



## Accelerating Business Growth by Reducing Liquid Damage in Smartphones

### Introduction

According to a new forecast from International Data Corporation (IDC), there will be 41.6 billion connected IoT devices by 2025<sup>1</sup>. One of the categories that has been experiencing strong growth is mobile devices. They are at the heart of our lives, as we depend on them to manage all aspects of our days. Smartphones in particular are one of the most popular consumer electronics ever, with nearly 57% of the world's population owning one today. As we are dependent on them, we carry and use them daily, increasing exposure to the risk of accidents. One of the most damaging types of accident is with liquids, as they may result in tremendous costs if the device becomes irreparable. For manufacturers, the impact of liquid damage is not just measured by the direct costs associated with the device (repair or replacement), but also by other indirect costs, such as revenue loss from customers not being able to use the device. Therefore, reducing liquid damage should be a strategic decision to drive business growth, as the benefits in terms of customer retention, customer satisfaction, and cost prevention, are enormous.

### Methodology

This paper is based on an IDC survey of 325 U.S.-based technology users carried out in June 2019 to understand their usage of electronic devices and factors impacting purchasing decisions, repair/depot services, and the frequency and types of accident with liquids and attitudes regarding water protection, including the costs associated with liquid damage.

The paper also benefits from the latest IDC research data and insights derived from interviews conducted by IDC with independent and official repair centers, carriers, and manufacturers, aimed at understanding the impact of accidents on their business and the costs associated with the exposure of electronics to water.

### Situation Overview

#### *The Connected Devices Market Outlook*

The connected devices market, including the machines, sensors, cameras, and other devices that make up the Internet of Things (IoT), continues to grow at a healthy pace, and according to IDC's forecast there will 41.6 billion connected IoT devices

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<sup>1</sup> IDC Worldwide Global DataSphere IoT Device and Data Forecast, 2019–2023, May 2019 (IDC #US45066919)

by 2025<sup>2</sup>. As the adoption of these devices grows, the need for more, smaller, and more complex devices will increase. However, many, if not most, of these devices will be exposed to challenging physical environments. Because the value they generate to consumers and enterprises is enormous, the need for reliability and durability will increase exponentially, making protection against liquids, dust, and other industrial hazards an essential feature.

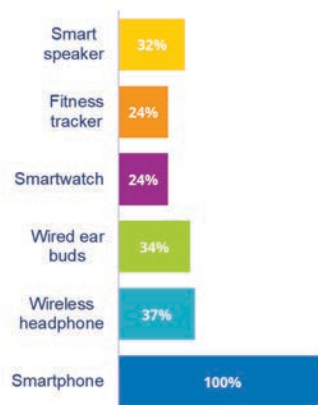
The connected devices market goes beyond sensors, cameras, and machines. Mobile devices, such as smartphones, wearables, and tablets have boomed in the past ten years. Smartphones are the most popular category and the one that experienced the fastest growth and adoption. Consumers spend more money on mobile devices than ever before as manufacturers continue to innovate and offer features on their products that excite them. Yet, as these devices are used on the move, and are therefore exposed to accidental damage, the need for protection against certain accidents becomes increasingly relevant.

### *The Mobile Device Market*

There are over 4 billion smartphones in use in the world in 2019, reaching 57% of the world's population. In regions such as the U.S., the popularity of smartphones is much higher, with the installed base of smartphones representing over 97% of the population, according to the latest IDC Quarterly Mobile Phone Tracker. However, smartphones are not the only devices that consumers love. According to the *IDC Waterproof Mobile Devices Survey 2019*, over 36% of U.S. consumers own wireless headphones, 32% a smart speaker, 24% a smartwatch or fitness tracker (Figure 1).

**Figure 1**  
**Device Ownership**

**Q:** What devices do you currently own?



N = 325

Source: IDC Waterproof Mobile Devices Survey, June 2019

<sup>2</sup> IDC Worldwide Global DataSphere IoT Device and Data Forecast, 2019–2023, May 2019 (IDC #US45066919)

*This day-to-day dependence on mobile devices creates a need to ensure their operational integrity, regardless of the environment or minor accidents such as spills and drops.*

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Sales of mobile devices will continue to grow, with shipments of smartphones, tablets, wearables, and smart home devices forecast to grow at a CAGR of 7.2% between 2018 and 2023, to represent \$947.6 billion in value by 2023 (Table 1).

**Table 1**  
*Worldwide Mobile Device Unit Shipments and Value Forecast, 2018–2023 (Millions of Units and \$U.S. Million)*

<b>Product Category</b>	<b>Shipments 2018 (Units and Value)</b>	<b>Shipments 2023 (Units and Value)</b>	<b>CAGR (2019–2023)</b>
Smartphones	1,403 \$483,228	1,484 \$512,004	1.1% 1.2%
Tablets	146.2 \$45,242	120.3 \$44,365	-3.8% -0.4%
Wearables	175.8 \$29,076	369.9 \$55,278	16.0% 13.7%
Smart Home	660.0 \$191,373	1,396.0 \$335,996	16.2% 11.9%
<b>Total</b>	<b>2,385</b> <b>\$748,919</b>	<b>3,370</b> <b>\$947,643</b>	<b>7.2%</b> <b>4.8%</b>

