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# The Personal Mobile Content Explosion

Understanding the Opportunities in Mobile Operator Cloud Storage

Prepared for:





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# Introduction

There is little doubt that smartphones and other mobile gadgets in wide use today are among the most personal devices the world has ever known. Users carry them wherever they go and rely on them for their most personal of tasks – from communicating with friends and family to creating, consuming and sharing media of all types, including downloaded video, real-time music streams and countless ‘selfies’ and other photos. Mobile devices, services and content aren’t just mission-critical – they are essentially ‘life-critical’ to users. Customers can’t live without them – or at least without feeling significant pain.

However, dealing with all of that mobile content has created serious headaches for mobile users – and a significant opportunity for mobile operators, which are well positioned to help their customers seamlessly manage their growing stores of mobile content. There are two points in the mobile content lifecycle when customer pain becomes particularly high: (1) when local files grow bigger than local storage capacity, forcing users to find other storage options or delete precious files; and (2) when users change or upgrade devices and suddenly must come to grips not only with how much content they own and how difficult it is to move onto their new device – but also just how devastated they would be to lose a single contact, photo or media file in the process.

Those customer-driven realities have created the opportunity for mobile operators to offer personal cloud services to help with customer content storage and management needs. Beyond that, major changes in how the mobile industry works – in particular, the end of phone subsidies and the advent of frequent device upgrade programs – has made managing personal mobile content an even bigger challenge for mobile users, while at the same time presenting to operators a much-needed ‘sticky’ service they can offer to keep customers from churning away to competitors.

In this Black & White paper – commissioned by Synchronoss Technologies – 451 Research examines exclusive consumer-survey and device-forecast data to better understand the scope, impact and opportunity of the personal mobile content explosion, including:

- How much and what types of content are mobile users creating, downloading and storing? To what extent will mobile device and other technology improvements drive even more content storage?
- How do changes in the way users purchase and upgrade their mobile devices affect how these users create, store, manage and transfer their personal mobile content?
- How can mobile operators best take advantage of these personal content and industry trends to capture incremental cloud storage and content management revenue and become more valuable to their customers?

## METHODOLOGY

The survey data used in this report was collected in December 2015 by 451 Research using a Web-based survey to query 504 US-based smartphone users on their personal content usage. The sample included respondents primarily between the age of 15 and 50 and was gender-balanced. Forecasts of smartphone purchases – including total number of smartphones sold, operator-led sales and holiday-season device sales and upgrades – were built using 451 Research’s quarterly device forecast data and models. Historical smartphone sell-in and sell-through data is provided by 451 Research’s archived estimates. Forecasted data is modeled from historical regional and country-level trends, with adjustments from demand-side inputs. Key supply-side inputs for quarterly smartphone shipments and sell-through are derived from information provided by device OEMs, OS platform/UI suppliers, mobile operators, third parties and 451 Research estimates.

# Table of Contents

---

**1. THE (PAINFUL) REALITIES OF MOBILE DEVICE STORAGE** **1**

*Figure 1: Smartphone Storage Space* . . . . .1

---

**2. WHAT IS TAKING UP ALL THAT STORAGE SPACE?** **2**

CONTACTS . . . . . 2

*Figure 2: Contacts Stored on Smartphone* . . . . .2

PHOTOS . . . . . 3

*Figure 3: Photos Stored on Smartphone* . . . . .3

VIDEO . . . . . 4

*Figure 4: Videos Stored on Smartphone* . . . . .4

MUSIC . . . . . 5

*Figure 4: Music Files/Songs Stored on Smartphone* . . . . .5

APPS. . . . . 6

*Figure 5: Apps Stored on Smartphone* . . . . .6

PERSONAL CONTENT STORAGE OF A TYPICAL MOBILE USER . . . . . 7

*Figure 6: Personal Content Storage of a Typical Mobile User* . . . . .7

---

**3. BETTER MOBILE CAPABILITIES = MORE MOBILE CONTENT** **8**

*Figure 7: Desired Capability Improvements* . . . . .8

*Figure 8: Increase in Future Use* . . . . .9

---

**4. UNDERSTANDING THE EVOLVING MOBILE DEVICE LANDSCAPE** **10**

MOBILE DEVICE PURCHASE TRENDS . . . . .10

*Figure 9: US Smartphone Sales Forecast* . . . . .10

**5. MAKING THE MOST OF THE PERSONAL CLOUD OPPORTUNITY** **12**

*Figure 10: Types of Storage in Use* . . . . . 12

*Figure 11: Moving Content to New Smartphone.* . . . . . 13

**6. APPENDIX** **14**

CONSUMER SURVEY DEMOGRAPHICS . . . . . 14

*Respondents' Age* . . . . . 14

*Respondents' Age & Gender* . . . . . 14

*Respondents' Smartphone Type/OS.* . . . . . 15

*Smartphone OS and Service Provider* . . . . . 15

SMARTPHONE SALES FORECASTS . . . . . 16

*United States (sell-through figures, units = thousands)* . . . . . 16

*United Kingdom (sell-through figures, units = thousands).* . . . . . 16

*France (sell-through figures, units = thousands).* . . . . . 17

*Germany (sell-through figures, units = thousands)* . . . . . 17

*Italy (sell-through figures, units = thousands)* . . . . . 18

*Spain (sell-through figures, units = thousands)* . . . . . 18

# 1. The (Painful) Realities of Mobile Device Storage

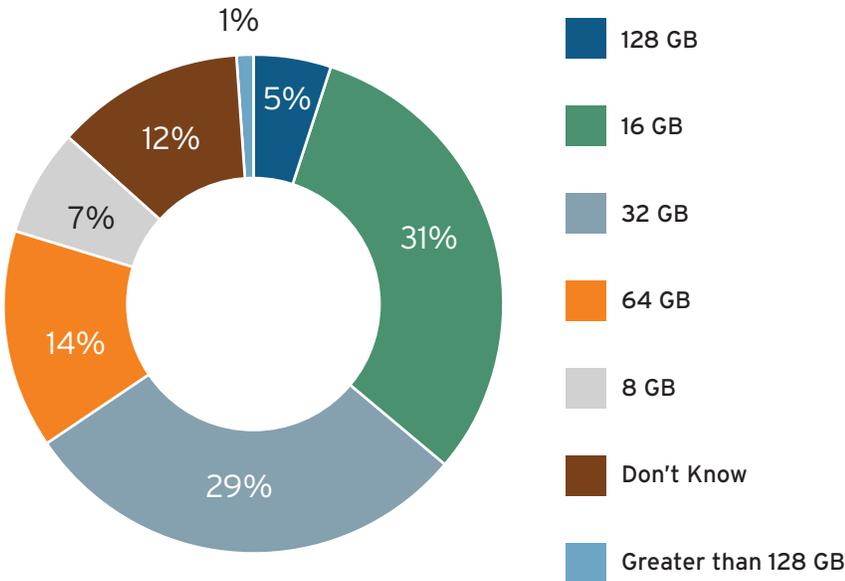
In these highly mobile times, owning and using a smartphone has become an everyday reality. But it is what is *on* that smartphone that really matters: contacts, photos, songs, videos, apps. These things are the currency of our mobile lives – incredibly useful, personally valuable and unfortunately vulnerable. If you have ever misplaced an important contact, had an everyday app suddenly turn buggy, or seen an important file disappear into the digital ether, you know firsthand just how important – how *personal* – mobile content is today.

Yet today's smartphones are imperfect vessels. They have limited local storage capabilities. Additional storage capacity can be costly. Consider the iPhone 6. An entry-level model offers a paltry 16GB of storage (and only about 12 GB of 'true capacity' for actual file storage) for \$649. Moving up to 64GB costs another \$100; doubling it again to 128 GB costs yet another \$100. And that is for a device that gets upgraded to new versions twice per year, encouraging customers to trade out frequently in order to stay up to date with the latest capabilities. The Android device ecosystem is much the same, with high-end phones priced in the same stratosphere and with much the same storage capacities and per-GB costs.

