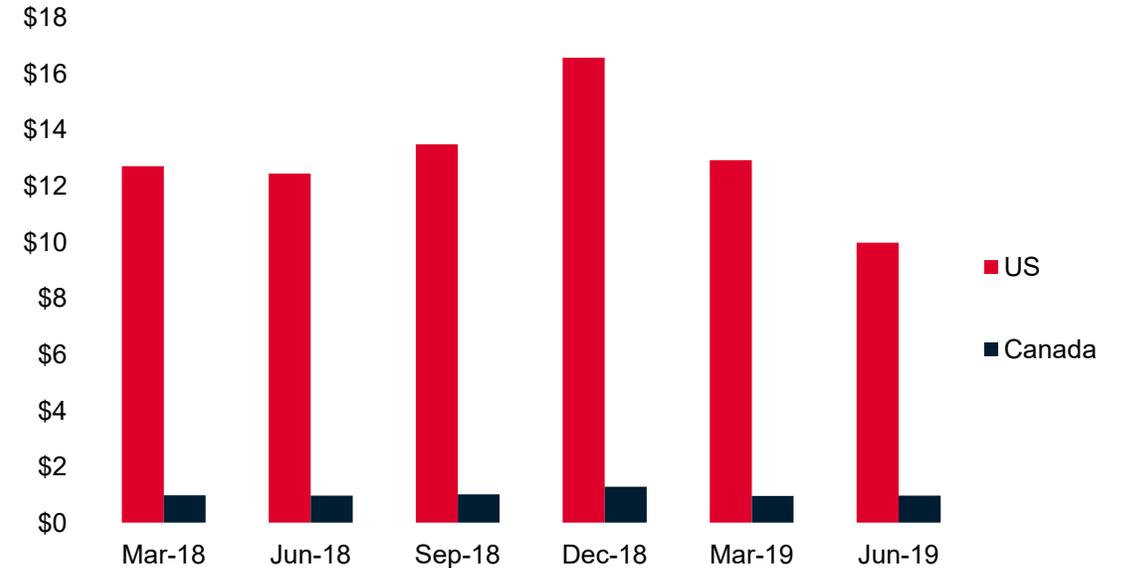
Quarterly mobile service revenue growth (year-on-year)



Figures are adjusted to account for introduction of IFRS accounting in 2018.
Source: GSMA Intelligence, company reports

- US operators had a strong start to 2019, driven by customer upgrades to unlimited plans, reduced pressure from the reseller market and prepaid to postpaid migrations. There is headroom for further growth as the take-up of unlimited plans and the launch of 5G services gather pace.
- Mobile service revenue growth in Canada remained strong in the first two quarters of 2019, though increased promotional activity led to a slowdown in growth compared with the previous year.

Mobile equipment revenues (\$ billion)



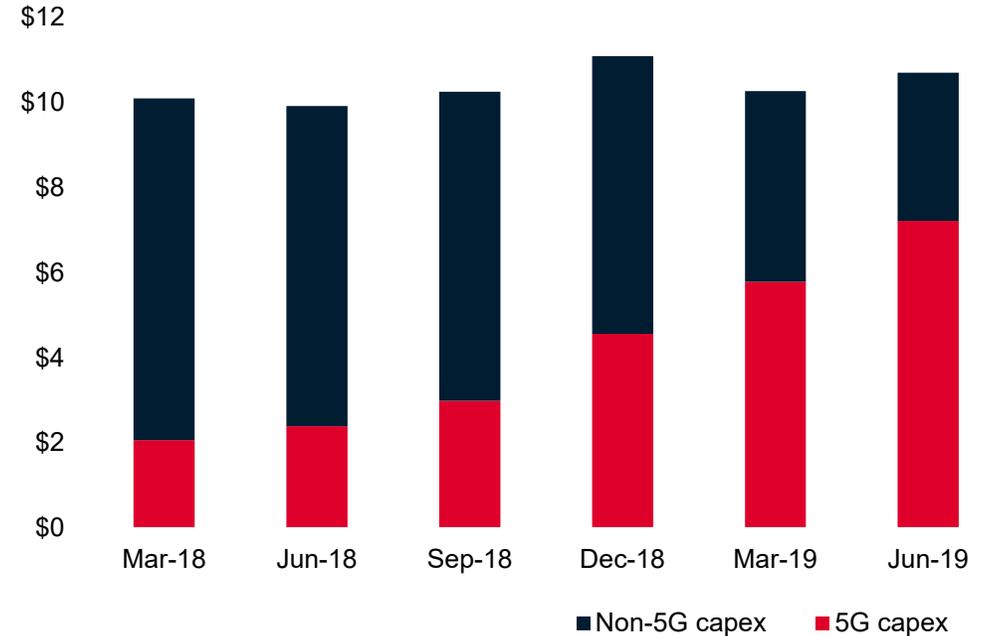
Figures are adjusted to account for introduction of IFRS accounting in 2018.
Source: GSMA Intelligence, company reports

- Declining US mobile equipment revenue is attributed to subscribers keeping devices for longer as smartphone innovation slows and premium handsets reach prices of \$1000+. This impacts operator postpaid device upgrade rates, potentially slowing 5G adoption.
- Mobile equipment revenue in Canada remains steady, but the recent introduction of device financing plans could lengthen replacement cycles, limiting growth in mobile equipment revenue.

