

# SONY

## White paper

November 2017



Xperia™ XZ  
F8331

# Purpose of this document

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Sony product white paper are intended to give an overview of a product and provide details in relevant areas of technology.

**NOTE:** The illustration that appears on the title page is for reference only. All screen images and elements are subject to change without prior notice.

# Document history

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Version		
September 2016	First released version	Version 1
October 2016	Second released version	Version 2
December 2016	Third released version	Version 3
November 2017	Fourth released version	Version 4

# Sony Mobile Developer World

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# Product overview

## Highlights

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- 23MP main camera with triple image sensing technology
- 13MP wide angle front camera
- Polished metal back with high purity
- Smart battery management with Battery Care\*\* and Qnovo Adaptive Charging
- Water resistant\*

### **23 MP main camera with three times the precision**

Your Xperia™ XZ comes loaded with the advanced photography technologies you recognize from other Xperia smartphones. We've also added triple image sensing technology and Predictive Hybrid Autofocus to analyse and adapt to any environment, helping you to capture the perfect shot.

- **Imaging Sensor**

Predicts movement to keep your subject in focus, and capture the shot without blur.

- **Laser AF sensor**

Measures the distance to the object and delivers sharp photos even in challenging light conditions.

- **RGBC-IR sensor**

Measures visible colour and infra-red to adjust white balance and capture naturally vibrant colours.

- **From standby to capture in 0.6 seconds**

The Xperia™ XZ delivers our fastest camera to date, so you'll never miss a shot.

- **13MP low-light selfie cam**

Take sharp, inclusive selfies with a wide angle camera featuring double-digit megapixels and low-light sensors.

### **A premium 5.2" design with polished and high purity metal back**

Xperia™ XZ's uncluttered design is meant to fit seamlessly into your life. The soft, rounded form with a loop surface and 2.5D curved Corning® Gorilla® Glass® makes it comfortable to hold, while the stunning colours are designed to suit your style. The back is made from high purity ALKALEIDO™\*\*\*\* metal, adding depth, shine and brightness to the finish

### **A smartphone that gets smarter every day**

The more you use your Xperia™ XZ, the more it will adjust to your habits, giving you the most dynamic and personalised smartphone experience yet.

## **Battery Care\*\* and Qnovo Adaptive Charging**

The Xperia™ XZ newly features Battery Care\*\* which learns and adapts to your charging habits. Together with Qnovo Adaptive Charging, they deliver up to twice the battery lifespan.\*\*\*

## **Smart cleaner**

Xperia™ XZ learns which apps you use the most. By automatically deactivating unused apps and clearing the cache, your smartphone always functions at optimum speed.

## **Water resistant\***

\*Sony's water resistant design takes the worry out of a little wet. Xperia™ XZ is built to withstand the splashes that are a part of everyday life. So you can relax about sudden spills or unexpected showers.

*\*Xperia™ XZ is water resistant and protected against dust, so don't worry if you get caught in the rain or want to wash off dirt under a tap water, but remember all ports and attached covers should be firmly closed. You should not put the device completely underwater; or expose it to seawater, salt water, chlorinated water or liquids such as drinks. Abuse and improper use of device will invalidate warranty. The device has been tested under Ingress Protection rating IP65/68. Note that the Xperia™ XZ has a capless USB port to connect and charge. The USB port needs to be completely dry before charging.*

*\*\*Battery Care is not available in the US market.*

*\*\*\*The result may vary depending on conditions and battery cell generation Definition: One cycle consists of charging to 100%, holding 20min at 100%, discharging to 0%, and waiting 20min at 0%. The procedures are performed with the battery held in a controlled steady temperature chamber. Reference charging is performed using the CCCV method. Span up to 2 times longer with Qnovo.*