Given those hefty price tags, it's not surprising that mobile users today often make real trade-offs between storage capacity and price. In our survey, 16GB was the most common amount of storage available on a user's smartphone, and the majority of respondents (60%) were using phones with 32GB or less. Just 5% saw the value – and sprung for the cost – of a phone with 128MB of storage (see Figure 1). As we look more closely at the amount of content being stored on today's devices, the limits and headaches caused by those storage levels becomes more apparent.

**Figure 1: Smartphone Storage Space**

Q: How much storage space do you have on your current smartphone? (n=504)



# 2. What Is Taking Up All That Storage Space?

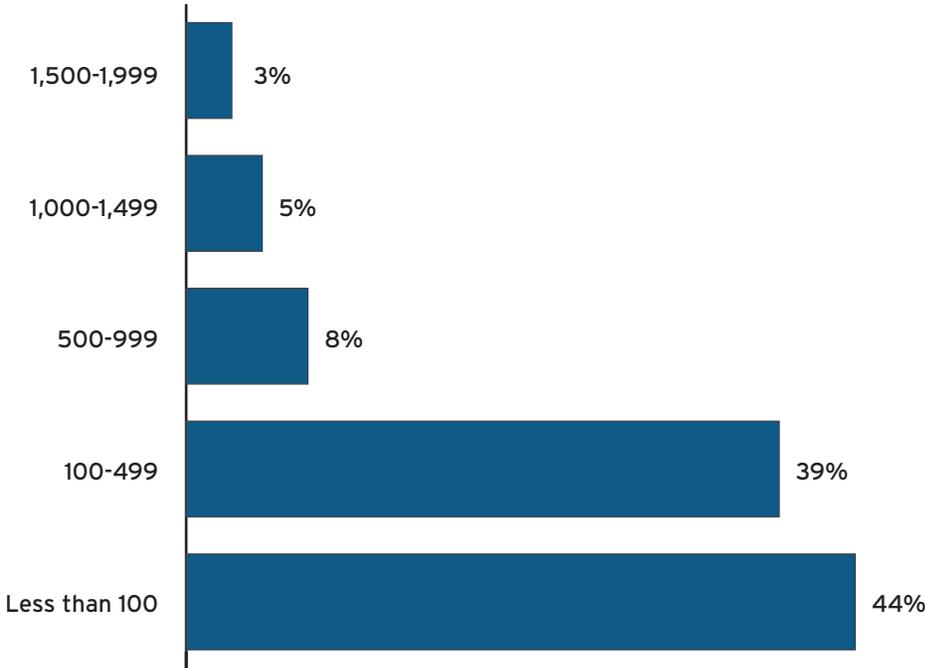
As uniquely personal devices, the content of each smartphone is no doubt unique as well. However, some common content and media file types certainly prevail. Mobile phones today are most typically used to communicate with others (contacts); interact with mobile content sources (apps); create and share media (photos and videos); and consume media (songs and videos). As we will see, mobile users accumulate those files at an aggressive pace. And as connectivity and device processing power improve, the size of those files is growing exponentially as well. More files – and more large files – very quickly place a significant strain on local device storage capacity.

## CONTACTS

There may be no more important piece of information on a phone than one’s contact list. Despite the multitude of ways people use their smartphones these days, they remain at their heart communications devices. And to communicate, one needs to know information about other people – their phone number, their email addresses, their instant messaging aliases, etc. According to our survey, 81% of respondents have 500 or fewer contacts on their smartphones, with the average being around 300 contacts. The majority of respondents add five or fewer contacts to their phone per month. But in this case, pure numbers or individual file size aren’t necessarily the issue. What is most important is the ability to accurately store, manage and – as needed – transfer contacts from one application to another, and from one device to the next. When it comes to contacts, pure storage isn’t the main issue; the ability to seamlessly and safely manage and transfer contacts is.

**Figure 2: Contacts Stored on Smartphone**

Q: How many contacts do you currently have in your smartphone? (n=504)



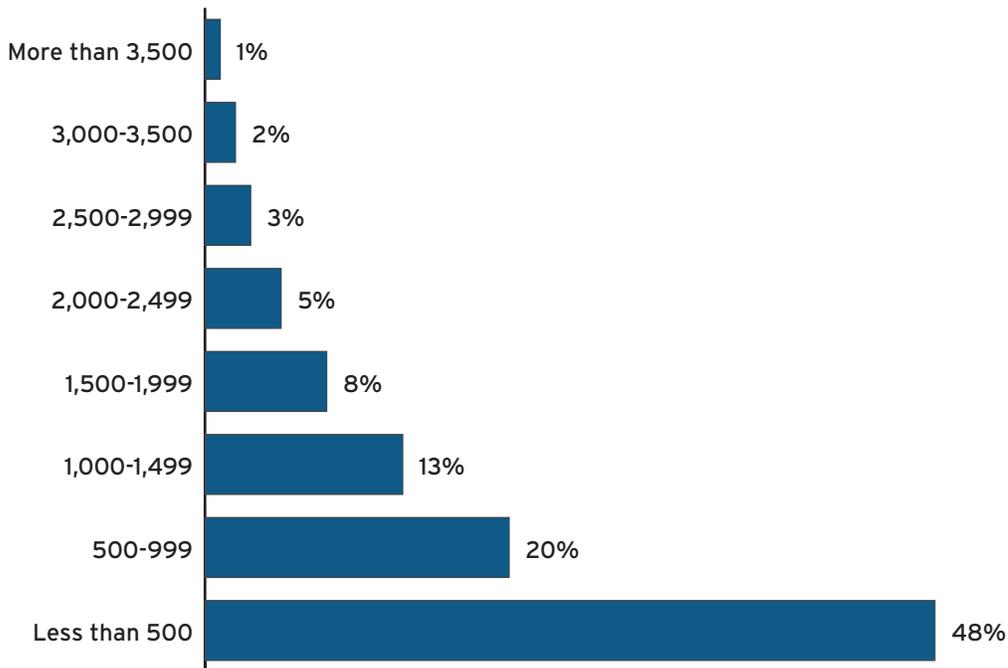
## PHOTOS

Instagram. Flickr. Twitter. Facebook. Snapchat. Photos sit at the center of some of the most-used mobile applications, and that's not even counting classic 'take a selfie, text it to a friend' behavior. Mobile users take photos to capture the world around them and to share those images with friends and family. And as smartphones have evolved, so have smartphone cameras. Not too long ago, an 8-megapixel camera was the smartphone norm. Today, high-end mobile devices like the Samsung Galaxy S6 sport 16-megapixel cameras, topping out with the 41-megapixel camera on the Nokia Lumia 1020.

While smartphone users can conserve storage by changing the settings on their camera and taking pictures at a lower resolution, most don't. According to our survey, 92% of respondents either shoot at the highest setting, or at their camera's default. Buy a 16-megapixel camera, and you will likely be shooting 16-megapixel images by default. And just how big are those images? For now we will assume most photos get stored in a compressed format like JPG (if not, raw photos are typically 10X bigger), meaning a 16-megapixel photo will take up about 4.8MB of storage. That is a hefty chunk. And while 48% of the surveyed mobile users have less than 500 photos stored on their phones, an average user stores about 750 photos on their phone. Using typical file sizes, those would take up about 3.6GB of storage, or nearly one-quarter of the available file storage on an iPhone 6 16GB device.