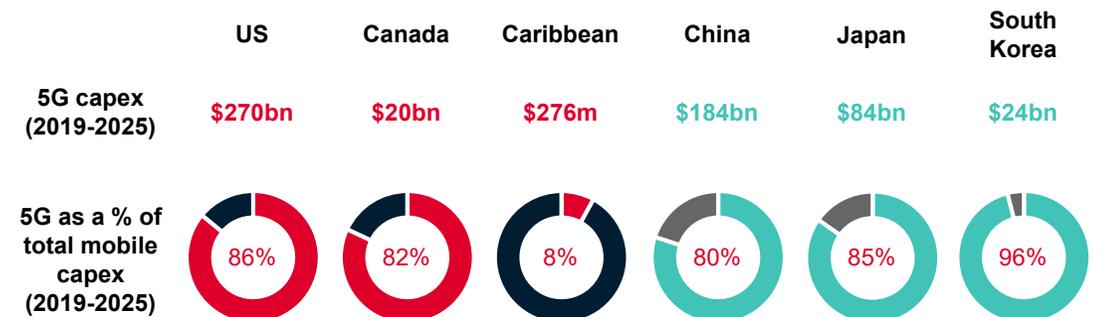
Regional market trends: 5G capex to rise rapidly

- 5G accounted for 61% of mobile capex in the US in H1 2019. The capex mix will increasingly lean towards 5G in the next few quarters – 5G is forecast to comprise 86% of total mobile capex in 2019-2025. Key drivers for this will include:
 - The deployment of mmWave in more locations across the US. This spectrum provides faster speeds and additional capacity in the busiest areas but requires a very high density of small cells to work at scale.
 - The rollout of low- and mid-band spectrum to provide nationwide 5G coverage, such as T-Mobile’s ongoing 600 MHz rollout.
 - The deployment of standalone (SA) networks, which use a 5G core and new radio.
- US operators will also continue upgrading LTE networks to support increased video and data traffic. Central to this will be the ongoing deployment of massive MIMO sites and small cells to boost LTE coverage and capacity.
- In Canada, LTE deployments remain an important focus. Less than a third of capex was apportioned to 5G in H1 2019; however, this figure will rise steadily as 5G moves from trials to deployments.
 - Significant fibre investments mean networks are ready to handle the uplift in data traffic in the 5G era; for example, 85% of Bell’s mobile sites have fibre backhaul.
- 5G is a longer term technology for the Caribbean, with the 4G investment cycle still in its infancy. Consequently, 5G will comprise only 8% of mobile capex in the region between 2019 and 2025.

North America mobile capex (\$ billion)



Source: GSMA Intelligence



Source: GSMA Intelligence

Technology

US: All major US operators have now launched commercial mobile 5G services:

- **April** – Verizon launched 5G commercial mobile services in Chicago and Minneapolis. This reached a total of nine cities by June, and a further 21 cities will be added by the end of 2019.
- **May** – Sprint is the only US operator not to deploy 5G using mmWave spectrum. It instead introduced 5G commercial services using 2.5 GHz spectrum in four locations. This gives it broader coverage (4 million people at launch) but lower speeds and capacity compared to networks using mmWave.
- **June** – AT&T's standards-based 5G network went live in 12 cities in December 2018, but it wasn't until June that the first 5G smartphone (Samsung Galaxy S10 5G) became available to buy for enterprise customers. The operator is prioritising 5G deployments in locations where there is enterprise demand. T-Mobile also launched the Samsung Galaxy S10 5G in June, with its mmWave network going live in six cities.

Canada: In Q2 2019, Rogers, in partnership with Ericsson, completed its first successful 5G test calls in Branson, Toronto and Vancouver.

Regulatory

US: In June, the FCC named the winners of the 24 GHz and 28 GHz auctions, which raised \$2 billion and \$700 million respectively (the 28 GHz auction raised around 20% more on a USD/MHz/Pop basis): AT&T bid \$982 million for 831 24 GHz licences; T-Mobile bid \$803 million for 1,346 24 GHz licences; and Verizon bid \$505 million for 1,066 28 GHz licences. US Cellular and Starry also acquired spectrum, demonstrating the demand for mmWave in rural areas and fixed wireless access. Notably, cable companies did not acquire licences, despite preregistering for the 24 GHz auction.

Canada: The Innovation, Science and Economic Development Canada announced the 600 MHz auction results in April. Rogers acquired 52 of 64 available licences, spanning every province and territory. The strong propagation characteristics of 600 MHz will allow Rogers to quickly provide broad 5G coverage and improve indoor penetration. Telus also acquired 600 MHz spectrum, while Bell did not participate in the auction because of its strong 700 MHz holding and focus on the 3.5 GHz and mmWave auctions (set for 2020 and 2021 respectively).