Source: IDC Quarterly Mobile Phone Tracker, Aug 2019; IDC Quarterly Personal Computing Devices Tracker, Aug 2019; IDC Quarterly Wearables Tracker, Aug 2019; IDC Quarterly Smart Home Tracker, Sep 2019

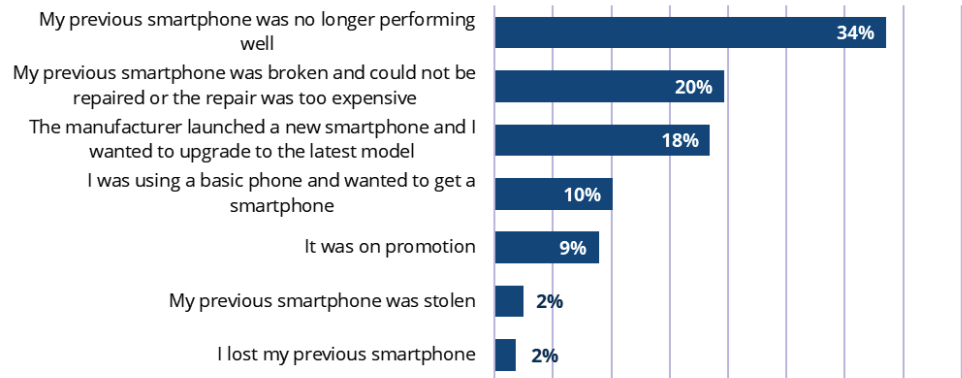
## Accidents With Devices

Electronic devices will remain an important part of everyday life, and will continue to be exposed to the risk of accidents. For example, 20% of smartphone users in the U.S. bought their current smartphone because the previous one suffered an accident and could not be repaired, or the repair was too expensive (Figure 2).

**FIGURE 2**

**Reasons for Purchasing a New Smartphone**

**Q:** *What was the main reason for choosing your current smartphone?*

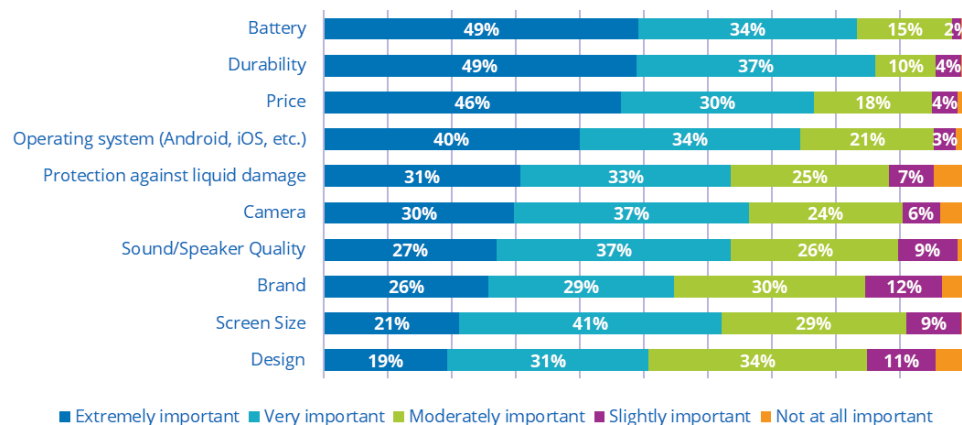


Source: IDC Waterproof Mobile Devices Survey, June 2019

As the use of electronics proliferates, consumer concerns regarding accidents also grow. Unsurprisingly, durability and quality are the number one aspect that individuals look for when buying a new smartphone; 86% of smartphone users consider this as extremely important or very important. And because liquid damage is common, protection against it is extremely or very important for 64% of smartphone users (Figure 3).

**Figure 3**  
**Aspects That Influence the Choice of a New Smartphone**

**Q:** *Please indicate how important each of the following aspects are when looking to buy a new smartphone?*



Source: IDC Waterproof Mobile Devices Survey, June 2019

*As the use of electronics proliferates, consumer concerns about accidents also grow exponentially. The durability and quality of smartphones are considered extremely or very important for 86% of users looking to buy a new smartphone, and protection against liquid damage preoccupies 64%.*

Manufacturers occasionally provide levels of protection on their products for dusty and wet environments, usually promoted under the International Protection (IP) Code, sometimes referred to as an IP rating (e.g., IP67, IPX8). However, this standard does not ensure full protection for the device's lifetime.

#### *The IP Code*

Although the IP Code is intended to demonstrate the level of protection on a device, it has some limitations and should only be used as a reference. Indeed, despite promoting the IP Code as an indication of protection, most manufacturers exclude any liquid damage from the warranty. The main problem with the IP Code and IP ratings is the controlled conditions under which tests are performed. The standard even recommends the atmospheric conditions to perform the tests, as well as the duration of the contact with water. These tests are performed only with clean water and on brand new devices, prior to launch.