*\*\*\*\*ALKALEIDO™ is a registered trademark of Kobe Steel, Ltd.*

## Facts – dimensions, weight, performance and networks

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<b>Operating system</b>	Google™ Android™ 8.0 (Oreo)
<b>Processor</b>	2.2 GHz / 1.6 GHz Qualcomm MSM8996 Quad Core
<b>GPU</b>	Adreno 530
<b>Size</b>	146 x 72 x 8.1 mm
<b>Weight</b>	161g
<b>Available colours</b>	Mineral black/Platinum/Forest blue/Deep pink*****
<b>SIM card</b>	Nano SIM
<b>Main screen</b>	
Size (diagonal)	5.2 inches
Colours	16,777,216 colour TFT
Resolution	Full HD 1080p 1080x1920 pixels
Display	Corning® Gorilla® Glass
<b>Input mechanisms</b>	
Text input	On-screen QWERTY keyboard
Touch screen	Capacitive
Touch gesture	Yes – multi-touch, up to 10 fingers supported
<b>Memory</b>	
RAM	3 GB
Flash memory	Up to 32 GB*
Expansion slot	microSD™ card, microSDHC, microSDXC supported**
Memory card speed class	Up to Class 10***
Memory card UHS speed class	Class 1***
<b>Camera</b>	
Camera resolution	23 MP main camera with Sony Exmor RS™ for mobile sensor
Triple sensing technology	Yes
Digital zoom	8x
Clear image zoom	5x
Photo flash	Yes
Video recording	4K

ISO	ISO 3200 maximum in Manual mode
	ISO 12800 maximum in Superior auto mode for photos
	ISO 4000 maximum for video
F number	F2.0
Minimum focus distance	120 mm
Front camera	Yes - 13MP front camera with Sony Exmor RS™ for mobile sensor (Full HD,1080p)
<b>Networks</b>	
F8331	UMTS HSPA+ 800 (Band VI), 800 (Band XIX), 850 (Band V), 900 (Band VIII), 1700 (Band IV), 1900 (Band II), 2100 (Band I) MHz GSM GPRS/EDGE 850, 900, 1800, 1900 MHz LTE (Bands 1,2,3,4,5,7,8,12,13,17,19,20,26,28,29,32,38,39,40,41) WLAN, 2.4G/5G, NFC
<b>Data transfer speeds</b>	
GSM GPRS	Up to 107 kbps
GSM EDGE	Up to 296 kbps
HSUPA (upload)	Cat 6, up to 5.76 Mbps
HSDPA (download)	Cat 24, up to 42.2 Mbps
LTE	Cat 9, up to 50 Mbps (upload), up to 450 Mbps (download)
<b>Battery performance</b>	
<b>Talk time (GSM)</b>	11 hours 40 min****
<b>Standby time (GSM)</b>	600 hours****
<b>Talk time (UMTS)</b>	17 hours 30min****
<b>Standby time (UMTS)</b>	610 hours****
<b>Standby time (LTE)</b>	590 hours****
<b>Music listening time</b>	78 hours****
<b>Video playback time</b>	11 hours****
<b>Battery (Embedded)</b>	2900mAH minimum
<b>Sensors</b>	
Accelerometer	Yes
Ambient light sensor	Yes
Barometer sensor	Yes
eCompass™	Yes

Game rotation vector	Yes
Geomagnetic rotation vector	Yes
Gyroscope	Yes
Magnetometer	Yes
Step counter	Yes
Step detector	Yes
Significant motion detector	Yes
Proximity sensor	Yes

\* Memory comprises approximately 10.5 GB of firmware, plus 21.5 GB of “Internal storage” for music, pictures and movies, and downloaded applications and their data. For more details about memory, see “Memory in Android™ devices” on page 20.

\*\* SDXC theoretically can support up to 2TB card. However, 256 GB is the largest capacity of microSD card available in the market as of January 2016.

\*\*\* This device meets the minimum hardware requirements to support Class 10 / UHS Speed Class 1 Flash memory. Flash memory performance is dependent on the application and task being performed on the device. If you would like to know about your memory card, refer to the technical specifications that came with the card.

\*\*\*\* Values are according to GSM Association Battery Life Measurement Technique as performed in controlled laboratory conditions. Actual time may vary.







\*\*\*\*\*This colour is not available in all markets.