**Figure 3: Photos Stored on Smartphone**

Q: How many photos do you currently store on your smartphone? (n=504)

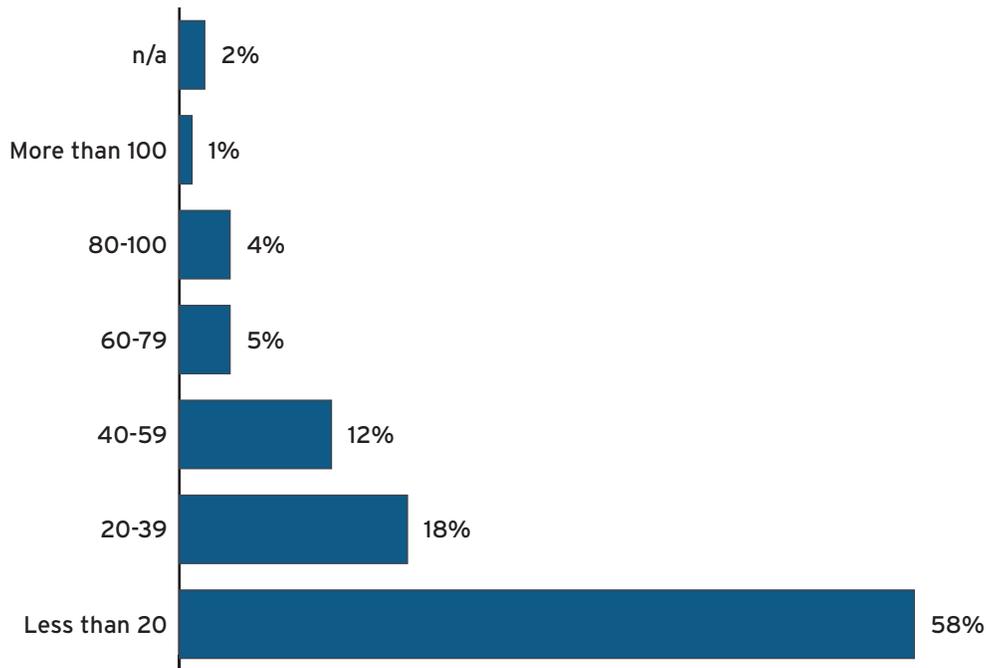


## VIDEO

Video is the wildcard of the mobile services world. It has become the most consumed file type for most mobile users. Streaming video (not saved to the device) accounts for more than 50% of all mobile video traffic, according to industry estimates. Video files have an equally large impact on local device storage. Video file sizes can vary widely depending on the type of compression used and the level of encoding, but as a rough estimate a one-minute video encoded at 1080p would take up about 124MB of storage. If a typical mobile user has around 10 videos stored on their device, averaging about three minutes each, that 30 minutes of video comes in at about 3.7GB of storage required.

### Figure 4: Videos Stored on Smartphone

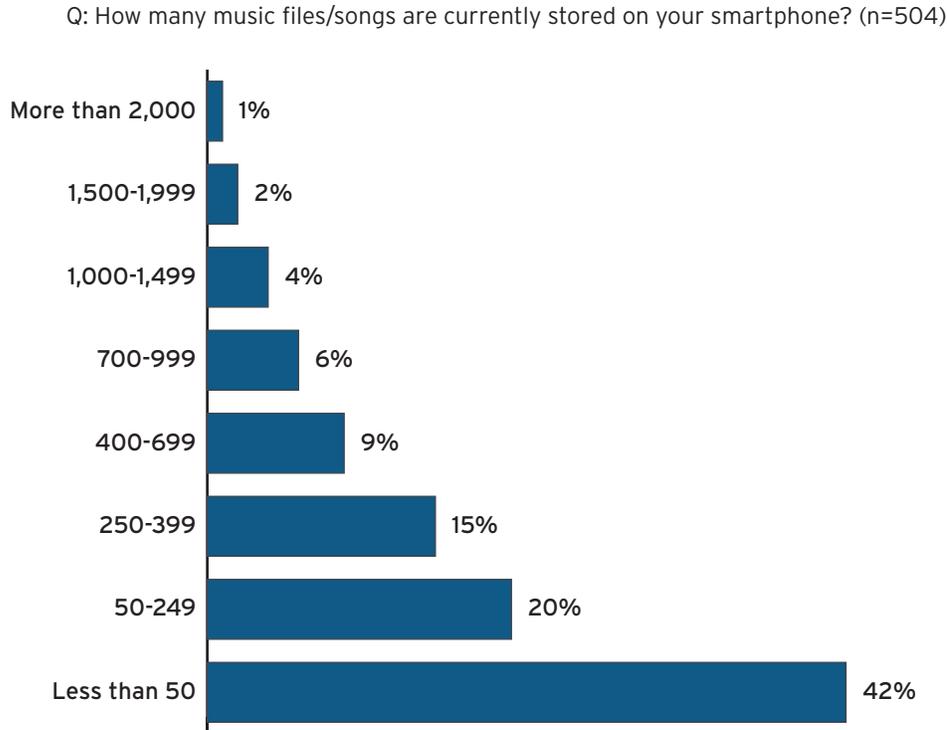
Q: How many videos do you currently store on your smartphone? (Including videos you recorded and those you downloaded e.g., YouTube) (n=504)



## MUSIC

As with video, streaming has become a major component of the mobile music market. But mobile users still like to have songs stored on their phone – whether downloaded from iTunes or marked ‘offline’ in Spotify or saved as MP3 files – so they can listen when away from their mobile network, or to avoid eating into their data caps. Also like video, the storage requirements for music files vary greatly depending on the encoding formats and levels. That said, 4MB represents a fair per-song average for MP3 files, which means that songs do have a major impact on mobile storage. According to our survey, a typical user has around 150 songs on their phone, which at 4MB per song, eats up 600MB of storage.

**Figure 4: Music Files/Songs Stored on Smartphone**

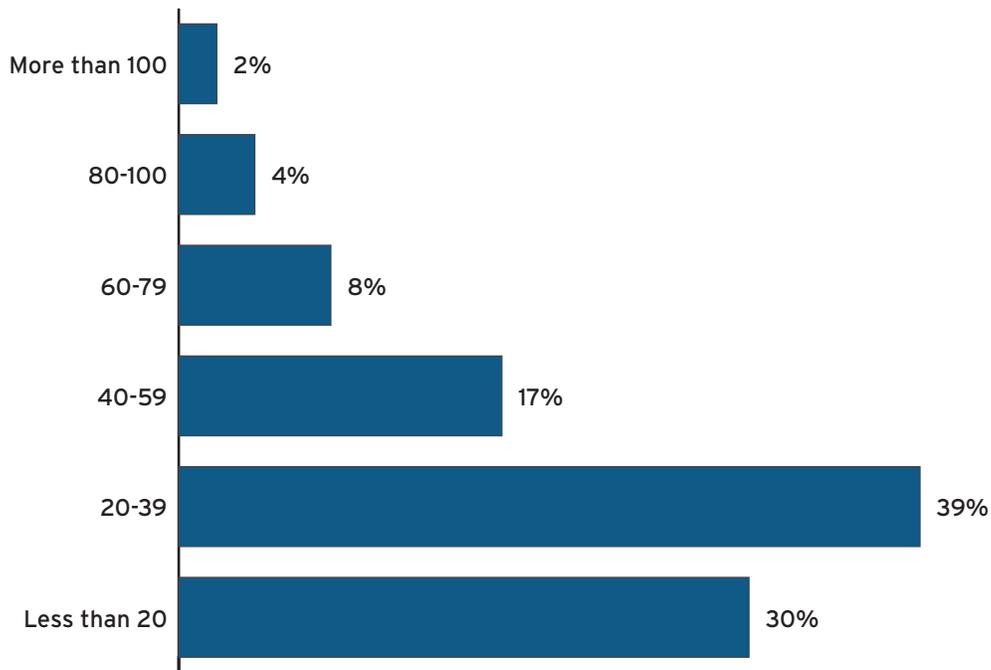


## APPS

Mobile users love apps – in many ways, they are what make smartphones truly powerful. They are easy to download and use – and also easy to download and forget. For that reason, most users have many more mobile apps on their phone than they realize. According to our survey, the largest percentage of users have between 20 and 39 apps on their phone – with a median value of 30 apps. The size of those apps are growing. Today the average mobile app is about 20MB in size, with games checking in at 60MB or even more. For the purpose of building our typical mobile user profile, we'll multiply 30 apps times an average file size of 30MB, for a total of 900MB of storage required.

