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The Global Need for Mobile Support and Protection Services: From Handset Protection to Mobile Technology Support and Beyond

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INTRODUCTION AND OVERVIEW

Frost & Sullivan's research indicates that global smartphone penetration among mobile phone users will exceed 80% by 2020. As smartphones emerge as the primary device for both content consumption and content creation, the need to protect, support, manage, and optimize the overall mobile experience has become increasingly important to consumers. In order to address this market reality, leading carriers are moving from simply offering handset insurance to providing comprehensive, integrated mobile support and protection plans that include handset protection, data protection, and premium technical and application support.

This Frost & Sullivan insight will discuss the critical need for such services in the global mobile and wireless market, and demonstrate the forces driving the expansion of the traditional handset protection (i.e., phone insurance) category to comprehensive mobile support and protection solutions. It will outline the important benefits of mobile support and protection for consumers and carriers throughout the world. Moreover, the research will highlight how these services can ensure the seamless continuation of mobile subscribers' digital lives in the event of various disruption scenarios, including but not limited to the following:

- Device damage: Accidental damage to the mobile device hardware
- · Device loss and theft: Loss and theft of mobile devices
- Technical challenges: Questions related to overall use, hardware and software settings and configurations, and malfunction
- Data loss: Loss of either user-generated content or third-party data stored on the mobile device
- Security/privacy threats: Threats related to mobile security and data privacy, such as unauthorized access to device data or location settings

BACKGROUND OF HANDSET PROTECTION

Mobile carriers started offering traditional handset protection as a value-added service in the early 1990s. Over time, as wireless handsets became mainstream, consumer adoption of handset protection increased rapidly. With increased competition for customers in the early 2000s, many leading carriers around the world realized the customer retention capabilities of handset protection and began marketing these services aggressively to their customer bases. More recently, the global proliferation of higher-priced smartphones that are prime targets for malfeasance such as theft or hacking has led to a surge in the awareness and popularity of expanded handset protection services.



Exhibit 1 depicts the global smartphones and feature phone mix for mobile phone shipments from 2013 to 2020.

Note: All figures are rounded; the base year is 2013. Source: Frost & Sullivan

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IMPACT OF SMARTPHONES

The evolution from basic feature phones to smartphones has been nothing short of phenomenal. The emerging middle class in developing markets—such as Latin America, China, and India—has led to a shift in consumer spending toward more advanced smartphones and other "connected" consumer electronic devices. Advancements in network technologies, coupled with the proliferation of sophisticated mobile consumer and enterprise applications, continue to aggressively drive data usage on these devices. In fact, Frost & Sullivan's research indicates the average 4G smartphone user now consumes upward of 2 GB of cellular data every month. Unlike many traditional computing devices, such as personal computers, smartphones are not stay-at-home devices. They are used in virtually all environments, which leads to a variety of new risks that were never a consideration with earlier technologies.

KEY REQUIREMENTS OF MOBILE SUPPORT AND PROTECTION

While handset protection programs can help consumers get a replacement device quickly in the event of device loss, theft, malfunction or damage, current global market realities point to the need for enhanced mobile support and protection solutions that offer much more than simply device replacement. Frost & Sullivan's research indicates that mobile support and protection must be comprehensive and integrated with: 1) Mobile Handset Protection; 2) Mobile Device Support; 3) Mobile Data Protection; and 4) Mobile Application Support.



Exhibit 2 depicts the four pillars of mobile support and protection.

Source: Frost & Sullivan

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Exhibit 3 presents an overview of the key global trends, industry challenges, and key requirements of mobile support and protection.

	Key Market Trends	Key Industry Challenges	Key Solution Requirements*
Т	Growth in Smartphones	Increasing Smartphone Incidents	Mobile Handset Protection
2	Enhanced Device Capabilities	Managing Device Complexity	Mobile Device Support
3	Growth in Mobile Data	Loss of Mobile Data	Mobile Data Protection
4	Explosion in Mobile Apps	Supporting Mobile Applications	Mobile Application Support

* Requirements of Mobile Support and Protection

Source: Frost & Sullivan

I. KEY GLOBAL TREND: GROWTH IN SMARTPHONES

High-speed networks, advanced mobile devices, economical mobile data pricing, and attractive device financing schemes are some of the key reasons for the global growth of smartphones. Additionally, the rapidly increasing trend of enterprise mobility has allowed smartphone users to leverage their devices for a range of business activities, thus increasing their popularity among global consumers and enterprise users alike.

Frost & Sullivan has highlighted the following key regional trends in smartphone growth:

• North America: Carrier initiatives such as device subsidies, device upgrade programs, and shared data plans have been key drivers for smartphone adoption in North America. Leading operators, such as Verizon Wireless, AT&T and Sprint, have recently reported that smartphones represent

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more than 75% of their retail postpaid base. Frost & Sullivan expects smartphones to contribute more than 90% to the tier-I installed base for mobile phones in the US by 2020. The trends are similar in Canada, where the three leading mobile operators (Rogers Wireless, Bell Mobility, and TELUS) currently have more than 70% of their postpaid base on smartphones.

- Asia Pacific: Frost & Sullivan's research indicates India and China alone will have a middle-class population of over I billion by 2020, giving them the most significant global purchasing power for products and services. The rapidly expanding middle class in China and India represents the biggest opportunity for smartphone OEMs. In absolute terms, China is the largest market for smartphones globally and has significant room for growth with smartphone penetration at approximately 40%. Similarly, the Indian smartphone market is still relatively under-penetrated, with estimated penetration of approximately 15%. Developed markets, such as Australia and South Korea, currently lead the region in smartphone adoption with 65 and 75% penetration, respectively.
- **Europe:** Smartphone penetration exceeds 50% in several EU countries, including the UK, Norway, Sweden, Spain, France, Germany, Italy, Netherlands, and Switzerland. Frost & Sullivan expects more than 80% of the mobile phone installed base to be made up of smartphones in the leading EU countries by 2020. Key drivers for the expected growth in smartphones include LTE network advancements, the availability of a range of feature-rich 4G devices, and attractive data pricing options.
- Latin America: Latin America has experienced substantial growth in smartphone shipments driven by Brazil, Mexico, Argentina, and Colombia. Infrastructure upgrades, telecom law reforms, and declining prices for data plans combined to make 2013 the year of the smartphone in Latin America, with a record-breaking 35.4 million new users joining the smartphone market in 2013. The smartphone installed base is expected to increase by more than 30 million every year through 2017.