**NOTE:** The battery performance may vary depending on network conditions and configurations, and device usage.




**NOTE:** The performance metrics are all measured under laboratory conditions.



## Categorised feature list

 <p><b>Call</b> Enriched calling* Noise suppression Smart call handling</p>	 <p><b>Messaging</b> Email Multimedia messaging (MMS) Text messaging (SMS)</p>	 <p><b>Applications</b> Amazon Shopping* Facebook™ application* Introduction to Xperia™ Lifelog News suite* Weather application What's new Xperia™ Companion Xperia™ Lounge* Xperia™ Tips</p>
 <p><b>Entertainment</b> Movie creator PlayStation® App* PS4™ Remote Play Kobo Reader* Sketch Video &amp; TV SideView Xperia™ Themes</p>	 <p><b>Organiser</b> ActiveSync® Airplane mode Alarm clock AVG Protection Battery Care***** Calculator Contacts Queue background data Setup guide Smart actions Smart cleaner STAMINA mode Stopwatch Timer Ultra STAMINA mode World clock Xperia™ Assist Xperia™ Actions</p>	 <p><b>Google</b> Gmail™* Google Calendar Google Chrome™* Google Drive Google Docs, Sheets and Slides Google Photos Google Play Movies &amp; TV Google Play Music Google Play Store™* Google™ search* Google Voice™ Search* Google voice typing Google Maps™* Hangouts™* Smart Lock YouTube™*</p>

 <p><b>Camera</b></p> <p><b>- Photo</b></p> <p>23 MP Camera with Sony Exmor RS™ for mobile image sensor****</p> <p>13 MP Front-facing camera with Sony Exmor RS™ for mobile image sensor***</p> <p>5x clear image zoom****</p> <p>8x digital zoom****</p> <p>24 mm wide-angle****</p> <p>Color &amp; Brightness</p> <p>Flash/Pulsed LED****</p> <p>Flash/Photo light****</p> <p>Hand shutter***</p> <p>HDR</p> <p>Image stabiliser</p> <p>Object tracking****</p> <p>Predictive Hybrid Auto focus****</p> <p>Quick Launch****</p> <p>Red-eye reduction****</p> <p>Superior Auto</p> <p>Save location</p> <p>Self-timer</p> <p>Smile Shutter™</p> <p>Scene recognition</p> <p>Touch capture</p> <p>White balance</p> <p><b>- Video</b></p> <p>8x digital zoom****</p> <p>Auto focus</p> <p>Color &amp; Brightness</p> <p>Front-facing camera (1080p)***</p> <p>Object tracking****</p> <p>Save location</p> <p>Smile Shutter™</p> <p>SteadyShot™ with Intelligent Active</p> <p>Scene recognition</p> <p>Touch capture</p> <p>Video recording</p> <p><b>- Add-on applications</b></p> <p>4k video</p> <p>AR Effect</p> <p>Creative effect</p> <p>Sound Photo</p> <p>Sticker creator</p> <p>Style portrait</p> <p>Style editor</p> <p>Panorama</p> <p>Timeshift video</p> <p>Timeshift burst</p>	 <p><b>Music</b></p> <p>3D Surround Sound (VPT)</p> <p>Album art</p> <p>Automatic headset compensation</p> <p>Bluetooth® stereo (aptX®, A2DP, LDAC)</p> <p>ClearAudio+</p> <p>Clear Bass™</p> <p>DSEE HX**</p> <p>Dynamic normalizer</p> <p>Hi-Res Audio (LPCM, FLAC, ALAC, DSD)</p> <p>Hi-Res Audio via 3.5 mm audio jack and USB</p> <p>Low power audio playback**</p> <p>Music application</p> <p>S-Force Front Surround</p> <p>Spotify*</p> <p>Stereo speakers</p>	 <p><b>Connectivity</b></p> <p>aGNSS</p> <p>Bluetooth® 4.2 wireless technology</p> <p>Cast</p> <p>Device Connection</p> <p>DLNA Certified™</p> <p>HDCP</p> <p>Media Transfer Protocol support</p> <p>NFC</p> <p>Quick Charge 2.0 &amp; 3.0 support</p> <p>Screen mirroring</p> <p>USB charging</p> <p>USB Connection mode</p> <p>USB High speed 2.0 support</p> <p>USB Host</p> <p>USB Type-C™</p> <p>Wi-Fi®</p> <p>Wi-Fi® Hotspot functionality</p> <p>Wi-Fi CERTIFIED Miracast™</p>
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 <p><b>Text Input</b>  Gesture input*  On-screen QWERTY keyboard*  SwiftKey™  Predictive text input</p>	 <p><b>Display</b>  Auto rotation  Glove mode  Multi-window  Screen zoom  Screenshot capturing  Smart backlight control  Super-vivid mode  TRILUMINOS™ Display for mobile  X-Reality™ for mobile</p>	 <p><b>Hardware</b>  3.5 mm audio jack Digital Noise Cancelling (DNC)  Fingerprint sensor****  IP65/68*****  Live Color LED  RGBC-IR sensor  ToF (Laser AF) sensor</p>
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\* *This service is not available in all markets.*