**Figure 5: Apps Stored on Smartphone**

Q: How many apps do you currently have on your phone? (n=504)



## PERSONAL CONTENT STORAGE OF A TYPICAL MOBILE USER

Based on the consumer survey conducted as part of this study and other 451 Research data and estimates, we can generate a picture of the personal content storage needs of a typical mobile user (see Figure 6). Given the wide range and asymmetry of the data from the consumer survey, we have used median values to illustrate typical or average behavior.

**Figure 6: Personal Content Storage of a Typical Mobile User**

<b>PERSONAL CONTENT STORAGE OF A TYPICAL MOBILE USER</b>	
<b>CONTACTS</b>	<b>300</b>
Growth rate	3 per month
<b>PHOTOS</b>	<b>750</b>
Growth rate	19 per month
Average file size	4.8 MB
Storage required/Monthly increment	3.6 GB/91 MB
<b>VIDEOS</b>	<b>10</b>
Average length	3 minutes
Growth rate	2 per month
Average file size	124 MB
Storage required/Monthly increment	3.7 GB/744 MB
<b>SONGS</b>	<b>150</b>
Growth rate	4 per month
Average file size	4 MB
Storage required/Monthly increment	600 MB/16 MB
<b>APPS</b>	<b>30</b>
Growth rate	2 per month
Average file size	30 MB
Storage required/Monthly increment	900 MB/60 MB
<b>OTHER (WORD DOCS, PDFS, PODCASTS, ETC.)</b>	<b>2 GB</b>
<b>TOTAL STORAGE REQUIRED</b>	<b>10.8 GB</b>
<b>ESTIMATED TOTAL MONTHLY INCREMENT</b>	<b>911 MB</b>

# 3. Better Mobile Capabilities = More Mobile Content

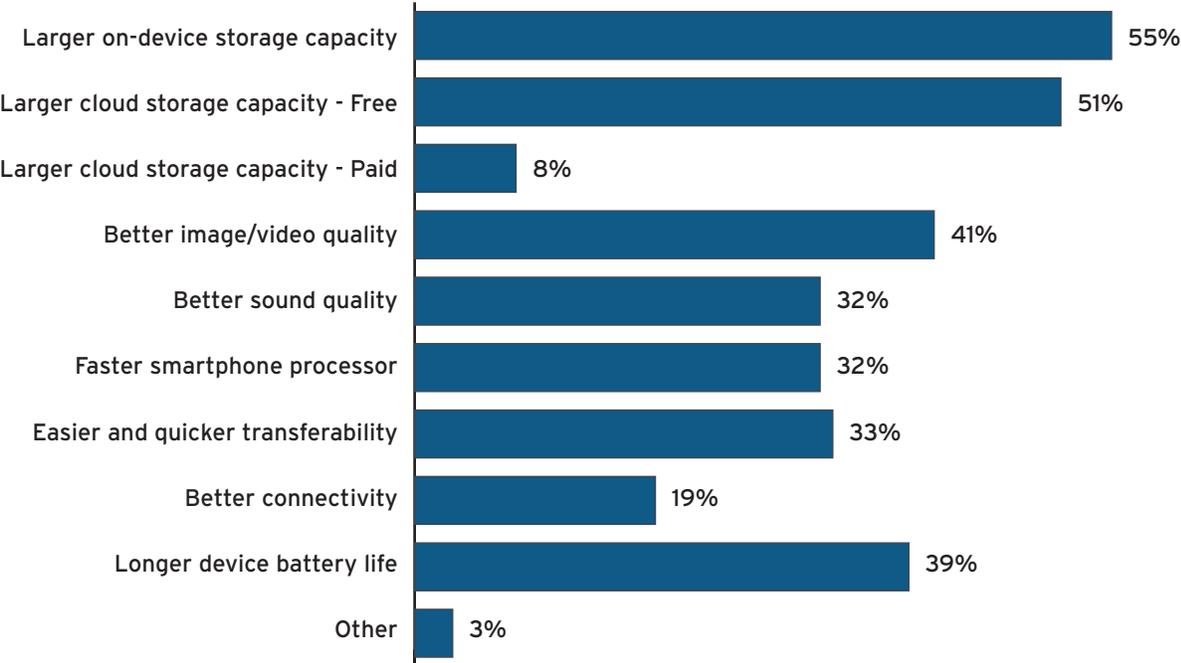
If anything, the amount of mobile content that gets created and stored will only grow as mobile phones and networks improve. We have seen this already as we examined the trends around various mobile file types, such as mobile video. The faster the mobile network, the more likely a user is to download and store larger media files like audio or video. Likewise, the more powerful the phone – i.e., better processor, battery life or storage – the more content an end user is able to keep and manage on their device.

As part of our survey of mobile users’ personal content habits, we specifically asked what capability improvements would most lead users to create/store even more mobile content. The results were illuminating:

- **More storage capacity has the biggest impact on mobile content creation.** More on-device storage capacity (55%) and free cloud storage capacity (51%) were seen to have the biggest impact on mobile content creation and storage.
- **Better content quality would also result in more local storage of content.** In particular, users said they would store more photos, videos and music, according to our survey results, if the image, video and sound quality were better.
- **Better device capabilities such as content management/transfer also have an impact on mobile content creation and storage.** Speedier processing (32%) and more efficient file transfer (33%) have significant impact on mobile content creation and storage, according to our survey results. Longer device battery life (39%) was also among the most desired capability improvements.

Figure 7: Desired Capability Improvements

Q: Which of the following capability improvements would encourage you to create/store more content (photos, videos, apps, etc.) on your smartphone? [select all that apply] (n=504)

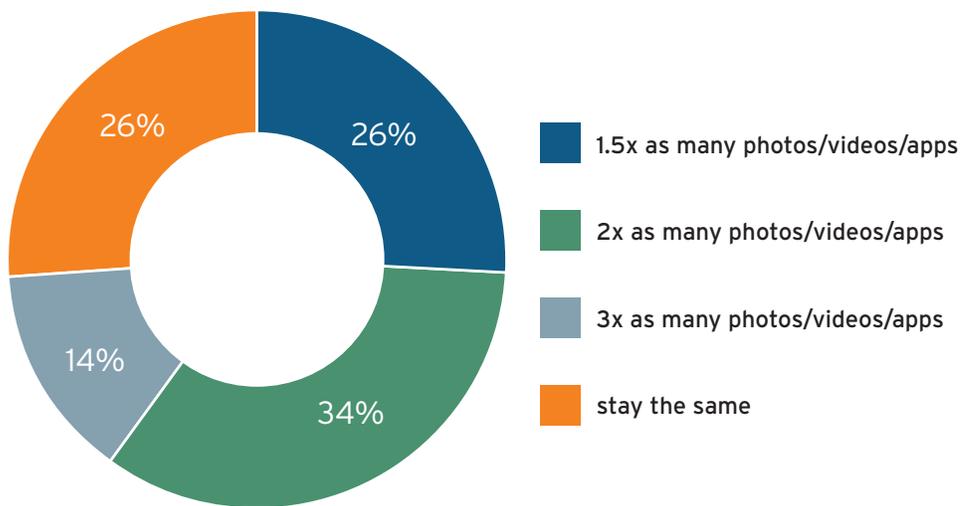


These responses make the case for even more personal mobile content being created and stored in the future. Devices will continue to improve, as will the quality of content they can create and consume. Most interesting is the impact that improved storage capabilities have on the amount of content created. With improved devices, more appealing content and better storage options, 74% of mobile users said they would create and store more content – in some cases, up to three times as much content as they do today.