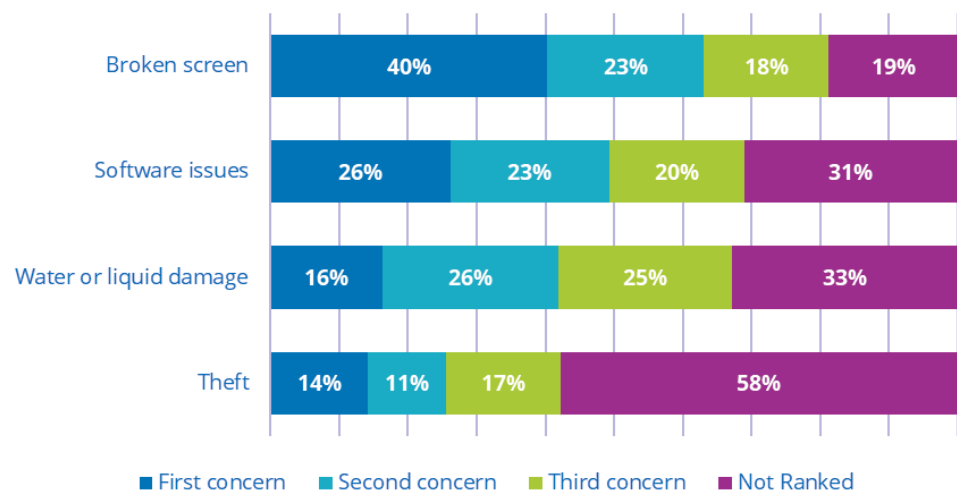
However, devices are rarely, if ever, exposed to the same conditions that the IP code protects against, and IP ratings fall short of ensuring protection in all challenging environments. For instance, devices can be in contact with very different types of liquids (soda, sea water, sweat, etc.), and the daily usage of the device can put pressure on components and may reduce protection against liquid ingress. IP tests are never performed under conditions that differ from the standard.

#### *Main Concerns With Smartphones*

Because most accidents are not covered by the product warranty, and many users do not have an optional insurance or coverage plan, this is an additional cost for the user. These aspects are therefore very important for consumers, who ranked them above aspects such as brand or design.

**Figure 4**  
**Main Concerns With Smartphones**

**Q:** *Thinking about your main smartphone, which of the following are your biggest concerns when using it?*

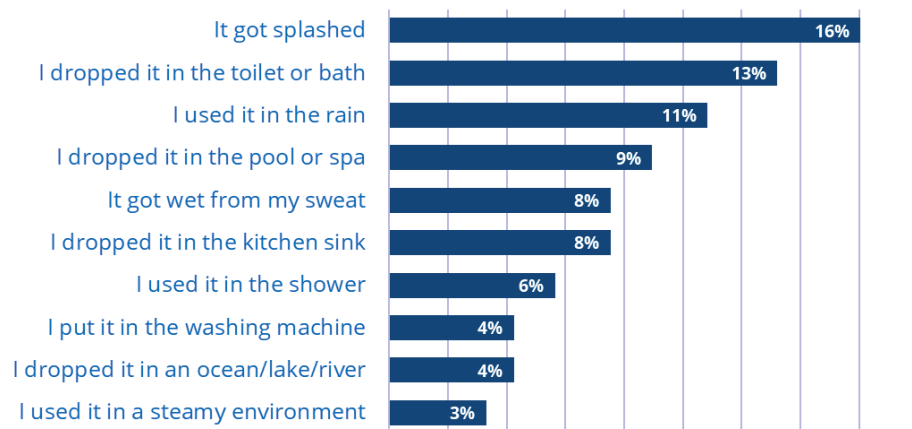


Source: IDC Waterproof Mobile Devices Survey, June 2019

Although shattered screens are still the most common smartphone accident, the device is easily repaired in such an event. Accidents with liquids are the second most common, but the damage is often catastrophic and considered irreparable. On contact with any liquid, a powered electronic component starts to corrode within seconds. One of the most common forms of corrosion occurs when a metal comes into contact with water, creating iron oxide, commonly known as rust. When a device remains in the water (even less than a minute), it can quickly become compromised, destroying it at a system level. This type of accident is typically not covered by the manufacturer's warranty.

**Figure 5**  
Accidents That Cause Liquid Damage to the Smartphone

**Q:** *And which of these accidents have caused damage to your smartphone?*



Source: IDC Waterproof Mobile Devices Survey, June 2019

Accidents with water are very common as people's lives gravitate around environments that can expose the device to water or other liquids. Smartphones can get splashed by rain, coffee or soda, or dropped in a pool, toilet, or bath (Figure 5). Whatever the reason, the risk of damage is severe, due to the many potential ingress points. On smartphones, for example, the ingress points include the SIM card, MicroSD card trays, headphone jack, microphone, the gaps between covers, the LCD, the USB charger, the buttons, and the speaker grills. These areas may have varying degrees of protection, but in almost all cases the standard is to protect a brand-new device against clean water. This style of protection can be quickly compromised with use and exposure to everyday life — saltwater, chlorinated water, beverages, etc.

Water damage may not be visible. In most cases the device stops working straight away after the accident, but it can also take a few days for permanent damage to become apparent, such as when the damage results from using the device in a steamy environment.