Exhibit 4 depicts smartphone shipments by region from 2013 to 2020.

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Note: All figures are rounded; the base year is 2013. Source: Frost & Sullivan

Key Industry Challenge: Increasing Smartphone Incidents

The global proliferation of higher-priced smartphones and correlating rise in threats has led to a surge in the awareness and popularity of handset protection services. Frost & Sullivan's research indicates that the average smartphone user spends less than six hours away from their smartphone daily, and carries and uses their mobile phone in virtually all environments, including pools, beaches, bars, businesses, restaurants, and bathrooms. This leaves devices particularly prone to loss, theft or damage. Thus, a surge in the number of mobile device "incidents" has emerged as a major challenge in all regions. In fact, theft of mobile devices makes up an increasingly significant percentage of reported robberies in most major global cities. Frost & Sullivan's research indicates smartphones are three times more likely to be lost or stolen than feature phones, and the rate is even higher for "iconic" devices such as the iPhone and Samsung Galaxy. This trend is only increasing as smartphones become more sophisticated and expensive, thus preserving high aftermarket resale value. In addition, larger screens have made smartphones particularly susceptible to physical damage. The introduction of larger screen devices, such as Apple® iPhone® 6 Plus, and the global growth of the "phablet" category is expected to drive this trend even further.

Key Requirement of Mobile Support and Protection: Mobile Handset Protection

Smartphones are an integral part of consumers' daily lives and any interruption in service usage is unacceptable and a trigger for customer churn. Effective handset protection services can provide a replacement device in 24 hours or less. Purchasing a replacement device is rarely an attractive economical option for consumers, particularly with the more popular smartphones that cost as much as US\$ 950. Frost & Sullivan's research shows that the more established handset protection programs provide a cost-effective, easily accessible service, which significantly reduces the expense and duration of disruption that otherwise occurs when a device is lost, stolen, damaged, or malfunctioning.

2. KEY GLOBAL TREND: ENHANCED DEVICE CAPABILITIES

Leading device OEMs attempt to "raise the bar" with every new product release, and now offer incredibly sophisticated devices that have cutting-edge features and functionality, as depicted in Exhibit 5. While these expensive devices have to be protected from hardware "incidents," it is equally important to ensure that consumers know how to leverage the advanced capabilities of their smartphones in order to maximize the benefits they get from their mobile devices. While early adopters push the envelope, early majority, late majority, and laggards all have phones that are far beyond their know-how. In fact, Frost & Sullivan's research suggests the average smartphone user taps into only 30% of existing capabilities available on their device.



Exhibit 5 illustrates the key advancements in smartphone features and functionality.

Source: Frost & Sullivan

Frost & Sullivan has highlighted key regional trends related to advancing device capabilities:

- **North America:** The smartphone replacement cycle in North America is 21 months, which is the shortest in the global mobile communication market. Apple has recently introduced several advanced features with the new iPhone 6 devices, such as new video recording and playback features, innovative mobile payment technologies, and built-in mobile applications for improved data services, which are expected to have a cascading effect, driving other device OEMs to introduce similar features.
- Asia Pacific: Local device OEMs have done an impressive job offering sophisticated smartphones at significantly lower price points than the global smartphone OEMs. Currently, "high-end" models constitute approximately 25% of smartphone sales in China. However, Frost & Sullivan expects nearly 60% of smartphones sold in China in 2020 to be categorized as "high end." Consumers in Japan regularly use Near Field Communication (NFC) services for contactless transactions. NFC adoption is on the rise in countries such as China and South Korea. The trend in India is toward increased adoption of larger-screen devices (or phablets), and shipments of these devices now

make up nearly 30% of smartphone shipments in India. Apart from browsing the Internet and using messaging services on their phones, Indian consumers also use the FM radio, camera, and flashlight features of their mobile phones regularly. Indian mobile operators offering mobile devices under their brand encourage their OEM partners to produce innovative products, which leads to introduction of advanced mobile devices.

- Europe: Frost & Sullivan's research suggests smartphones in the EU are increasingly being used in the enterprise environments, with over 55% of EU business supporting BYOD policies. As a result, smartphone OEMs have incorporated a variety of advanced software technologies in their devices to make them suitable for the secure communication and control needs of enterprises. Moreover, Frost & Sullivan's research suggests the EU region will witness a 40% compound annual growth rate in connections related to Internet of Things (IoT) over the next five years. Many IoT deployments, particularly in the areas of healthcare, automotive, security, payments and transportation, will focus on mobile application integration, which will further entrench the smartphone as the "control center" for mobile users' connected lives, especially in regions such as the EU, where consumers will own multiple connected products.
- Latin America: Android is the leading platform in the price-conscious Latin American market. However, OEMs such as Apple and Samsung have announced plans to expand their retail business in key Latin American markets and are expected to introduce more advanced smartphones in the region. The introduction of 4G in Latin America, coupled with increasing device choices for consumers, is expected to become a key driver for increasing penetration of advanced smartphones. As a result, Frost & Sullivan expects smartphones to achieve critical mass in Latin America by 2017. A significant percentage of smartphone owners will be first-time users who will need user-friendly customer support to help them fully leverage the powerful capabilities of their mobile devices.