Just as intriguing is the finding that storage alone isn't enough to encourage – or handle – such huge leaps in mobile content creation and storage. Users say they also require longer device battery life, better connectivity to move that content off their device and into the cloud, and easier and quicker transfer capabilities to help them better manage how content moves between their devices and cloud-based storage services.

### Figure 8: Increase in Future Use

Q: If your mobile device had the desired capability improvements (selected by you), how would that impact the current volume of content that you create/store on your smartphone (on average)? (n=504)



## 4. Understanding the Evolving Mobile Device Landscape

To fully understand the challenges and opportunities presented by the mobile content explosion, it is important to understand the changing dynamics of how users buy and upgrade their mobile devices. Users not only depend on their smartphones and other mobile devices to create, capture, download and store mobile content – but they must also work around the limitations of those devices when local storage proves insufficient, or when they must move content from an old device to a new one.

### MOBILE DEVICE PURCHASE TRENDS

To better understand those user dynamics, we have examined the smartphone purchase/upgrade habits of mobile users in six countries – US, UK, France, Germany, Italy and Spain (see Appendix). But to fully understand how such metrics are evolving, and how they impact mobile content creation and storage, let's take a closer look at perhaps the most rapidly evolving smartphone market – the US.

Figure 9: US Smartphone Sales Forecast

SMARTPHONE SALES FORECAST (IN UNITS) – UNITED STATES		
	2015	2019
<b>TOTAL SMARTPHONE SALES</b>	<b>144.7 MILLION</b>	<b>157.6 MILLION</b>
Operators	95.2 million	95.5 million
Retail/Distributors	49.5 million	62.1 million
<b>TOTAL IN-STORE SALES</b>	<b>85.6 MILLION</b>	<b>92.6 MILLION</b>
Operator Stores	53.8 million	57 million
Retail/Distributor Stores	31.7 million	35.6 million
<b>HOLIDAY SALES</b>	<b>33.3 MILLION</b>	<b>35 MILLION</b>

- **Total US smartphone sales will total 144.7 million in 2015, growing to 157.6 million in 2019.** The fact that sales continue to grow is significant given the level of smartphone saturation (i.e., virtually everyone who wants a smartphone today has one). This means most sales going forward will be not new sales but upgrades, with users needing to account for and move data and content from old phones to new ones.
- **Of those sales, 95.2 million (or 66%) will be sold by operators in 2015.** Those transactions give operators a chance to help customers move their personal data to their new devices, including providing offers of additional storage to both ease the move and satisfy future creation/storage requirements.
- **Of total smartphone sales, 85.6 million devices (59%) are sold in-store.** Of that number, operator retail locations account for 53.8 million units, and retailer/distributor stores another 31.7 million devices. In-store device sales or upgrades provide even more hands-on opportunities to help users with data/content storage and transfer issues.
- **The holiday season, defined as the eight-week period from mid-November through mid-January, creates a boost in handset sales.** While that period covers just 15% of the calendar year, it accounts for 23% of annual smartphone sales. That makes the holiday season a particularly important time for mobile operators to help their customers deal with personal content storage and management issues.

These raw numbers tell only part of the device sales/upgrade story, however, since the way that mobile operators sell and upgrade with their customers has changed drastically in recent years. In strongly postpaid-oriented markets, such as the US, two-year contracts and phone subsidies have largely been replaced by device financing, leasing and accelerated upgrade programs. Such dynamics have always been at play in prepaid markets, but moving them into postpaid markets – and super-charging them via accelerated device-upgrade programs such as T-Mobile Jump or AT&T Next – drastically alters the

device landscape. No longer are customers locked into their carrier relationship, nor are they stuck with devices for long periods of time. For example, with T-Mobile's new Jump on Demand program – the industry's most aggressive – customers can upgrade their high-priced smartphones up to three times in a single year. That keeps users up to date with the very latest devices, and potentially keeps mobile operators busy helping those customers transfer and store personal content at each step along the way.

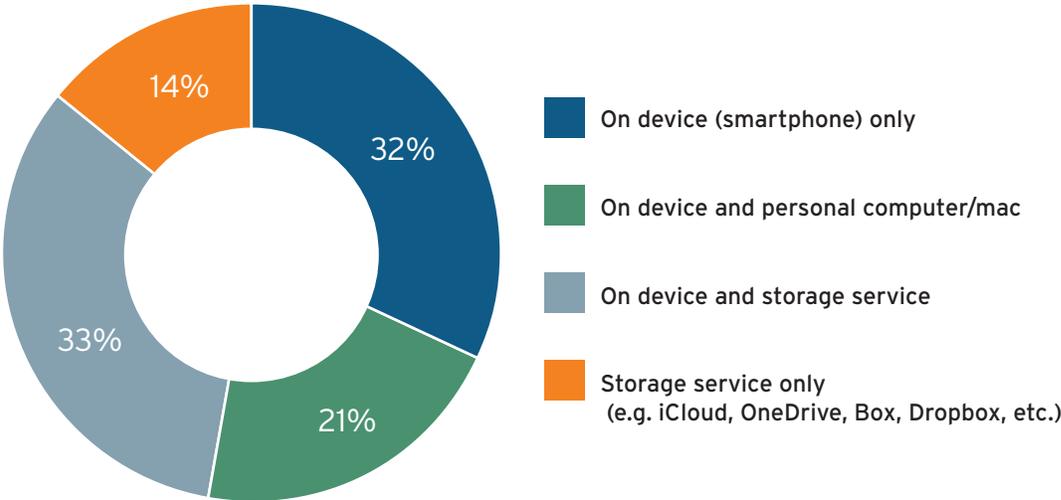
The move away from service contracts and device subsidies presents significant challenges to operators as well. Unlike in the past – where device subsidies, two-year contracts and early termination fees made it difficult for mobile users to change carriers – customers can churn away at any time. Beyond that, aggressive 'steal' promos by operators – such as paying off early termination fees or device financing balances – make it even easier for customers to leave a carrier. In that environment, it is paramount that operators find 'sticky' services that help keep customers on board. Device financing programs themselves represent one such service, requiring users to pay off their financing balances before they can depart. Another approach is to offer specific services that make it difficult or unappealing for customers to disconnect from services offered by their carrier – for example, an exclusive deal on a music streaming service; a mobile banking app that becomes entwined with a user's financial transactions; or a mobile content storage service that holds and helps manage a customer's most precious personal content and data assets.

# 5. Making the Most of the Personal Cloud Opportunity

Given the storage limits on most smartphones today and the proclivity of users to eat up available on-board storage capacity very rapidly, how best to manage that storage becomes a crucial concern for mobile users. And it's not just a capacity issue. Keeping one's important mobile content *only* on one's phone also greatly increases the risk of loss – lose the phone, have it stolen or suffer a crash, and all of the content on that device could be lost for good. Mobile users already understand those risks and limitations, and rely heavily on storage options beyond their device to manage their personal mobile content. According to our survey, just 32% of respondents use only their device to store mobile content. The majority of users (58%) count on other storage options as well – including 14% that rely on storage services only; 33% that manage storage across the device and a cloud storage service; and 21% that share content between their device and home computer.