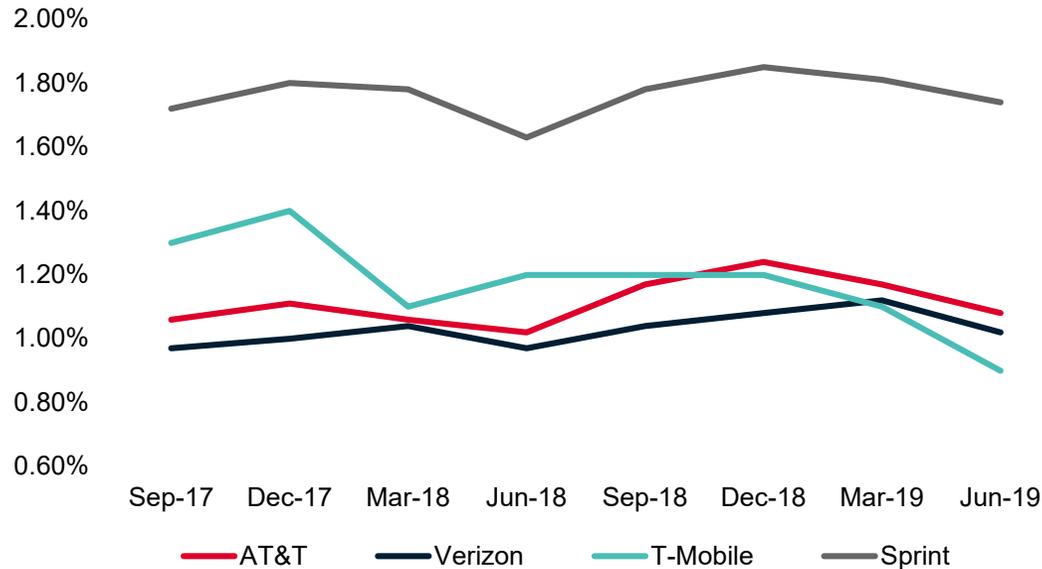
Competition

US: The FCC and the US Department of Justice have provided clearance for the merger of T-Mobile and Sprint. Pending settlement of state-level lawsuits aiming to block the merger, the transaction will create a mobile operator with the scale and investing power on level with the US's two largest mobile operators. This will be a pivotal development as 5G investment expands. As part of the merger concessions, Sprint will divest its prepaid business and a portion of spectrum to Dish (for \$5 billion), ostensibly to keep the US a four-player market in the long term.

Canada: In July, Canadian operators introduced device financing plans. Commonplace in the US, these plans allow customers to pay off their smartphone purchases in either 24 or 36 monthly instalments with 0% interest. This is important given the rising price of premium smartphones. However, the Canadian Radio-television Telecommunications Commission (CRTC) has requested the removal of the 36-month option, citing that it will make it difficult for consumers to switch providers. Rogers and Telus subsequently removed their 36-month plans.

US: T-Mobile's churn success and AT&T's prepaid gains

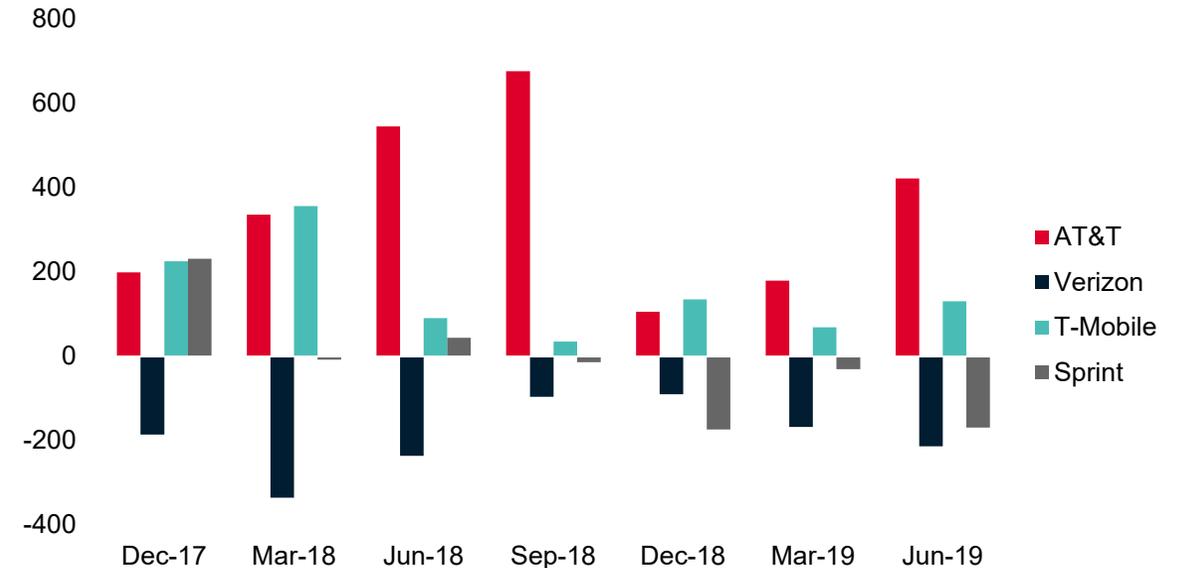
Branded postpaid churn (year-on-year)