Key Industry Challenge: Managing Device Complexity

The first generation of smartphones offered a single processor, limited multimedia capabilities, and could only support slower 2.5G or 3G networks. They also offered extremely limited interoperability with other connected products. Today's smartphones offer quad-core processing capabilities, along with dedicated processing capabilities for multimedia services, I GB RAM, high-definition display, larger screen sizes, integrated Wi-Fi and cellular voice and data services, multi-radio 4G communication services, NFC and Bluetooth capabilities, a full range of sensors, and interoperability and integration with other connected products. For example, smartphones can be used to print documents; display content on smart TVs; integrate with Bluetooth-enabled, in-car entertainment systems; and pay for items at retail point of sale by using stored digital credentials.

Unfortunately, the dramatic pace of advancement in smartphone hardware and software technologies has also made them more complicated to use. Quite often, users know what a device can do, but struggle with the how aspect of using their mobile device. While carriers or OEMs may pre-configure some services for immediate usage, popular applications such as email are generally left to the user to configure, not to mention more complex functions or connections between devices. Configuring smartphones properly to use these advanced features and troubleshooting them if something goes wrong is a significant challenge for consumers. Frost & Sullivan's research indicates that one in three

consumers have problems or questions with their smartphones at least once a month. Current market trends point to the need for premium technical support to manage device settings and software configurations. By helping consumers understand how to use the various innovative features of their smartphones, mobile support and protection can also ensure that consumers get maximum utility out of their devices.

Another issue emerging across regions is the high rate of returns for smartphones. A significant percentage of returned smartphones — on average 40% globally — are categorized as no trouble found (NTF) returns. Frost & Sullivan's research indicates that in nearly 70% of cases, what is perceived as a malfunction for returned devices may simply be a case of unfamiliarity with how to use the device properly. Reducing instances of such devices from entering the reverse logistics stream can deliver significant cost avoidance for the mobile and wireless ecosystem industry participants and can ensure that higher-value smartphone customers continue to remain connected to the carrier's network.

Key Requirement of Mobile Support and Protection: Mobile Device Support

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Today's support experience for the consumer, regardless of their global location, is a highly fragmented journey resulting in long wait times, phone transfers and frustration. Providing a single support solution to help smartphone owners with device usage-related queries is clearly an opportunity for mobile and wireless ecosystem participants. Optimal support services should include: 1) operating system (OS)-agnostic smartphone configuration, troubleshooting, and personalization; 2) managing connectivity with other compatible electronic devices in the connected home and other environments, such as vehicles; and 3) optimizing device performance such as battery life and security settings.

With smartphones rapidly becoming the "remote control for life" in the era of Internet of Things, it is more important than ever to be able to provide appropriate support solutions to consumers who need help with managing or troubleshooting smartphone-based connected implementations, such as connected home, automotive, and health monitoring solutions. Thus, remote-diagnostic capabilities that allow technical support personnel to directly access a smartphone for support will be an important part of successful mobile support and protection. A solution provider should aim to inform consumers with regular and engaging communications that are personalized to their needs. Forward-looking mobile support and protection programs can help users avoid smartphone issues before they happen, and optimize the usage of features and functionality on the device. A knowledge base that tracks operating systems, applications, and hardware trends is also critical in establishing an understanding of relevant information for a particular consumer about their smartphone.



Exhibit 6 Depicts Internet of Things (1960 - 2020).

Source: Frost & Sullivan

In many regions, consumers inherently expect ongoing support from their carrier for the full gamut of mobile device and support issues. In these cases, store representatives and technical support representatives will increasingly be challenged to provide the level of support needed as smartphone functionality advances. Premium support services allow carriers to shift the relationship from needs-based support (e.g., customer loses a mobile device and walks into a carrier store asking for help), to proactive support, by providing relevant information to customers about their smartphone before issues occur. Mobile support and protection for the smartphone can also be used as a gateway to provide technical support for other in-home devices. This presents mobile carriers with the opportunity to support "connected" categories, such as smart TVs and connected appliances, and potentially emerge as leading providers in the "battle for the home." Therefore, as carriers become more entrenched with their customers, mobile support and protection can lead to growth opportunities beyond traditional mobile services.

3. KEY GLOBAL TREND: GROWTH IN MOBILE DATA

4G networks, advanced devices, shared data plans, and proliferation of high-end mobile data plans continue to drive an increase in mobile data traffic. This acceleration in mobile data consumption leads to increased data stored on smartphones, including music files, images, video clips, phone numbers, email IDs, and other communication identifiers such as instant messaging user names, social media accounts and personal passwords. Additionally, increased device capabilities, such as high-resolution cameras/video cameras, inherently drive consumers to store more user-generated content on their smartphones. Finally, devices may also hold sensitive corporate documents and numerous mobile applications. Thus, smartphones have become an important repository for personal and work-related digital content and credentials that need to be protected and supported.

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Key regional trends related to mobile data are as follows:

- North America: The region has one of the highest adoption rates for smartphones and is a leader in 4G mobile services. 4G smartphone users already consume nearly 2 GB of cellular data every month and are expected to approach 5 GB of cellular monthly data by 2020 in North America. Pervasiveness of camera phones has led to a dramatic increase in user-generated content in the region.Video content, in particular, has been the growth driver for user-generated content on the North American 4G LTE networks. Together, higher mobile data usage and user-generated content leads to higher amounts of content being stored on smartphones. Frost & Sullivan's research indicates that the amount of content stored on smartphones in North America has increased from less than 1 GB in 2010 to nearly 3.5 GB in 2014, and is expected to exceed 8 GB by 2020.
- Asia Pacific: Smartphone users in the developed mobile communication markets in APAC have similar data consumption rates as North American users. For example, cellular data usage consistently exceeds 2 GB for 4G LTE users in South Korea (which is one of the top countries globally for LTE adoption). With China granting licenses for 4G services in 2013, leading Chinese mobile operators have introduced 4G services and are seeing encouraging adoption of 4G. China Mobile also reported that the average data usage for 4G devices is nearly 10 times that of 2G devices, while it is more than six times the data usage of 3G devices. The trends are similar in India, where leading operators, including Bharti Airtel and Reliance Communications, have reported extremely high growth rates of upward of 100% for mobile data traffic on their networks. Camera phones are extremely popular in the Asia Pacific region, where pictures and short multimedia clips dominate the trend in user-generated content. Adoption of mobile social networking is a strong phenomenon in Asia Pacific, where the mobile phone has emerged as the primary device for picture uploads on mobile and Web-based social networks, which drives the trend toward user-generated content in the region.
- Europe: According to the GSM Association, LTE smartphones generate twice as much traffic as a non-4G smartphone in the EU. Frost & Sullivan's research indicates that LTE smartphones generate more than 1.5 GB of cellular traffic every month in most EU countries. According to Cisco's VNI Global Mobile Data Traffic Forecast Report, mobile data traffic grew 57% in Western Europe in 2013, while growing by nearly 99% in Central and Eastern Europe. According to the same report, the data traffic in Western Europe will increase at a CAGR of 50% from 2013 to 2018, while growing at a CAGR of nearly 68% in Central and Eastern Europe for the same time period. For user-generated content, the trend in Europe is similar to the North American region, where the current surge in user-generated traffic is due to high-definition pictures and video content created on advanced smartphones.
- Latin America: Adoption of mobile data services, such as the mobile Web, mobile commerce and mobile banking, is increasing rapidly in Latin America. Asset divestiture by America Movil, the leading Mexican mobile operator, in order to comply with the new regulatory norms in Telecoms is likely to provide more capital to the company to expand its 4G network. Other operators in the region, such as Movistar, have also announced LTE initiatives and are in various stages of executing their LTE/4G strategies in the region. Increasing adoption of smartphones, coupled with increasing

availability of 4G, is likely to drive the growth of the mobile data traffic in Latin America. Multimedia Messaging Services (MMS) is one of the most popular value-added services in Latin America due to the rise of smartphones capable of sending multimedia content and the greater demand to share content driven on social networks. Frost & Sullivan's research indicates that more than 50% of smartphone users in the leading Latin American markets of Mexico and Brazil regularly use their mobile devices to send and receive MMS.



Exhibit 7 shows mobile data traffic by region from 2013 to 2020 representing a global CAGR of 50.7%

Note: All figures are rounded; the base year is 2013. Source: Cisco Visual Networking Index 2014, Frost & Sullivan

Key Industry Challenge: Loss of Data

The amount of data being stored on smartphones continues to increase. As a result, the impact of loss of data stored on the mobile device is often more disruptive than the loss of the device itself. For example, consumers may have to manually re-enter all contacts into their replacement device, which can be an extremely tedious process. Not surprisingly, the loss of cherished user-generated content such as photos or video clips is often the most devastating result of a device incident to the consumer.

Sensitive personal or corporate data that is stored on a "compromised" mobile device could fall into the wrong hands or be misused. The rapidly increasing trend of mobile malware and greyware (e.g., free mobile applications that send personal information to third-party servers without the device owner's awareness) has emerged as a concern for the theft of both corporate and personal data. Intensive mobile data usage on smartphones also exposes these devices to harmful content and applications. For example, consumers surfing the Web on their smartphones need to be cognizant of "drive-by" malware that can download malicious code on a user's smartphone via the device's browser when a user visits a legitimate but infected/hacked website.

Key Requirement of Mobile Support and Protection: Mobile Data Protection

The proliferation of mobile data establishes a critical need for comprehensive mobile data protection and support solutions for smartphones, which can also protect the consumer experience with mobile data services. Frost & Sullivan believes that cloud-based solutions that offer safe, secure, and seamless backup and recovery services to protect the data stored on the mobile device should be part of mobile support and protection. Additionally, technologies such as safe browsing, privacy protection, and antivirus solutions should also be offered to safeguard the consumer experience with mobile data services. In the event that a phone is lost, consumers should have access to "locate, lock, and erase" solutions that allow them to find their phone, lock the phone until they get it back, and erase its contents so that their information does not fall into the wrong hands. When providing a replacement phone to consumers, mobile support and protection solutions should be able to seamlessly restore consumers' secured content on their new phones "as if nothing happened."

It is also important to integrate robust mobile security that monitors third-party applications to ensure that no hidden, rogue behavior of these applications can harm the consumer or infringe on their personal information. Only by securing device hardware and device data can solutions effectively serve the emerging protection and support requirements of smartphone users.

4. KEY GLOBAL TREND: EXPLOSION IN MOBILE APPLICATIONS

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The number of available global applications for iOS and Android device platforms has increased from less than 1,000 to more than 2 million in a short span of six years. The average global smartphone user now has more than 50 pre-installed and third-party applications on his or her mobile phone, compared to less than 30 mobile applications five years ago. Availability of a large number of free applications, an outstanding user experience, real-time information update capabilities, and a well-developed application monetization ecosystem, based on in-application mobile advertising and commerce, are the key reasons for the growth of smartphone applications globally.

Exhibit 8 depicts the cumulative global application downloads from leading application stores from 2013 to 2020.