**Figure 10: Types of Storage in Use**

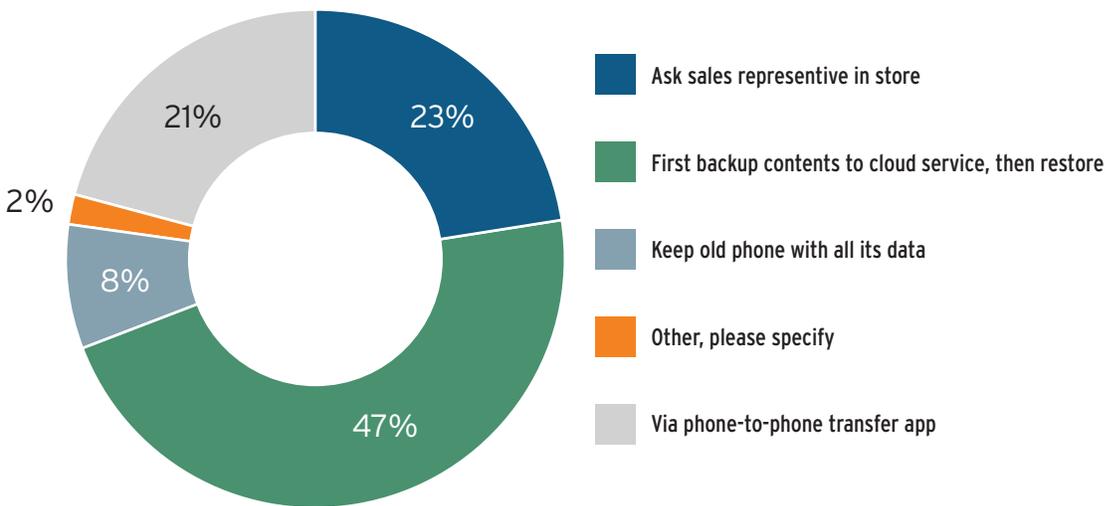
Q: Where do you store photos and videos taken with your smartphone? (n=504)



Just as important as having access to storage beyond the mobile device, users need assistance and tools to help them move content between devices – especially as device upgrade programs increase the opportunity for more frequent phone swap-outs. Today mobile users rely on two main capabilities to help them move content: 1) backing up data to a cloud service and then restoring it to their new phone (47%); and 2) having an in-store sales rep assist with the content transfer process (23%). Both use cases potentially put mobile operators at the center of the mobile storage and transfer equation, either by providing cloud-based storage or making available hands-on, in-store help to assist customers with their mobile content management, storage and transfer needs.

**Figure 11: Moving Content to New Smartphone**

Q: When upgrading/purchasing new device, how do you move your content to your new phone? (n=504)



By now it should be clear that the case for mobile users requiring – and mobile operators offering – personal cloud storage services is a strong one. To recap our survey findings and industry analysis:

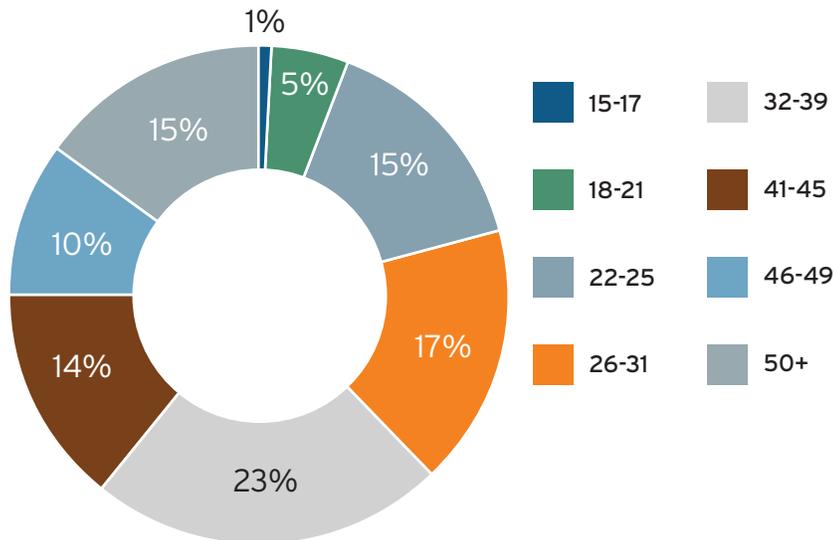
- According to our survey, the average mobile user stores about 11GB of content on its phone and creates additional 911MB per month (see Figure 6), which can easily and quickly stress the storage limits of a typical entry-level 16GB mobile device. That forces users to stop adding or start deleting content, or to seek additional storage beyond the device.
- Technology improvements spur the creation of additional mobile content. Even more than device or content improvements, the most important advances to our survey respondents include: larger mobile cloud storage capacity, better image/video/sound quality, longer device battery life, more network bandwidth, quicker processing, and improved content-transfer tools.
- Most mobile users already employ off-device storage to manage their mobile content, and rely on cloud storage and in-store personal help to transfer content when they upgrade to new devices.
- Industry moves away from device subsidies and service contracts toward device financing/leasing and frequent upgrade programs will mean that mobile users are eligible to change devices more often than in the past. Such changes also mean that mobile operators need sticky services to keep users from churning away to competitors once the traditional mechanisms like two-year contracts and early termination fees are no longer in play.

In the end, it is these underlying dynamics that continue to drive the personal mobile-content explosion. User demand is high. Technology trends support ever greater levels of content creation and storage. Overall industry direction signals the need for sticky services – including mobile cloud services – that help prevent churn. This combination of mobile-content realities underlies a strong case for mobile operators offering personal cloud storage services.