Source: GSMA Intelligence, company reports

- The four major US operators recorded a fall in branded postpaid churn in Q2 2019, which is typically a quieter promotional period, meaning lower switching volumes.
- T-Mobile is now the US market leader for branded postpaid churn (though Verizon still leads in branded postpaid phone churn), driven by the Uncarrier brand, improvements to its mobile network and customer service initiatives (e.g. Team of Experts initiative).
- Employing a similar formula to reduce Sprint's branded postpaid churn will be crucial for realising the potential of the T-Mobile/Sprint merger.

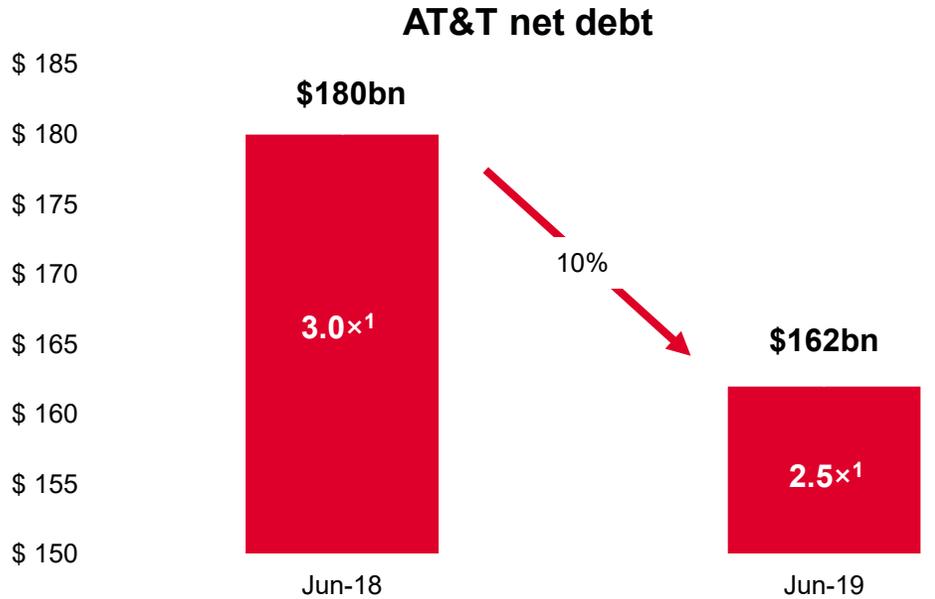
Retail prepaid net additions



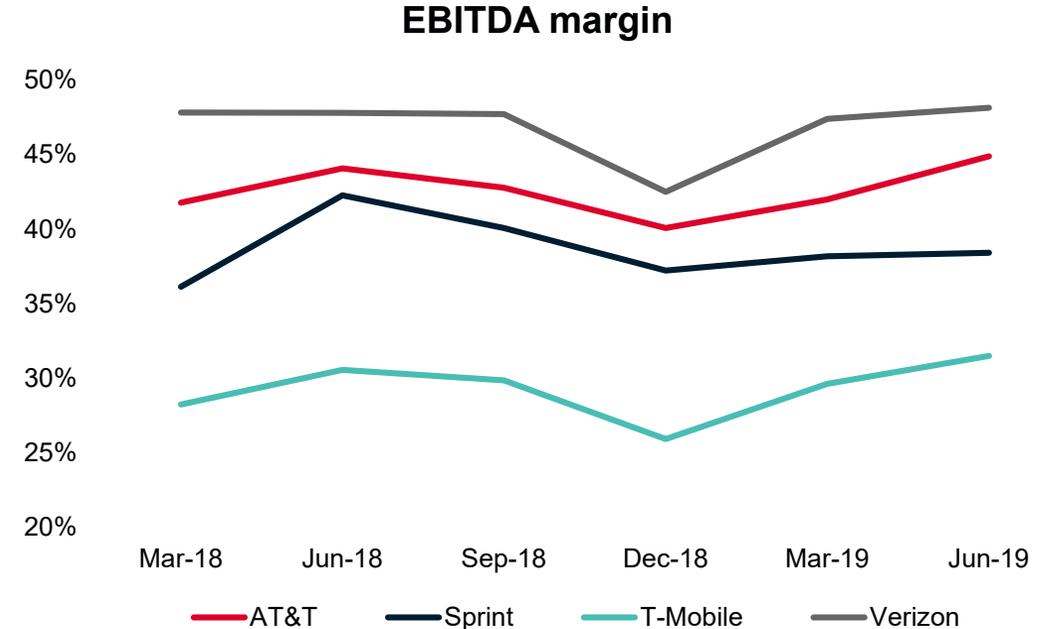
Source: GSMA Intelligence, company reports