### *Assessing Liquid Damage*

When an accident happens, a customer usually visits a store or repair center and asks for the device to be checked, but often it is not obvious why a device has stopped working, especially when they do not mention that the device suffered an accident with liquids.

To understand the problem and the severity of damage, the device is then sent to a repair center for assessment. Repair centers will open the device and evaluate the status of the multiple liquid damage indicators (LDIs) or liquid contact indicators (LCIs) at the various ingress points in the phone. If the device came into contact with a liquid, the indicators will change color, and the device is typically returned to the user and not repaired under the warranty, or an estimate of the repair cost is provided.

While broken screens are assessed in the store and an estimate of the replacement cost is provided immediately, liquid damage requires an assessment by a specialized repair center, even in the event of damage as a result of misuse. When a device is sent to a repair center for assessment, all parties involved will incur costs: the manufacturer, the carrier or retailer, and the user.

Manufacturers will incur the cost of assessment, usually paying a flat fee for the service. In many cases the accident is the result of misuse, usually not self-reported because user knows that the repair will not be covered by the warranty. Carriers also demand minimum service levels from manufacturers, which allows them to replace the device automatically in certain circumstances (e.g., in the first 14 days of purchase). In these cases, the manufacturer will incur the full cost of the device, when it is unrecoverable.

Carriers and retailers will incur the administrative costs of handling the device in the store and sending it to the repair center, as well as revenue loss from churn or airtime and data not used while the device is out for repair.

Costs for end users may vary between having to send the device to repair themselves and paying for the assessment (usually when the device is out of warranty), and the cost of repair or replacing the device when unrecoverable.

Although the assessment is a simple process, it has major implications as it results from not being able to evaluate the impact of the accident on the device. The subsequent actions will most likely result in a cost, depending on the severity of the damage.

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*Preventing liquid damage is a strategic decision that will benefit manufacturers, retailers and carriers, users, and other players that provide services to the mobile devices.*

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## Future Outlook

Preventing liquid damage is a strategic decision that will benefit manufacturers, retailers and carriers, users, and other players that provide services to the mobile devices. Offering liquid protection also helps to improve customer satisfaction and reduce costs. IDC believes that manufacturers should offer liquid protection as a standard feature on their devices; carriers and channels should require it from their OEM partners; and consumers should demand it. This is a problem that should not exist with the solutions available today to manufacturers. Liquid protection also increases the value of the device as it lasts longer, providing users with a higher value when trading it in for a new device.

The *IDC Waterproof Mobile Devices Survey 2019* shows that the level of interest in liquid protection is growing among consumers, particularly for those that have had an accident before. 64% of people who bought a new smartphone after their previous device was damaged with liquids preferred a new smartphone with liquid protection. And more importantly, 55% of consumers are willing to pay between \$11 and \$70 more for an identical smartphone with liquid protection.

### *The Implications of Liquid Damage and Increased Importance of Liquid Protection in All Electronics*

Protection against liquid damage goes beyond mobile devices. The number of connected devices will continue to grow, and other products will experience similar implications of liquid damage as mobile devices. IoT devices, for instance, will face exposure to liquids and the risk of damage, which may have major implications in a business activity or process. Many products are deemed critical, and any damage that impacts their performance may result in halting an entire business. Dependence on technology extends from the convenience of a smartphone to the mission criticality of a self-driving car. Liquid protection is therefore essential to any device, as the implications of damage can be tremendous.

### *Smartphone Users*

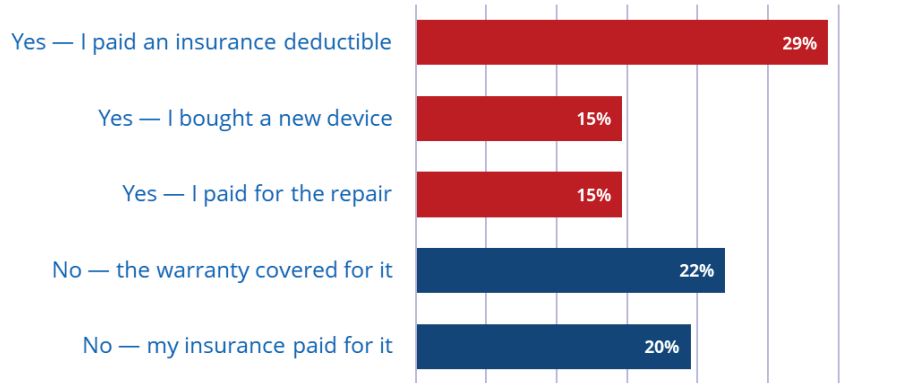
The increased and usually mobile usage of smartphones has contributed to a surge in the number of accidents, for which less than half have any type of insurance or protection plan. Even for those who have a plan, the expense can be considerable to complete a repair. Ideally, the phone itself would afford a level of protection that meets the day to day rigor of the phone's use. This historically has been accomplished with mechanical seals (e.g., rubber gaskets) which break down over time and ultimately fail with continued use.