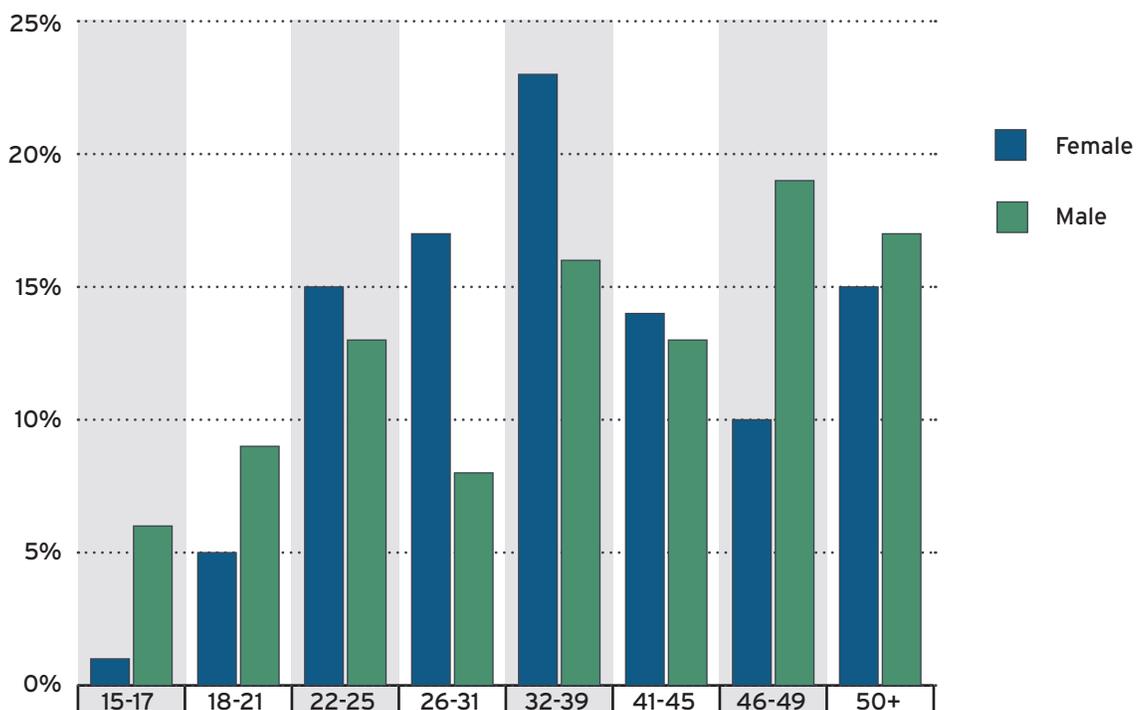
# 6. Appendix

## CONSUMER SURVEY DEMOGRAPHICS

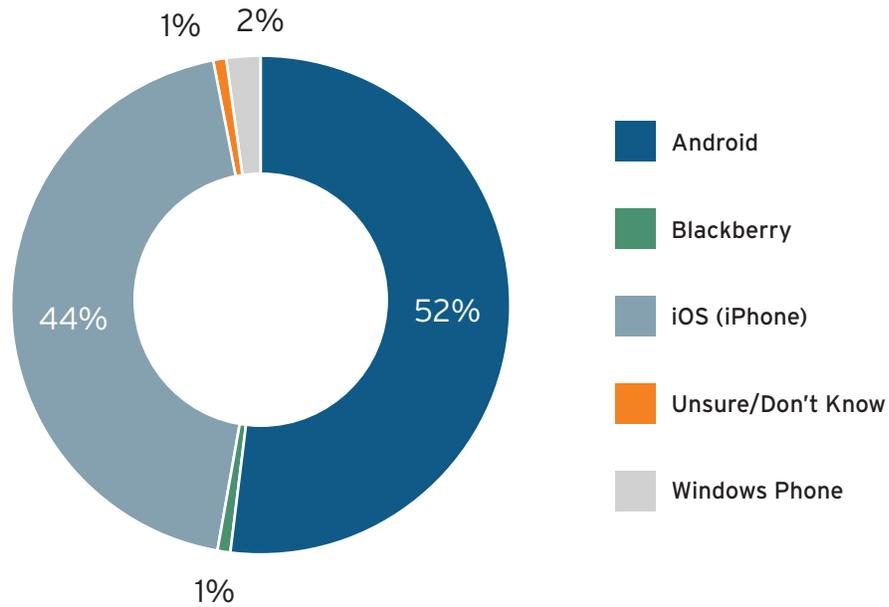
### Respondents' Age



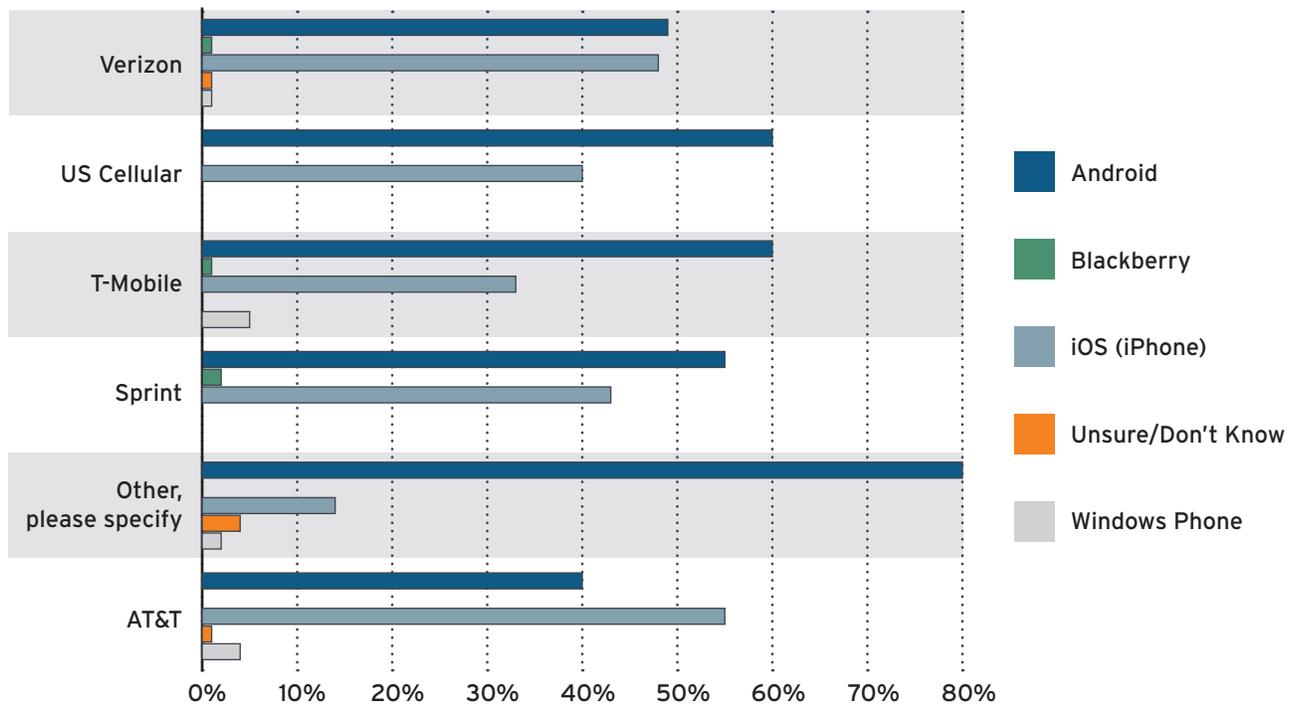
### Respondents' Age & Gender



Respondents' Smartphone Type/OS

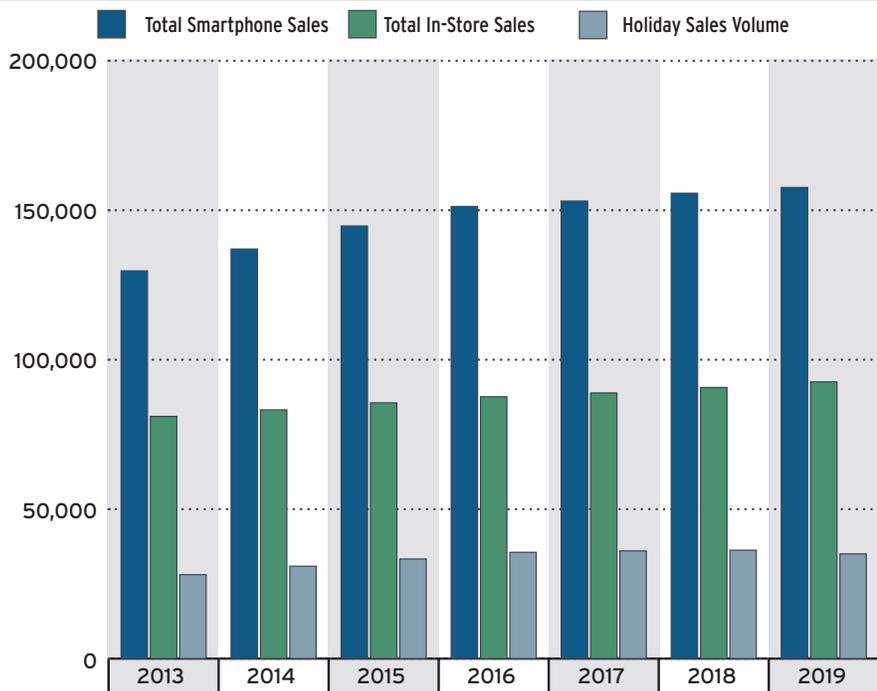


Smartphone OS and Service Provider

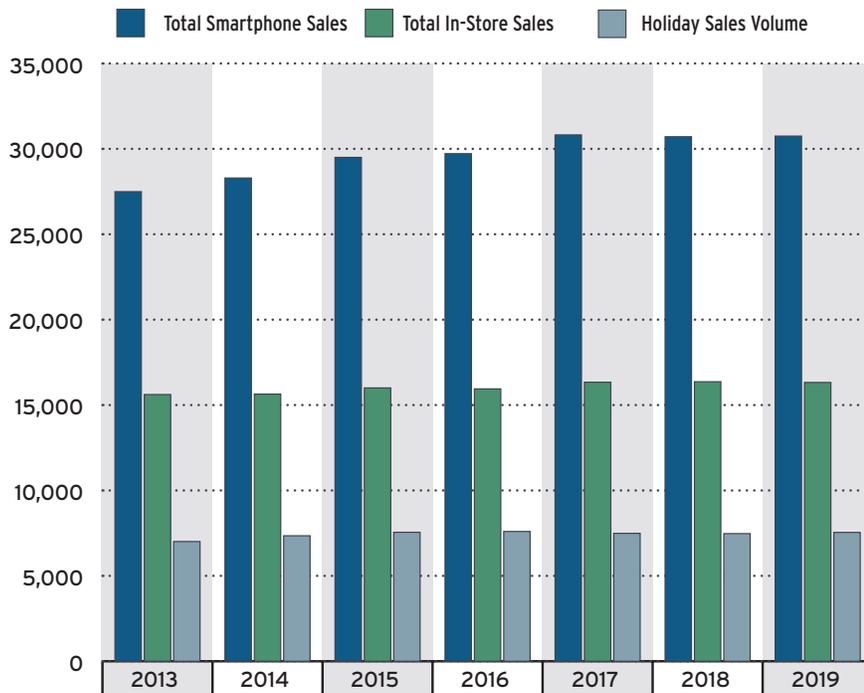


## SMARTPHONE SALES FORECASTS

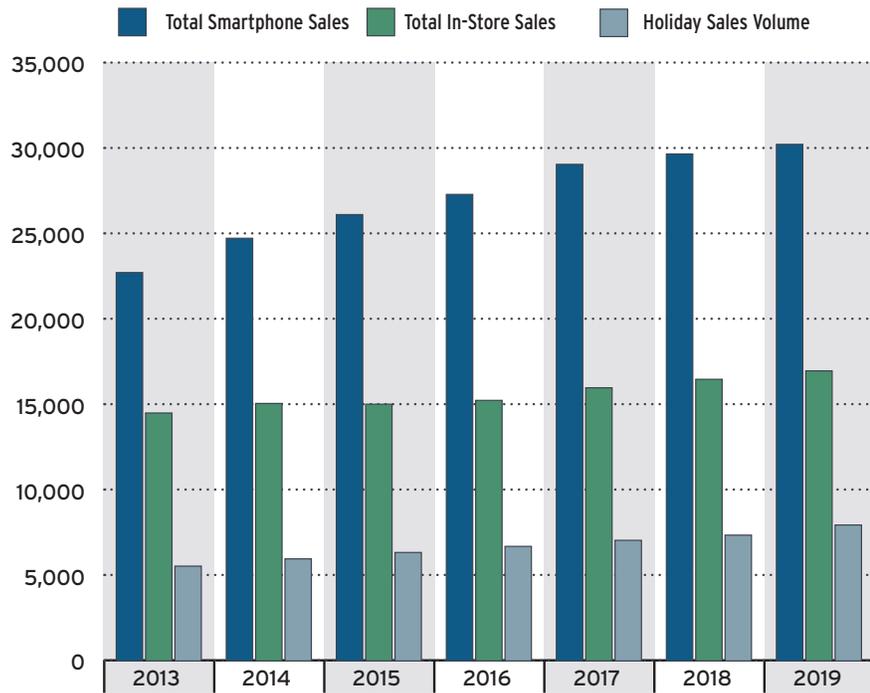