- AT&T's prepaid growth is underpinned by the continued success of its Cricket brand. Targeting the high-value prepaid segment, Cricket reached 10 million subscribers in H1 2019 (double the amount it had when AT&T acquired it in 2014).
- Verizon's prepaid losses reflect its growing focus on the postpaid segment. Prepaid connections account for under 10% of Verizon's total mobile connections (excluding IoT) compared with 20% and 37% for AT&T and T-Mobile respectively.
- T-Mobile's retail prepaid net additions slowed in H1 2019 (compared with H1 2018) as the operator prioritises prepaid to postpaid migrations (235,000 in H1 2019) to secure the higher ARPU and lower churn of the postpaid segment.

US: an improving financial outlook



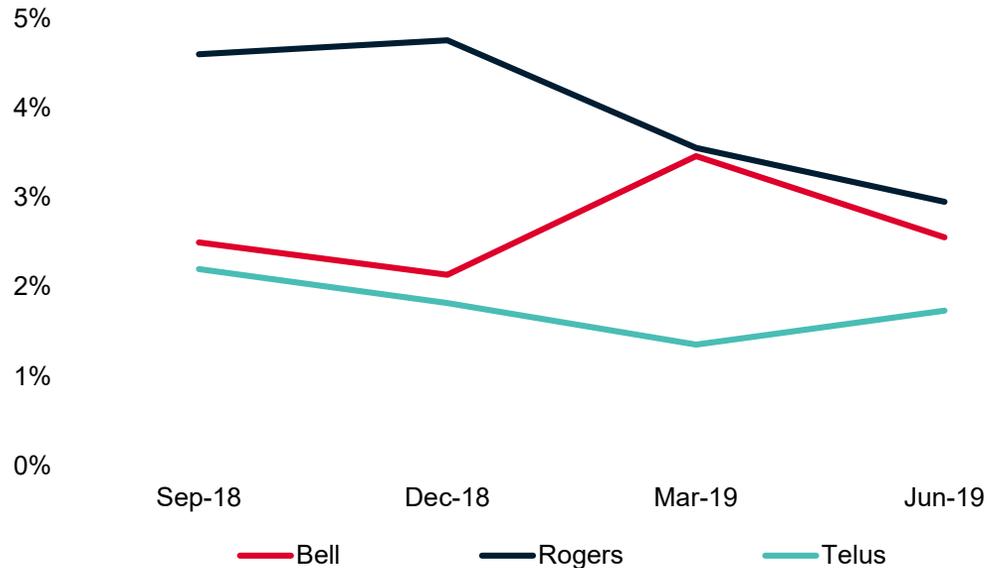
¹Net debt to adjusted EBITDA ratio
Source: GSMA Intelligence, company reports



Source: GSMA Intelligence

- A strategic priority for AT&T is reducing the debt it has taken on from recent acquisitions. Its free cash flow position helps with this: AT&T generated \$8.8 billion in free cash flow in Q2 2019 (more than Verizon, T-Mobile and Sprint combined).
- AT&T generated \$3.6 billion in cash in Q2 2019 from the sale of its Hulu stake and Hudson Yards office tower. To speed up its deleveraging plan, AT&T could sell further non-core assets, simplifying its operations in the process.
- Verizon's net unsecured debt to adjusted EBITDA ratio was 2.1x at the end of the quarter. As Verizon approaches its target of 1.75-2.0x, there will be scope to deploy the incremental capital it will generate.
- T-Mobile's lower margins are a sign of the operator's struggle to balance growth and profitability. It has undoubtedly achieved the former, but sustained ARPU growth remains elusive. Margin improvements in H1 2019 therefore underscore its increased scale and improved cost management.
- Sprint's EBITDA margin growth was flat in Q2 2019, as a result of service revenue pressure and increased cost of service because of its decision to extend roaming agreements to expand LTE coverage.

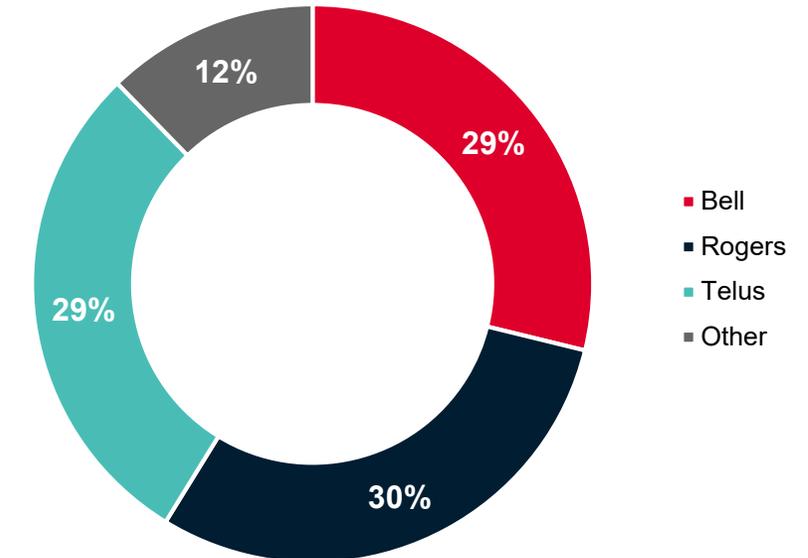
Quarterly mobile service revenue growth (year-on-year)