Note: All figures are rounded; the base year is 2013. Source: Frost & Sullivan

Frost & Sullivan has identified the following key regional trends in mobile application usage:

- North America: North American consumers are among the most prolific users of smartphone applications. An average smartphone user spends more than 35 hours on mobile applications every month in North America. Social networking, entertainment, communication, mobile shopping, and location-based services are the top categories of applications. Enterprise mobile applications, including company operations and productivity applications such as file-sync and share, CRM apps, and expense reporting; communication and collaboration applications (such as WebEx and ShareFile); and enterprise messaging applications (including instant messaging applications and enterprise social networks) are also popular in North America.
- Asia Pacific: The average smartphone user in South Korea has nearly 80 pre-installed and third-party applications on his or her smartphone, which is among the highest in the world. Japan's app store downloads exploded in 2013, and Japan is the top revenue generator for smartphone applications across Apple's App Store and Google Play combined. In Japan, carriers can now bill consumers directly for smartphone application downloads from leading app stores, which is a key reason for this trend. Frost & Sullivan's forecasts indicate that more than 100 billion mobile applications will be downloaded in the Chinese market in 2014. High-bandwidth applications such as video calling, video streaming, and multimedia content sharing are becoming increasingly popular in the Chinese mobile communication market. The trends are similar in other developing markets as well, where increasing penetration of smartphones is driving substantial growth of mobile applications. Activities such as chat apps, social networking and games are driving the highest levels of engagement in the Asia Pacific region.
- **Europe:** Smartphone owners use their mobile devices for more than 80 hours every month in the leading mobile communication markets in the region. A significant portion of this time is spent on consumer mobile applications, including applications for gaming, social networking, music streaming, and location-based services. Freemium pricing and applications running on mobile social network platforms have accelerated overall application adoption in both consumer and enterprise markets. Moreover, the proliferation of mobile applications into roles as marketing "mediums" to deliver business-to-consumer services such as consumer banking continues to drive the growth of the mobile enterprise application economy in the region.
- Latin America: Frost & Sullivan's research indicates that usage of search, video, games, and social networking applications and services is increasing rapidly among the Latin American smartphone users. Smartphone users have anywhere from 15 to 25 third-party mobile applications installed on their smartphones, and are not averse to installing paid applications if these offer additional functionality or an ad-free experience. Increasing penetration of smartphones and connected tablets is expected to increase the number of application downloads in the region.

Key Industry Challenge: Supporting Mobile Applications

The large number of choices in mobile applications is good for consumers, but represents a major industry challenge. Consumers need a single source to help with managing and supporting their mobile application experience. Frost & Sullivan's research indicates that most smartphone owners struggle

to get proper, qualified support with mobile applications, and are inclined to abandon the application after an average of three attempts at resolving a problem. In many regions, smartphone users first reach out to their carriers, and then to their friends and family, or the Internet, to try and find answers to questions related to mobile applications, often with mixed results. An effective, unified application support system to help manage all the applications on a user's phone can make the proliferation of applications less daunting for consumers, as well as for the mobile and wireless industry participants.

Poorly designed or loosely secured applications have the potential to share personal data that can compromise user security and privacy. Several applications have been known to be exploited by cyber criminals to access and share private data. For example, an entire range of malevolent "Flappy Bird" clones that could send and receive SMS or extract contact data without the user's knowledge were available for downloads after the original application was pulled from application stores in early 2014. Consumers need knowledge about the privacy settings for mobile applications to ensure that their data is safe and that the application behaves as intended. However, customizing privacy settings and monitoring application behavior can be overwhelming given that the average smartphone user generally has a large number of unique applications on their smartphone. There is a clear need for solutions that can help consumers understand the true behavior of mobile applications and ensure that there are no privacy violations.

Key Requirement of Mobile Support and Protection: Mobile Application Support

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Smartphone application support should be a part of mobile support and protection. Common support services that should be offered include:

- Providing assistance with the identification and selection of the right type or appropriate application, such as helping users select the best application for their unique requirements from more than 300 different types of cooking apps in Android or iOS app stores
- Allowing users to properly configure downloaded mobile applications, and informing them proactively of potentially harmful or disruptive application characteristics even before it affects the user, for example, through SMS alerts
- Alerting users to improper application behavior, such as unauthorized access to personal user information, to allow them to remain in full control of their data
- · Assisting users in understanding how to get the most utility from their mobile applications
- · Optimizing privacy settings for applications in a centralized framework

Supporting the million-plus mobile applications across different smartphone platforms requires investments in high-quality assets such as qualified personnel and advanced and effective technical support knowledge management tools.

VALUE OF MOBILE SUPPORT AND PROTECTION FOR CARRIERS

Wireless carriers can take the lead in protecting consumers' smartphones and providing innovative support to smartphone users that have a device, application, or data-related issue or question. However, it can be prohibitively expensive for carriers to deploy the required resources, such as a large team of technicians, to handle the gamut of smartphone-related support requests that can potentially come in, not to mention provide outreach to customers to proactively offer useful information about their device. Carriers that do not have the required smartphone support capabilities in-house may be forced to direct customers to the device OEM or to another third party. However, the service and support experience delivered to customers can vary greatly across these channels, many of which are not controlled by the carrier. A fragmented support and protection experience delivered by third parties often leads to high levels of frustration among customers who have a smartphone-related issue. One of their customers is by partnering with specialized providers that integrate all of the components into a comprehensive offering. An integrated mobile support and protection experience can deliver significant benefits to carriers, including:

- Reduced customer churn and increased loyalty: Mobile support and protection is an effective way to reduce churn of smartphone customers. Additionally, by managing customer touch points, mobile support and protection helps increase customer satisfaction levels.
- Increased ARPU: Adoption of higher-value mobile support and protection plans provide an opportunity to increase service pricing, compared to standalone handset protection.
- Reduced concessions and cost of customer care: Carriers do not have to provide free or subsidized phones as replacements to high-value smartphone users that have an issue with their device.
- Reduced NTF and remorse returns: An effective mobile application and device support offering can reduce the number of customers returning mobile phones during the remorse period if they become frustrated because they experience challenges using their new smartphone.
- Increased productivity of carrier sales representatives: Sales representatives can avoid the
 opportunity cost from providing technical help to customers and focus on revenue-generating
 activities.

THE LAST WORD

 Smartphones are an integral part of consumers' daily lives and any interruption in service usage is unacceptable in today's connected world. While handset protection can help consumers get a replacement device quickly in the event of a device loss, theft, malfunction or damage, current market trends suggest that the traditional handset protection category has expanded to include support. Frost & Sullivan's research indicates that mobile handset protection, mobile data protection, mobile application support, and mobile device support are the four pillars of mobile support and protection offerings.