\*\* *This feature is only available when you play music using the Music application.*

\*\*\* *This feature is only supported by the front camera.*

\*\*\*\* *This feature is not supported by the front camera.*

\*\*\*\*\* *This feature is not available in the US market.*

\*\*\*\*\* *Sony's water resistant design takes the worry out of a little wet. Xperia™ XZ is built to withstand the splashes that are a part of everyday life. So you can relax about sudden spills or unexpected showers.*

\*\*\*\*\* *The Xperia™ XZ is water resistant and protected against dust, so don't worry if you get caught in the rain or want to wash off dirt under a tap water, but remember all ports and attached covers should be firmly closed. You should not put the device completely underwater; or expose it to seawater, salt water, chlorinated water or liquids such as drinks. Abuse and improper use of device will invalidate warranty. The device has been tested under Ingress Protection rating IP65/68. Note the Xperia™ XZ has a capless USB port to connect and charge. The USB port needs to be completely dry before charging.*

# Technologies in detail

The information presented in this section is a general overview of the technology incorporated into the product. However, hardware and software levels of compliance to standards and specifications vary between products and markets. For more information, contact Sony Mobile Developer World or the relevant Sony representative.

## Accessibility and Usability

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Accessibility shortcut	Yes
Auto-rotate screen	Yes
Captions	Yes
Color correction	Yes
Color inversion	Yes
Display size	Yes
Hearing Aid Compatibility (HAC)*	Yes
Large mouse cursor	Yes
High contrast text	Yes
Font size	Yes
Magnification	Yes
Mono audio	Yes
Power button ends call	Yes
Select to Speak	Yes
Switch access	Yes
Talkback	Yes
Teletypewriter (TTY)**	Yes
Text-to-speech output	Yes
Touch & hold delay	Yes

**NOTE:** These are Android features. Subject to possible change in future releases of Google™ Android™.

\* Available in specific regions.

\*\* The TTY feature is for deaf or hearing-impaired users.

## Device-to-device communications (local)

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### Bluetooth® wireless technology

Bluetooth® profiles supported	<p>Advanced Audio Distribution Profile v1.2          Audio/Video Remote Control Profile v1.6          Device Identification Profile v1.3          Generic Access Profile          Generic Attribute Profile Client/Server over LE          General Audio/Video Distribution Profile v1.2          Handsfree Profile v1.7 (Wide band speech)          Headset Profile v1.2          HID over GATT Profile v1.0          Human Interface Device Profile, Host role v1.0          Messaging Access Profile v1.2          Object Push Profile v1.2          Personal Area Networking Profile v1.0          Phonebook Access Profile v1.2          Serial Port Profile v1.2</p>
Core version and supported core features	<p>Version 4.2          Bluetooth Low Energy</p>
Other supported features	<p>aptX® CD quality audio streaming over Bluetooth®          LDAC High sound quality audio streaming over Bluetooth®</p>
Connectable devices	<p>Products that support at least one of the Bluetooth® profiles listed above.          Bluetooth® 4.2 accessories generally require the installation of a supporting application.</p>

More information:

[www.sonymobile.com/developer](http://www.sonymobile.com/developer)

[www.bluetooth.com](http://www.bluetooth.com)

**Wi-Fi®**

Supported standards	IEEE 802.11a/b/g/n/ac MIMO and Wi-Fi® Wi-Fi Direct®, Wi-Fi Protected Setup™, Wi-Fi CERTIFIED Passpoint™, Wi-Fi CERTIFIED Miracast™
Connectable devices	Wi-Fi® compatible devices Wi-Fi® access points Wi-Fi Direct® compatible devices
Frequency band	2.4 GHz/5 GHz
Data transfer rate	Up to 867Mbit/s
Security	Open Authentication Shared Authentication EAP-SIM EAP-AKA EAP-AKA' EAP-TLS EAP-TTLS/MSCHAPv2 PEAPv0/EAP-MSCHAPv2 PEAPv1/EAP-GTC WPA Personal and WPA2 Personal WPA Enterprise and WPA2 Enterprise
Encryption	WEP 64 bit, WEP 128 bit, TKIP and CCMP (AES)
Power save	WMM-UAPSD
QoS	WMM, WMM Power Save