### United States (sell-through figures, units = thousands)



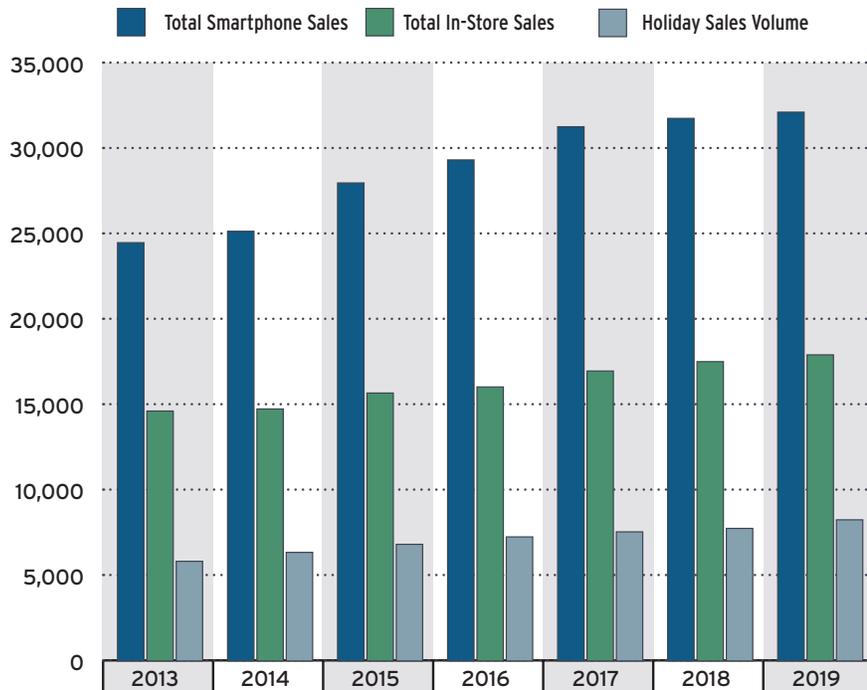
### United Kingdom (sell-through figures, units = thousands)



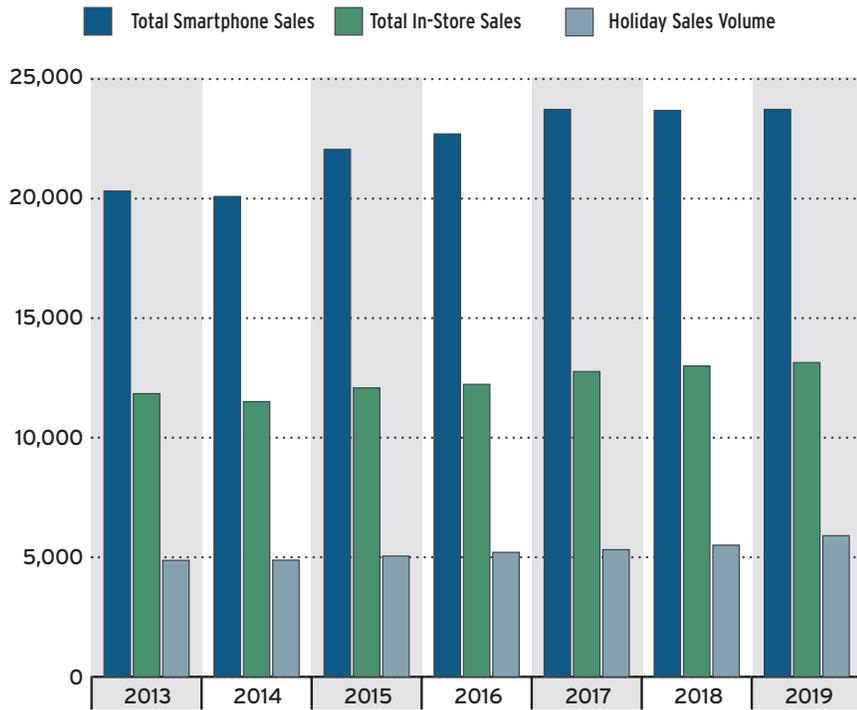
France (sell-through figures, units = thousands)



Germany (sell-through figures, units = thousands)



Italy (sell-through figures, units = thousands)



Spain (sell-through figures, units = thousands)