Dropping a phone in the toilet or in the bath, getting splashed by rain or while having a coffee will likely result in a substantial cost for the owner. 59% of those who had an accident with liquid involving their smartphones incurred an out of pocket cost as a result of the accident, according to the *IDC Waterproof Mobile Devices Survey 2019*. The cost can vary depending on how fast the phone is removed from the liquid, the type of liquid it was exposed to, or how quickly the phone was cleaned, which will have an impact on the level of exposure and the damage to the components. In many scenarios, this means the owner will have to dispose of the phone and buy a new one (Figure 6).



**Figure 6**  
Users Incur Costs as a Result of Accidents

**Q:** *Thinking about the most recent accident with your smartphone, did you incur any costs as a result of the accident?*



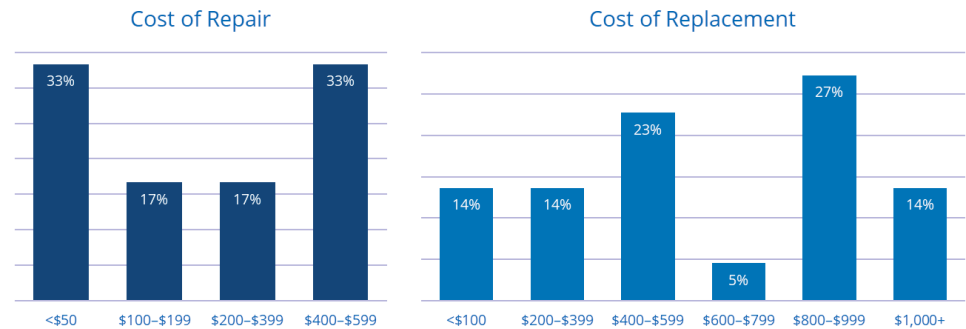
Source: IDC Waterproof Mobile Devices Survey, June 2019

The cost of either repair or replacement is high, with 74% of consumers spending over \$400 for a repair due to liquid damage (Figure 7), resulting in high levels of frustration and adversely affecting brand satisfaction.

**Figure 7**  
Cost of Repairing or Replacing a Smartphone After Damage

**Q:** *How much did it cost to repair your smartphone?*

**Q:** *How much did it cost to replace your smartphone?*



Source: IDC Waterproof Mobile Devices Survey, June 2019

In developed markets such as the U.S. the average selling price of smartphones jumped from \$485 in 2010 to \$572 in 2018, an increase of 18%. As more consumers spend more money on their smartphones, they become more wary of potential damage.

Manufacturers have started offering liquid protection on their devices to meet market demand, improve customer satisfaction and retention, and prevent repair and warranty costs.

### Device Manufacturers

While liquid protection is not new, over the past several years an increasing number of manufacturers have started offering liquid protection on their devices for three main reasons: a) market demand; b) to improve customer satisfaction and retention, and c) to prevent repair and warranty costs.

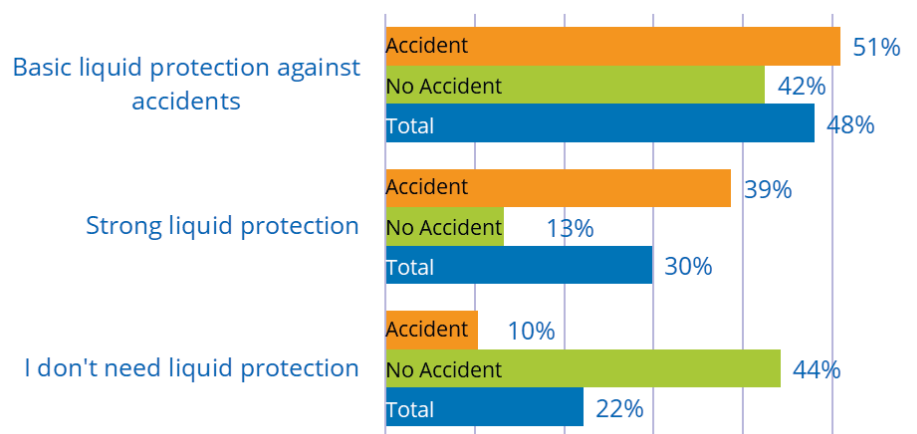
#### a) Market Demand

Liquid protection has been available to varying degrees on mobile phones and other devices for many years, but it was when Apple introduced water protection on its products in 2016 with the iPhone 7 that consumers started to understand the benefits of having a device that can withstand contact with water. Damaging a device due to contact with water or other liquids is the second largest concern for smartphone users, and consequently a key consideration when considering a new device. 78% of smartphone owners now consider liquid protection to be essential (Figure 8). Unfortunately, it can be confusing for them to understand the real nature of protection, and reference to Ingress Standards (e.g., IP68) does little to provide assurance that the device will stand up to the elements, spills, and other hazards over the course of its life.

Figure 8

#### Levels of Protection Consumers Consider Essential for Their Next Smartphone

Q: Please indicate which of the following levels of liquid protection you would consider essential to have in your next smartphone?