Figures are adjusted to account for introduction of IFRS accounting in 2018
Source: GSMA Intelligence, company reports

- The strong mobile service revenue growth of recent quarters could be destabilised by the three national operators' launches of unlimited mobile data plans with no overage fees (starting at \$75 per month) at the end of June 2019.
- With overage fees typically accounting for less than 5% of revenue and some legacy capped data plans costing over \$75 per month, the biggest risk to operators is more customers trading down, rather than up, to unlimited plans.
- The removal of overage fees on unlimited plans potentially reduces operator costs, as inbound call volumes for billing queries will be reduced, offsetting the threat to revenue growth.

Postpaid market share (Q2 2019)

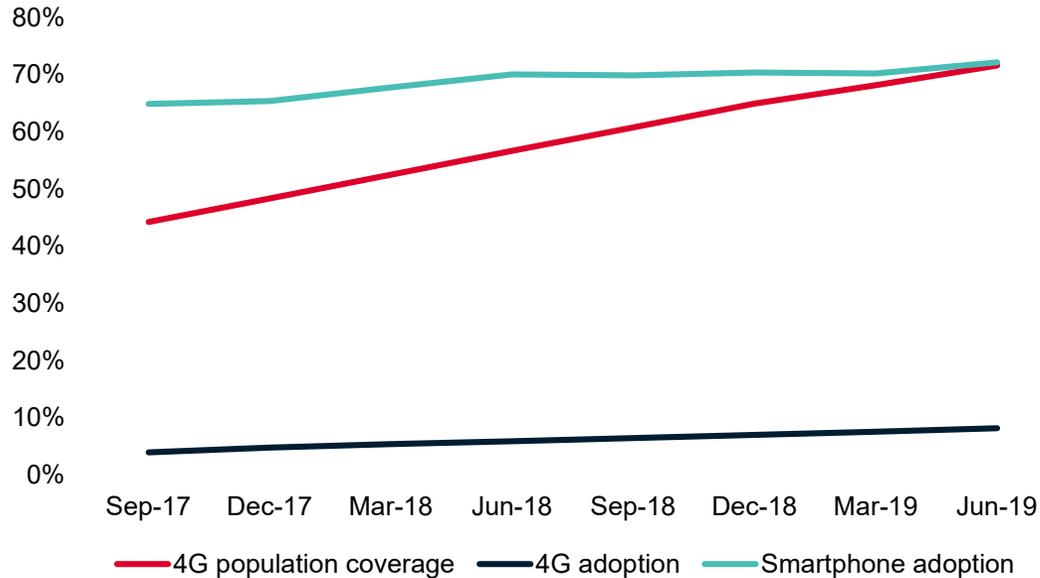


Source: GSMA Intelligence, company reports

- Rogers reported strong initial take-up of its unlimited proposition: 365,000 customers (around 3% of its total subscriber base) were on the new plans after six weeks.
- The launch of unlimited data plans could help the three national mobile operators maintain market share against regional operators, such as Freedom Mobile, which have steadily gained customers by selling plans with large data allowances.
- The elimination of overage fees and launch of device financing plans demonstrate the efforts of operators to deliver additional value to consumers ahead of the completion of the CRTC's mobile market review.