- By minimizing the impact of smartphone incidents, preventing loss of data stored on smartphones, optimizing the mobile application experience, and addressing issues related to device usage, mobile support and protection services can ensure the seamless continuation of a subscriber's mobile experience.
- Carriers can take the lead in providing appropriate support to smartphone users who have device, application, or data-related issues. However, it can be prohibitively expensive for carriers to deploy a large team of technicians with the broad and deep skill sets and tools to handle the gamut of smartphone-related support requests. One of the ways in which carriers can support the different mobile support and protection requirements of their customers, including emerging interconnections with other smart devices in the home, is by implementing an ongoing support model that provides relevant information proactively to their customers, including easy-to-access expert technicians across the consumer's entire journey with their device.
- Carriers are encouraged to conduct a detailed analysis of the various vendors in order to select the right partner for their device protection and support programs. Selecting an experienced partner that can provide an end-to-end, integrated user experience that incorporates all components of mobile support and protection is a critical consideration for carriers' success with next-generation mobile services.
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Frost & Sullivan's research indicates that mobile support and protection offerings provide significant value to carriers, including: 1) reduced customer churn and increased loyalty; 2) increased ARPU;
3) reduced concessions and cost of customer care; 4) reduced NTF and remorse returns; and
5) increased productivity of carrier sales representatives. These are important benefits, which is why carriers should promote mobile support and protection within the channels they control.

APPENDIX: COUNTRY CASE STUDIES

UNITED KINGDOM (UK) MOBILE DASHBOARD

Exhibit 9 shows the country dashboard for the UK.

Mobile Connec	tions	Smartphon Penetration	ie 1	Smart Marke	phone t Attributes	Socio-e	conomic ors
2013 Connections 2018 Connections	86 Million 120 Million	2013 Penetration 2018 Penetration	63% 85%	Smartphone Market Status Device Distribution Channels	Mainstream Mobile operators, retailers	Economic Status 2013 GDP per Capita	Developed Market US\$39,500
4G Trends		Mobile Dat Trends	a	Mobile Trends	Application	III IoT Tre	nds
2014 4G Subscribers	10 Million (estimated)	Smartphone Monthly Data Consumption	700 MB	Time Spent on Mobile Apps Popular Mobile	25-30 Hours/ Month Gaming, Social Networking**	2013 Cellular IoT Connections	6.1 Million
2018 4G Subscribers	45 Million (35% CAGR)	Smartphone Data Storage (2014)*	3.5 GB	Applications	Content Streaming	2018 Cellular IoT Connections	25.2 Million (33% CAGR)
# 2018 mobile con *Represents images **Includes chat pro	nection numbers ir , video clips, and tl grams	nclude cellular IoT connectior hird-party applications stored	is I on the device	•			

Source: Frost & Sullivan

UK Mobile Trends

Rapid Growth in Mobile Data: 4G LTE services are now offered by all leading mobile operators in the UK. Frost & Sullivan's research suggests that UK 4G plans are, on average, generating nearly 20% more ARPU versus comparable 3G plans, and 4G customers are consuming approximately 2.3 times more data. Continued adoption of 4G is expected to drive significant growth in mobile data traffic in the 2013-2018 time period. Camera phones—with high-quality image and video content creation capabilities—are ubiquitous in UK, which drives consumers to store more user-generated content on their devices. Images contribute nearly 75% of this content (by size) for the average smartphone user in the UK.

Trend Impact: Frost & Sullivan's research indicates that smartphones are the primary device for taking pictures for nearly 60% of smartphone owners in the UK. Consumers in the UK store significant amounts of content on their mobile devices, which could be lost in case of a device incident. At the same time, higher consumption of mobile data increases the risk of harmful content and applications, including hidden code in third-party applications and advanced malware that can even make its way to the device via the browsing experience.

OEMs Introduce Advanced Features to Drive Upgrades: The average smartphone replacement cycle in the UK is approximately 26 months, which is quite long. This trend forces device OEMs to introduce newer phone models with advanced features in order to convince consumers to upgrade their smartphones more frequently. For instance, leading smartphone manufacturers catering to the UK are increasingly offering wearable electronics products in conjunction with smartphone launches as a way to entice new consumers to upgrade their phones.

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Trend Impact: Advancements in device technologies also result in complexity with device configuration and settings. This trend is driving the need for premium support services that can help consumers utilize the advanced capabilities of their smartphones. Consumers also need help with troubleshooting the issues that arise when pairing—or interconnecting—smartphones with other compatible electronic devices and personal wearables. Therefore, such services should also be a part of the protection experience offered to smartphone users.

BYOD & IoT Trend Drives Mobility in Enterprise: With the proliferation of BYOD in the UK, smartphones are increasingly used to access corporate networks and applications. This makes it critical to properly configure and secure mobile devices to make them suitable for use in the enterprise environments. Frost & Sullivan's forecasts indicate that cellular IoT connections will increase from approximately 6 million in 2013 to over 30 million by 2018. Smartphone-centric consumer IoT deployments are expected to contribute to the growth in M2M for UK.

Trend Impact: Consumers are increasingly using personal smartphones to access corporate networks; increased usage of smartphones for enterprise access presents an opportunity for mobile malware to make its way into enterprise networks. Additionally, loss or theft of smartphones containing confidential or sensitive work-related information can have serious consequences for organizations. Therefore, it is important to ensure proper security for mobile devices.

The Mobile Support and Protection Opportunity

Frost & Sullivan's research indicates that more than 3 million smartphones are lost, stolen, or damaged every year in the UK. Iconic devices such as Apple iPhones and Samsung devices are nearly twice more likely to be stolen in the UK than more economical smartphones. Therefore, comprehensive mobile support and protection solutions that protect the device and the data on the device are extremely important in the UK mobile communications market. Market trends present a clear opportunity for mobile operators to expand their mobile support and protection programs and ensure continued usage of their networks by protecting consumers from device incidents and data loss. Moreover, offering value-added services, which protect and enhance the overall mobile experience—such as assistance with mobile applications, device settings and configuration, and general mobile device support—can help UK mobile operators increase customer loyalty, reduce churn, and increase the lifetime value from their customer base.