Source: IDC Waterproof Mobile Devices Survey, June 2019

With each introduction of a new smartphone model we see the bar raised in terms of level of protection, most recently seen with Apple's iPhone 11 introduction, featuring submersion protection for 30 minutes at 4 meters. Not surprisingly, 64% of smartphone owners who bought a new smartphone after their previous phone had been damaged by liquid preferred a new device that offered liquid protection, according to the *IDC Waterproof Mobile Devices Survey 2019*. However, the demand for protection is not just coming from consumers. Carriers also have their own requirements that OEMs must meet.

### b) Improve Customer Satisfaction and Retention

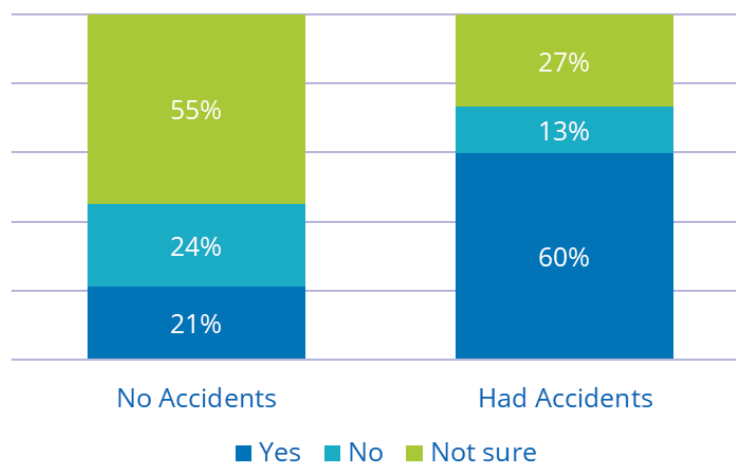
Warranties only cover factory defects, which means misuse such as liquid damage is never covered. When a customer returns a phone reporting that it has stopped working, the device needs to be assessed. To identify problems with liquids and prevent costs associated with misuse, manufacturers have added liquid damage indicators (LDI) to their products that will show if the device has been exposed to water or any liquid. While this prevents the manufacturer from incurring additional repairs or replacement costs, it also generates disputes with the brand, dissatisfaction, and frustration. This also does not protect the manufacturer from the cost associated with diagnosing the damage in the first place, which can be substantial.

Most consumers do not understand that manufacturers typically are under no legal obligation to repair or replace a device damaged by liquid. However, they do believe the devices should withstand certain levels of contact with water, the same way they do not expect a phone to break with the first minor accident that happens. In many cases, smartphone users do not even understand that the phone can be damaged just by steamy environments or even by being in contact with sweat. However, even when customers understand that they are responsible for the damage, the relationship with the brand is also damaged. The next time they need to buy a smartphone it is very likely they will choose another brand that offers liquid protection. 60% of smartphone users who had an accident with liquids plan to replace their smartphone with one that offers liquid protection (Figure 9).

Figure 9

#### Purchase Intention of a Smartphone With Liquid Protection

Q: *Thinking about your next smartphone, are you planning to get one that has liquid protection?*



Source: IDC Waterproof Mobile Devices Survey, June 2019

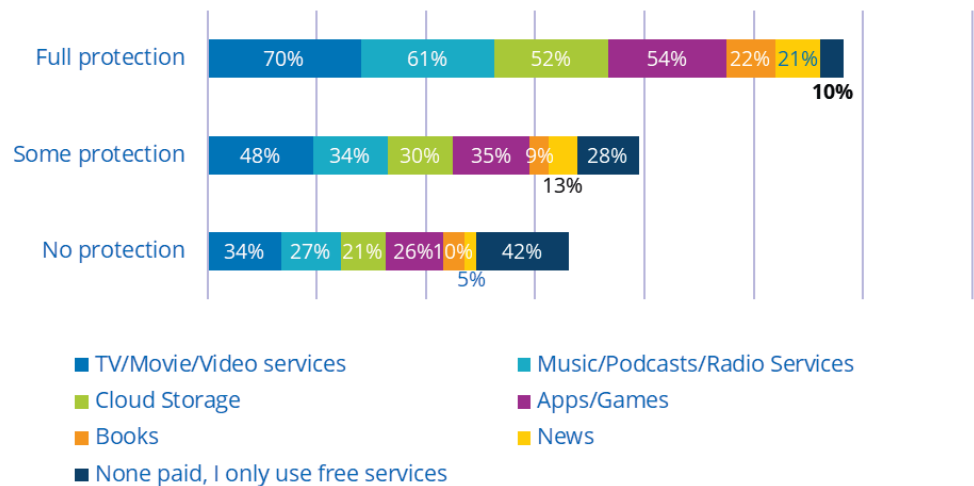
It is clear then that offering liquid protection contributes to higher retention and brand loyalty due to the positive experience that customers will have after an accident with liquids. This creates the idea of device durability, which, as previously mentioned, is the main factor influencing the purchase of a new smartphone.

IDC research shows that consumers with a smartphone that offers protection against liquid damage buy more apps and content than those with smartphones with no protection.

A fully functioning device is also a source of potential new revenue, from applications and services to accessories for the device. Consumers with a smartphone that offers protection against liquid damage buy more apps and content than those with smartphones with no protection, which helps further tie the consumer into the brand's ecosystem (Figure 10).

Figure 10  
Paid Smartphone Services Used by Consumers

Q: Which of the following paid (not free) smartphone services do you use?