Caribbean: 4G adoption lags in Jamaica and Puerto Rico

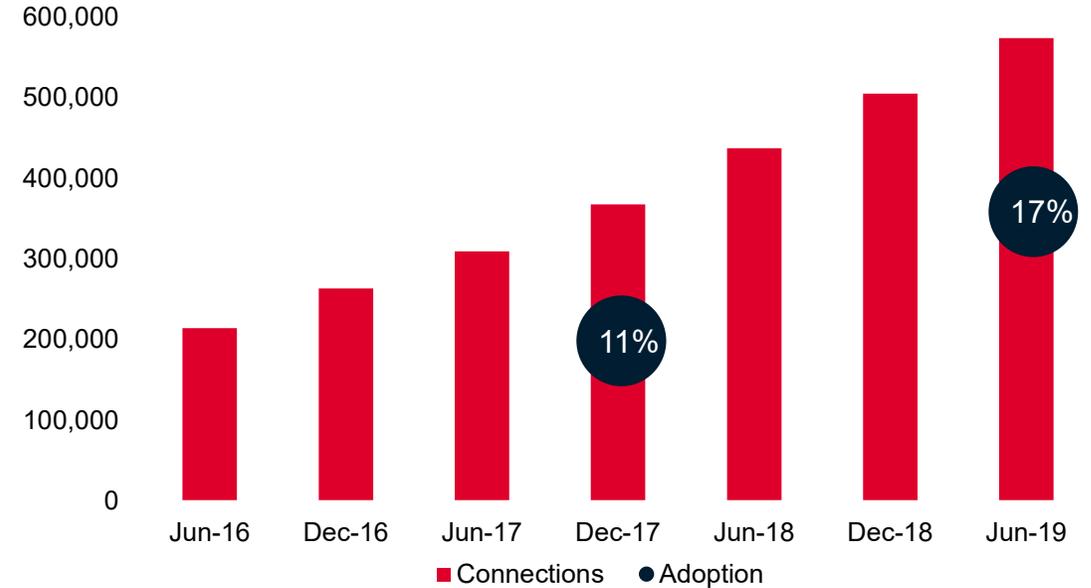
Jamaica: 4G versus smartphone adoption



Source: GSMA Intelligence

- Jamaica has one of the lowest 4G adoption rates in the Caribbean, despite high 4G population coverage and smartphone adoption.
- To stimulate 4G adoption in Jamaica, Liberty Latin America’s Flow introduced free unlimited (zero-rated) access to social media apps and 500 MB/1 GB for YouTube, easing customer concerns about 4G data allowances being used up too quickly.
- The benefits of growing 4G adoption are clear: Liberty Latin America reports that ARPU for 4G subscribers is 1.5× higher than for non-4G subscribers. 4G also increases engagement levels, which enhances customer satisfaction and reduces churn.

Puerto Rico 4G take-up



Source: GSMA Intelligence

- 4G adoption is steadily rising in Puerto Rico, but challenges persist around the affordability of services among low-income groups.
- T-Mobile completed its 4G rollout in Puerto Rico using 600 MHz spectrum in August 2019. This low-band spectrum enables the operator to achieve nationwide population coverage, allowing subscribers outside of urban areas to access 4G.
- As well as increased costs from extending LTE coverage, operators experienced downward pressure on operating margins from reconstructing mobile networks in the aftermath of Hurricane Maria in September 2017.

CBRS: boosting capacity and deploying FWA in rural areas

- Citizens Radio Broadband Service (CBRS) opens up 150 MHz of the 3.5 GHz band (3550-3700 MHz) using a spectrum management approach with three access tiers:
 - **Incumbents:** includes the US military, satellite providers and wireless ISPs. A spectrum access system (SAS) protects users from interference from lower tiers.
 - **Priority access licence (PAL):** holders buy rights to use a portion of the available spectrum – but can only use it when not in use by incumbents. The PAL spectrum auction will not take place until 2020 and will use county-sized licence areas with 70 MHz of spectrum sold in blocks of 10 MHz.
 - **General authorised access (GAA):** users will be permitted localised access to any portion of the band when not in use by incumbents or PAL holders.
- The 3.5 GHz band has emerged as a key 5G licence band in many countries outside of the US; CBRS will therefore benefit from the economies of scale that will emerge in the market for network equipment and consumer devices.
- Initial CBRS commercial deployments will begin following the CBRS launch event in September. Deployments will use LTE, with CBRS support for 5G expected in 2020.

Key CBRS use cases for mobile operators

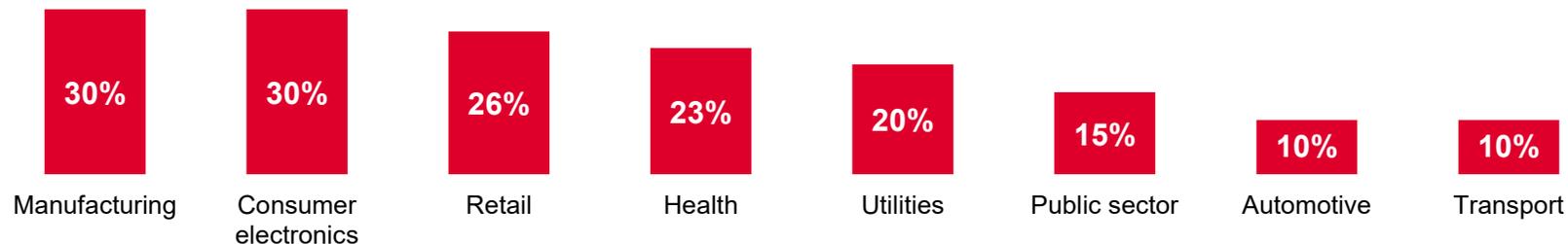
	Fixed wireless access (FWA)	Mobile broadband
CBRS role	3.5 GHz spectrum has greater propagation characteristics than high-band frequencies such as mmWave. This reduces the need to deploy additional small cells, helping to improve the FWA business case, particularly in rural areas.	GAA provides open access to spectrum. Although it still requires the installation of compatible network equipment, this tier provides a low-cost solution for boosting capacity and speeds, especially in dense urban areas where data traffic is highest. Capacity can be boosted further through PALs, which can be obtained in the 2020 auction.
Interested companies	Mobile operators, cable companies and wireless ISPs.	Mobile operators and MVNOs (which offload data traffic to CBRS, reducing fees owed to the host network).
Implications for mobile operators	Deployments will mostly be limited to rural areas, where it is difficult to deploy mmWave or fibre. However, US operators deploying FWA have to devote sufficient spectrum bandwidth to deliver speeds that would rival cable/fibre. This will unlikely be significantly affected by CBRS, because of the limited volume of spectrum available.	CBRS allows operators to access additional spectrum to boost capacity. This will be especially useful for operators that lack mid-band spectrum. However, CBRS is less suitable for delivering 5G services because of the limited volume of spectrum available (each operator need access to 80-100 MHz of contiguous spectrum in mid-range bands for 5G services).