SOUTH KOREA'S MOBILE DASHBOARD

Exhibit 10 shows the country dashboard for South Korea.

Mobile Connections	Smartphone Penetration	Smartphone Market Attributes	Socio-economic Indicators		
2013 Connections 55 Million 2018 Connections [#] 70 Million	2013 Penetration72%2018 Penetration80%	Smartphone Market StatusMainstreamDeviceMobileDistributionoperators, (e)retailers	Economic Developed Status Market 2013 GDP US\$26,000 per Capita US\$26,000		
4G Trends	Mobile Data Trends	Mobile Application Trends	IoT Trends		
2014 4G 35 Million Subscribers (estimated) 2018 4G 45 Million Subscribers (5% CAGR)	Smartphone Monthly Data 2.1 GB Consumption Smartphone Data Storage (2014)* 3.8 GB	Time Spent on Mobile Apps 20-25 Hours/ Month Popular (Social) Gaming, Mobile Social Networking**, Applications Entertainment	2013 Cellular IoT Connections 2.4 Million 2018 Cellular 12.0 Million IoT Connections (32% CAGR)		
# 2018 mobile connection numbers include cellular IoT connections *Represents images, video clips, and third-party applications stored on the device **Includes chat programs					

Source: Frost & Sullivan

Key Mobile Trends

Mature Mobile Infrastructure: South Korea is a developed country and occupies the top position in the United Nations International Telecommunication Union ICT Development Index that benchmarks the most important indicators for the information society. It is a global leader in next-generation mobile broadband, with one of the highest levels of smartphone (and phablets) penetration, mobile application usage, and mobile data traffic growth rates.

Trend Impact: Smartphones are essential parts of consumers' everyday lives in South Korea. Increased usage of smartphones has led to increased instances of mobile device incidents in South Korea. For example, nearly 1.25 million smartphones reported lost in 2013 alone is also a concern for the South Korean mobile industry. Therefore, the need for expeditious device replacement services is quite apparent in the smartphone-dominated South Korean mobile communications market.

Continued Growth in Mobile Data Traffic: Cellular data usage consistently exceeds 2 GB for the lion's share of 4G LTE users in South Korea. As reported by Korean regulator KCC, mobile data traffic on 2G, 3G, and 4G networks in South Korea increased approximately 70% between 3Q 2012 and 3Q 2013. Larger-screen devices — or phablets — are quite popular in the South Korean market, with 40% of iOS and Android devices categorized as phablets. Proliferation of these multimedia-centric devices is driving the trend of user-generated mobile content in South Korea, where picture messaging and uploading images and video clips on social networking sites are popular activities.

Trend Impact: Higher consumption of mobile data and increased usage of smartphones to create content leads to significant amounts of data stored on smartphones. As users consume higher amounts

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of mobile data, exposure to harmful content and third-party applications is also emerging as a significant challenge in South Korea.

Mobile Application Usage: Mobile application usage is among the highest in the world, with an average smartphone customer having approximately 80 applications on his or her mobile device in South Korea (including pre-installed mobile applications that ship with the smartphone). Games, instant messaging, and mobile social networking applications are the popular application types in South Korea. The domestic mobile gaming market in South Korea is already worth over a billion dollars, which is a significant number for a market that has less than 60 million total mobile users.

Trend Impact: Consumers in South Korea are among the most prolific users of mobile applications. All major operators in South Korea offer LTE 4G services, which is a key reason for increased usage of multimedia-enabled "social" mobile applications in the country. However, there is a clear lack of a centralized support service that can help users manage and optimize their mobile application experience.

THE MOBILE SUPPORT AND PROTECTION OPPORTUNITY

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Rising cases of device lost, theft, and damage; increasing device complexity due to short product refresh cycles; high usage of mobile applications; and significant patterns of multimedia content creation and sharing via smartphones are the key trends that support the need for advanced mobile support and protection in South Korea. Mobile operators are the prime channels for smartphone sales and distribution, and they are well positioned to take the lead in offering comprehensive mobile support and protection services to their customer bases.

CHINA'S MOBILE DASHBOARD

Exhibit 11 shows the country dashboard for China.



Source: Frost & Sullivan

China's Mobile Trends

Smartphone Proliferation: With more than 700 million smartphones in use, China is the world's largest smartphone market. Device OEMs in China are focused on offering advanced devices at highly competitive pricing to drive product sales in the near-saturation Chinese markets. There is a good presence of local/regional device OEMs as well who owe their success to their unique ability to offer advanced mobile devices at extremely reasonable price points.

Trend Impact: Smartphone incidents — especially device damage, loss and theft — are on the rise in China. The recent surge in phablet sales in China — with more than 50 percent of new smartphones sold in the country in 2015 expected to have screens that are larger than 5 inches — is expected to further increase the cases of device incidents.

Increasing Mobile Data Consumption: Smartphone monthly data consumption is increasing exponentially, primarily due to the introduction of 4G services by the leading Chinese mobile operators. Average mobile data consumption has increased by over 80% in 2014 for the leading Chinese mobile operators. According to China Internet Network Information Center (CNNIC), nearly 85% of Chinese Internet users access the Web from their mobile devices currently. Frost & Sullivan's research indicates that nearly 20% of smartphone users use mobile video services regularly, and adoption of rich media mobile content and services is only going to increase as 4G services become ubiquitous.

Trend Impact: Market trends establish the need for holistic mobile data protection solutions that can secure the content on the device and also protect consumers from the risk of intrusion or fraud that can happen when using the Internet from their smartphones. Therefore, it is in the best interest of Chinese mobile operators to ensure a secure device usage experience for continued use of mobile data services and to generate customer loyalty.