Source: IDC Waterproof Mobile Devices Survey, June 2019

#### c) Prevent Costs

Device manufacturers can face extensive direct costs related to liquid damage: assessment costs, administrative costs, refunds to customers, and refurbishment costs when possible. These costs can range between \$50 and the full cost of the device (>\$800) in the case of replacement or refund. But manufacturers can also face indirect costs: the cost of re-acquisition when a customer replaces the device with a competitor's brand, or administrative costs related to managing complaints and unhappy customers.

These costs could easily be prevented by reducing the risk of liquid damage. Device makers offering liquid protection in their products are doing it: 1) as a strategy to reduce the direct repair, replacement, and warranty costs; 2) to reduce liabilities associated with device failure; and 3) to foster customer satisfaction leading to ancillary purchases (e.g., audio devices, cloud services, music services, apps). For example, when a customer returns a device complaining that it stopped working, the store needs to send it for assessment to the repair center. If there is no damage after the accident, manufacturers will save significant amounts of money in unnecessary assessments. They will also improve customer loyalty and retention as a result of the positive experience that users have when their device continues to work normally after the accident. For consumers the costs associated with the damage are important, but equally important is the fact that they will be deprived of their smartphones for several days or even weeks. The key takeaway is that liquid damage is preventable, and prevention fosters a happy customer and helps ensure the manufacturer's bottom line.

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*Conscious of the impact on their business in terms of customer satisfaction, churn, and administrative cost, most carriers have introduced minimum requirements related to liquid protection.*

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### *Carriers and Retailers*

To retain customers and minimize churn, carriers have been focusing on selling smartphones that offer higher quality standards, such as higher durability, to minimize potential technical problems. Most carriers have introduced minimum requirements related to liquid protection, because they are conscious of the impact on their business in terms of customer satisfaction, churn, and administrative costs associated with managing the complaint and handling the device, as well as the decline in usage by the user. In the U.S., AT&T requires that all smartphones are IPX2 certified to prevent damage due a small accident with liquids.

When damage occurs, smartphone buyers expect the store to resolve the problem, either by repairing the device at no extra cost or by replacing it for free. Consumers usually do not understand why they are asked to pay for the repair if, for example, they used it in a steamy environment and the device was not dropped in the water. Neither do they understand when they are told the warranty does not cover water damage or when they removed the device from water immediately and took immediate action to dry it out. Frustrated customers tend to complain and "spread" their dissatisfaction on social media where they can reach thousands or even millions of other customers of the carrier. Carriers and retailers' stores are in the "first line of attack" by unhappy customers. This can result in high costs if the unhappy customer moves to another network or if the device is not in use during the assessment or repair period.

### *Insurers*

The number of protection plans offered by insurers has exploded over the years. However, according to the *IDC Waterproof Mobile Devices Survey 2019*, most smartphones (52%) are still not covered by an insurance or protection plan, as consumers continue to rely on warranty coverage as the primary method to protect their smartphones.

When an accident happens, insurers are directly affected when they must repair or replace a device after a claim. Devices that do not offer liquid protection will have a higher impact on their margins and therefore there will be higher policy prices on these devices.

### *Service Providers*

In recent years, access to media content has moved online and smartphones are now important vehicles to access this content. Consumers are spending money on different services, from music to TV and movies, from cloud services to news and books. TV, movies, and video are at the top of the list, with 42% of consumers subscribing to these services, of which 76% spend between \$6 and \$20 per month, according to the *IDC Waterproof Mobile Devices Survey 2019*. Music and radio services attract 33% of smartphone users, with most subscribers spending over \$11 per month. Apps and Games are the third largest paid category, with 31% of smartphone owners buying apps and games, and the majority spending \$6 or more per month.

Not being able to use the smartphone due to an accident will adversely affect services usage and potentially lead to the cancelation or suspension of subscriptions while the device is away for assessment or repair. Furthermore, if

users incur additional costs due to an accident, they may need to cut costs if their budgets are limited.

IDC research shows that people with smartphones that offer liquid protection buy more apps and subscribe to more services than those with unprotected smartphones, and they also spend more money per month on those services.

## Solutions to Prevent Liquid Damage

Device makers have different approaches to liquid protection on their devices:

- a) **Physical Seals:** by using seals and gaskets, device makers can create a physical barrier that prevents liquid ingress.
- b) **Plasma-Applied Nano Coatings:** hydrophobic coating that prevents corrosion by creating a hydrophobic surface that allows liquids to roll away instead of coming into contact with the device's sensitive components.
- c) **Parylene:** microns-thin physical barrier applied to the internal circuitry of a device which prevents direct contact from water and other liquids on the device's internal circuitry by providing a truly conformal barrier.
- d) **Other conformal coatings** (acrylics and silicones): thin polymeric film applied to the printed circuit board (PCB) to protect its components.