Other CBRS use cases have attracted interest from a wide range of companies

	Neutral host network (NHN)	Private network
Use case	A neutral host is a third party that deploys its own small cell network and sells capacity to one or multiple mobile operators on a wholesale basis. An NHN is most common as a localised deployment requiring ultra-high bandwidth in a compressed area with high footfall (e.g. stadia, entertainment venues or shopping centres) or to absorb capacity at the edge.	A private network is a dedicated slice of bandwidth allocated for the sole use of a specific customer. Enterprises are increasingly choosing private networks to digitise operations at location-specific environments (e.g. factories) for the increased security offered by isolating their data from public networks.
CBRS role	CBRS makes it easier for a third party to deploy an NHN as it does not require mobile operators to share licensed-spectrum infrastructure. The third party can also use CBRS spectrum to build an NHN without risking interference with an operator's mobile network.	Localised spectrum licences through CBRS enable the deployment of location-specific networks. GAA licences allow private network applications to be tested without the cost of acquiring spectrum (excluding SAS access fees).
Interested companies	Wi-Fi hotspot operators (e.g. Boingo), equipment vendors and tower companies.	Mobile operators, equipment vendors, cloud companies and enterprises (particularly from the manufacturing vertical).
Implications for mobile operators	NHNs provide a more economical way for operators to improve indoor coverage (which is important given the use of higher frequency spectrum in 5G networks), reducing the risk of poor session continuity and damage to the customer experience.	Operators are, in theory, the default provider of private networks to service enterprises. However, the CBRS model makes it easier for enterprises to build and operate their own networks or collaborate with third parties. Consequently, CBRS could increase infrastructure competition, forcing operators to spend capex more selectively (i.e. where there is established enterprise demand).

Source: GSMA Intelligence

Requirement for location-specific network coverage by vertical (% of US respondents)



Source: GSMA Intelligence Enterprise Survey 2018

Resurging interest in satellite communications

New players have the financial clout and expertise to challenge incumbent satellite operators; initial commercial services will launch in early 2020.

	Companies involved	FCC filings	Initial deployments*	Milestones
OneWeb	Hughes Network Systems, Softbank, Virgin Group	1,980 satellites	650 satellites	Feb 2019 – Sent the first six satellites for its broadband constellation into orbit.
Project Kuiper	Amazon	3,236 satellites	3,236 satellites	July 2019 – Made its first filing to the FCC. Amazon is currently hiring staff for Project Kuiper.
Starlink	SpaceX	11,943 satellites	4,425 satellites	May 2019 – Put 60 satellites into orbit for its broadband constellation, though 10 have since been decommissioned.
Telesat	Amazon (Blue Origin) Google (Loon)	512 satellites	117 satellites	Oct 2018 – Piloted the first ever low Earth orbit (LEO) in-flight satellite broadband service.

* If initial deployment plans progress to completion, this would equal four times the number of active satellites currently in orbit for any purpose.

Source: GSMA Intelligence, company reports

Three broad market segments exist for satellite:

- **Fixed broadband** – SpaceX and Amazon plan to target the 17% of US households which remain on legacy copper lines and the 20% that have no fixed broadband at all. In Canada, the government has pledged \$500+ million to support Telesat’s efforts to connect a million homes.
- **Rural broadband** – New satellite constellations can provide rural mobile internet provision and backhaul capacity in emerging markets, where local market conditions constrain the provision of ground-based networks from operators.
- **IoT** – Satellite companies can target specific verticals (e.g. aviation, logistics and maritime) with connectivity services, such as unit tracking. OneWeb, Project Kuiper, Starlink and Telesat have all expressed their interest in this area.

Implications:

- These offerings will have lower latencies and faster speeds compared to existing satellite services (e.g. Viasat) because the new satellite constellations will be closer to the earth. Cost challenges for new constellations remain but, if resolved, these offerings could compete with 5G FWA in rural areas.
- For satellite operators, partnering with mobile operators that can provide sales and distribution capabilities in these locales will be crucial. This therefore represents an opportunity for mobile operators.
- By targeting specific verticals, satellite companies potentially threaten the growth of licensed cellular technologies, such as LTE-M and NB-IoT. Operators can counteract this by working with satellite companies to offer hybrid networks (e.g. AT&T’s Satellite Dual Mode addresses gaps in its wireless coverage).

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