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_____ Frost.com **Surge in Mobile Applications:** Frost & Sullivan's forecasts indicate that more than 100 billion mobile applications will be downloaded in the Chinese market in 2014. Mobile games, micro-blogging, and chat programs are extremely popular in China. High bandwidth applications such as video calling, video streaming, and multimedia content sharing are also becoming increasingly popular in the Chinese mobile communication market. For example, the Youku App from Youku Tudou Inc., China's leading Internet Television Company, is extremely popular and is generally considered among the top four applications in China in terms of aggregate time spent by users. Customer loyalty programs—such as offering free calls to mobile app users—are also major factors in increasing adoption of mobile applications in China. At the same time, the popularity of mobile games continues to increase. China now has nearly 350 million mobile gaming users, and the mobile gaming market is worth an estimated \$3 billion annually.

Trend Impact: Mobile applications are the preferred interface for a wide range of mobile content, mobile commerce, and mobile social networking interactions in China. Mobile applications are well entrenched in the daily lives of the Chinese consumers, therefore making it critical to offer appropriate support services to ensure a smooth application experience for users of mobile applications in China.

THE MOBILE SUPPORT AND PROTECTION OPPORTUNITY

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Chinese consumers are highly engaged with their mobile phones and are among the heaviest users of cellular and Wi-Fi data services in developing markets. The 4G "journey" is just starting in China, yet we are already seeing exponential growth in mobile data traffic. Devices in use are becoming more sophisticated as well, with over 45% of smartphones sold in the Chinese markets likely to be "high end" by 2020. A significant — and rapidly growing — mobile app economy exists in China as well. These trends will drive the need for effective device and data protection, and product support to help users leverage the advanced communication capabilities of their mobile devices. Chinese customers place a premium on customer service when purchasing mobile devices, which is an opportunity for mobile operators to offer advanced mobile devices with appropriate protection solutions in order to strengthen the customer value proposition.

MEXICO'S MOBILE DASHBOARD

Exhibit 12 shows the country dashboard for Mexico.

Mobile Connections	Smartphone Penetration	Smartphone Market Attributes	Socio-economic Indicators		
2013 Connections 105 Million 2018 Connections [#] 130 Million	2013 Penetration 37% 2018 Penetration 55%	Smartphone Regional Market Status Leadership Device Distribution Distribution Retailers, Channels Mobile Operators	Economic Status Developing Market 2013 GDP per Capita US\$10,500		
4G Trends	Mobile Data Trends	Mobile Application Trends	IoT Trends		
2014 4G I Million Subscribers (estimated) 2018 4G 4 Million Subscribers (35% CAGR)	Smartphone Monthly Data 140 GB Consumption Smartphone Data Storage (2014)* 2.8 GB	Time Spent on Mobile Apps 10-15 Hours/ Month Popular Gaming, Gaming, Mobile Mobile Social Networking ^{HER} , Mobile Search	2013 Cellular I.8 Million IoT Connections I.8 Million 2018 Cellular 6.0 Million IoT Connections (27% CAGR)		
# 2018 mobile connection numbers include cellular IoT connections * LTE being positioned as a niche technology in the region, to be supplemented by HSPA/HSPA+ *Represents images, video clips, and third-party applications stored on the device **Includes chat programs					

Source: Frost & Sullivan

Key Mobile Trends

Increasing Smartphone Adoption: Smartphone penetration in Mexico is comparatively high in relation to other major Latin American countries. However, with close to 40% adoption, there is significant room for smartphone growth in Mexico, which could have upward of 70% penetration for smartphones by 2020.

Trend Impact: The total number of reported device incidents—including device loss and theft, and device damage—is on the rise in Mexico. Appropriate device protection solutions are needed to help deliver peace of mind to Mexican smartphone users, which will help the region increase the share of smartphones in the installed base for mobile phones.

4G Network Initiatives: Asset divestiture by the leading Mexican mobile operator (America Movil) in order to comply with the new regulatory norms in TELECOMS is likely to provide more capital to the company to expand its 4G network. Other Mexican operators, such as Movistar, have also announced LTE initiatives and are in various stages of executing on their LTE/4G strategies in the region.

Trend Impact: The increasing trend in user-generated content is a key driver for the growth in mobile data stored on smartphones in Mexico. The average smartphone user in Mexico clicks nearly 30 pictures every month from their phones, and most of these images are stored "perpetually" on their smartphones. The amount of content and applications stored on smartphones in Mexico has increased by nearly 30% in 2014 (over 2013), and this growth rate is expected to continue through 2020, when 4G services become ubiquitous in the region.

_____ Frost.com **Mobile Operator Role in Privacy and Data Protection:** According to GSMA research into mobile users' privacy attitudes, nearly 55% of mobile users in Mexico are inclined to approach their carrier in case of a privacy violation or a data security issue, regardless of who was actually responsible for the event. Frost & Sullivan's research indicates that there is a growing concern among Mexican smartphone users regarding the security of their mobile data. If they were convinced that appropriate safeguards were in place, they would feel more comfortable using mobile applications and the Internet on their smartphones.

Trend Impact: As mobile operators get more involved in mobile phone sales, they should embrace the opportunity to deliver appropriate privacy management and data protection solutions in the region. Mobile support and protection can help them achieve this objective.

THE MOBILE SUPPORT AND PROTECTION OPPORTUNITY

Mexico is still a relatively under-penetrated market for smartphones and 4G LTE. Mobile operators are likely to drive adoption of smartphones by providing the necessary support to consumers to purchase advanced mobile devices under a service contract. Lower device prices, improving economic conditions and greater choices for consumers will contribute to the growth of the Mexican smartphone industry. This establishes a further need for comprehensive mobile support and protection that serves the Mexican consumer. Mobile operators have an established retail infrastructure and are well positioned to leverage the billing relationship with the consumer to offer advanced mobile support and protection services in partnerships with the leading protection providers.

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