### *a) Physical Seals*

Physical seals prevent water ingress by using seals and gaskets that protect the device at key ingress points, such as the SIM Card and SD card trays, charger ports, headphone jack, microphone, buttons, and speaker grid. While in the past manufacturers offered physical seals by using small covers on some of these areas, today this is part of the industrial design and covers are no longer needed in most standard consumer smartphones. Physical seals also present some challenges:

- The design of the phone requires a much higher level of complexity to be able to accommodate the physical protective seals with the other components within the device. As smartphones have become thinner, the space required by the battery to provide the performance needed throughout the day also puts pressure on the space available for other components. The implementation of physical seals is therefore highly expensive due to the investments needed in terms of industrial design.
- During their lifetime, smartphones are exposed to different environments. Smartphones are not always used on flat surfaces, nor carried in boxes. They are exposed to drops, to pressure inside pockets, and are carried under heavy objects in bags. These environments and behaviors can compromise the seals and how the components sit on the printed circuit board, which increases the risk of the seals not being able to fully prevent liquid ingress. The physical seals also do not prevent corrosion from taking place in the event of water getting inside the phone.
- Physical seals tend to be bulky, adding weight, and can distract from the device aesthetics.

*b) Plasma-Applied Nano Coatings*

Keeping water away from a device is half the battle. With nano coatings that utilize a plasma process as an application catalyst, manufacturers can create a hydrophobic surface on the outside and/or inside of a device that prevents liquid from pooling (think lotus leaf effect) and finding its way inside the device, causing destruction. Plasma-applied nano coatings should be considered as protection only against limited liquid exposure such as light splashes or rain and not against complete submersion — brief or prolonged.

*c) Parylene*

Parylene is a microns-thin transparent coating that creates a physical barrier around the internal circuitry of a device. Because of its robust chemical properties, Parylene is able to withstand a wide variety of liquids including water, sweat, coffee, soaps, household liquids, and more, as well as enable prolonged submersion of the device it is applied to (IPX7 and beyond) according to the specifications of the manufacturer.

*d) Other conformal coating*

Other conformal coatings, such as acrylics, silicones, and urethanes, are also available, although they are becoming far less common. These coatings offer specific advantages depending on the application. One of the advantages is the fact that they are breathable, which allows moisture trapped in the electronic boards to escape.

## Challenges With Liquid Protection

Liquid protection is becoming a standard feature in most flagship products, and consumers today consider this protection an essential feature when purchasing a new smartphone. However, there are some challenges:

- Driven by consumer interest, manufacturers use water protection as a strategic message in their product marketing. However, consumers may not fully understand the meaning of the IP ratings, nor read the full terms and conditions of the device warranty. Misled by marketing messages, they feel confident in using their devices in water and are less careful when using the device close to liquids. But disappointed consumers who realize that they have been misled by marketing when an accident occurs are very likely to switch brands and become detractors to others.
- Consumers who never experienced an accident with liquids will not value the feature. Educating these consumers to the importance of buying a device with liquid protection is harder, as they do not fully understand the impact of liquid damage.
- Manufacturers and channels continue to look at liquid protection as a feature, rather than as a strategy to drive customer retention and satisfaction and prevent costs. The focus is more on the IP rating for marketing purposes than finding the right solution to prevent liquids from damaging the device.

## Conclusion

In today's challenging economic environment, customer retention and cost reduction are vital for the success of any business. The adoption and usage of mobile devices is not going to slow down, and reducing the risk of damage, should an accident happen, is important. Because devices are important in our lives, people are keener on paying more for a device that performs better and offers the quality and durability needed. Some consumers may need educating, but for manufacturers the effort will be worthwhile.

The solutions marketed today for electronics offer minimal protection to prolonged use and adverse conditions. Next-generation solutions will go beyond preventing water from entering the device to ensuring components inside the device are protected against contact with liquids of all forms over the life of the product. The combination of industrial design and conformal coating technologies is highly recommended, and should be addressed by manufacturers strategically, as it will reduce and prevent costs, mitigate liability, support incremental revenues, and retain happy customers.



## About the Analyst



### **Francisco Jeronimo, Associate VP, Devices, IDC EMEA**

Francisco Jeronimo is associate VP for European devices at IDC. Based in London, he leads the research that covers mobile devices and personal computing devices trends across Europe. He examines market dynamics for personal computers, tablets, smartphones, wearables, and augmented reality and virtual reality, and provides in-depth analysis of the strategies and performance of the key industry players. Jeronimo is also responsible for the several device trackers in the region.

Jeronimo has worked in the mobile devices industry for 18 years, in Japan, Finland, and Portugal. Before joining IDC, he was responsible for the mobile devices business of LG in Portugal. He worked with mobile operators and managed the distribution channel of the biggest mobile phone wholesaler in Portugal. He launched a mobile software development company and did project management and consultancy in mobility for several companies in a number of industries. Before that, in 1998, he started working for the Nokia R&D Center in Japan and then in Finland.

Jeronimo is a regular commentator on trends in mobile telecommunications in leading industry and business publications, including the Financial Times, the Wall Street Journal, the New York Times, The Economist, CNBC TV, Bloomberg TV, Reuters, the BBC, The Independent, The Telegraph, The Guardian, Wired, and CNET.

He has a master's in management from Oporto University in Portugal and is a postgraduate in sales management from Lisbon University with a major in telecoms. He is fluent in English, Spanish, and Portuguese.

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