## DLNA Certified™ (Digital Living Network Alliance)

Supported Device Classes	<p><b>M-DMS – Mobile Digital Media Server</b> Media Types: image, video and music Summary: The digital media server exposes the media files in your device to a Wi-Fi® network. The files can then be accessed from other DLNA Certified clients or Sony devices which support home networks.</p> <p><b>M-DMP – Mobile Digital Media Player</b> Media Types: image, video and music Summary: Play content stored on another device, for example, a server or a PC, directly on your device.</p> <p><b>M-DMC – Mobile Digital Media Controller</b> Media Types: image, video and music Summary: A remote controller that searches for content on another device and plays them on your device.</p> <p><b>+PU+</b> Media Types: image, video and music Summary: Play media in your device on another device, such as a TV or a PC using 2 box push technology. +PU+ is integrated in the Album and Music applications.</p>
Supported Bearers	Wi-Fi® Wi-Fi Direct®
DRM Support	The DLNA Certified™ implementation does not support DRM-protected content.

## Messaging

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### MMS (Multimedia Messaging Service)

According to OMA Multimedia Messaging Service v1.0 + SMIL

### Email

Bearer type (IP)	GPRS, EGPRS, UMTS, LTE, Wi-Fi®
Character sets	BIG5 Traditional Chinese GB18030 ISO-2022-JP Japanese ISO-8859-1 ISO-8859-2 Eastern Europe ISO-8859-5 Cyrillic ISO-8859-7 Greek ISO-8859-9 Turkish ISO 8859-11 KOI8-R Cyrillic Shift_JIS Japanese US-ASCII UTF-16 UTF-8 Windows® 874 Windows® 1251 Cyrillic Windows® 1252 Windows® 1254 Turkish Windows® 1258 Vietnamese
Protocols	POP3 and IMAP4
Push email	Microsoft® Exchange ActiveSync® (EAS) IMAP4 IDLE (RFC2177)
Secure email	SSL/TLS, both port methods (POPS/IMAPS) and STARTTLS
HTML mail	Yes (read only)

#### More information:

[www.sonymobile.com/developer](http://www.sonymobile.com/developer)

[www.openmobilealliance.org](http://www.openmobilealliance.org)



## Positioning – location based services

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Supported standards:

- OMA Secure User Plane Location (SUPL) v2.0
- 3GPP™ Control Plane location (incl. Emergency location)
- Qualcomm® GPSOneXtra™

Supported satellite systems:

- GPS
- GLONASS
- BeiDou\*

**NOTE1:** When needed, the device automatically uses a combination of all available satellite system to accurately provide location information

*\* BeiDou satellites are not used for providing location information in U.S. territory.*

## Provisioning (OMA CP)

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OMA CP version 1.1

## Multimedia (audio, image and video)

<b>Audio Playback</b>	<b>Decoder format</b>	<b>Supported in file format</b>
	AAC (AAC-LC, AAC+, eAAC+, AAC-ELD)	3GPP (.3gp, 3gpp), ADTS (.aac), AVI (.avi), M4V (.m4v), MP4 (.mp4, .m4a), MPEG-2 TS (.ts)
	ALAC	MP4 (.m4a)
	AMR-NB, AMR-WB	3GPP (.3gp, .3gpp), AMR (.amr, .awb)
	DSD	DSF (.dsf), DSDIFF (.dff)
	FLAC	FLAC (.flac)
	MIDI	SMF (.mid), XMF (.xmf), Mobile XMF (.mxmf), OTA (.ota), RTTTL (.rtttl), RTX (.rtx), iMelody (.imy)
	MP3	MP3 (.mp3)
	PCM	AIFF (.aiff), AVI (.avi), WAV (.wav)
	Opus	Matroska (.mkv), MatroskaAudio (.mka), WebM (.webm)
	Vorbis	OGG (.ogg), MatroskaAudio (.mka), Matroska (.mkv)
	WMA	ASF (.wma)
<b>Audio Recording</b>	<b>Encoder format</b>	<b>Supported in file format</b>
	AAC (AAC-LC, AAC+, AAC-ELD)	ADTS (.acc), MP4 (.mp4, .m4a)
	AMR-WB	3GPP (.3gp, .3gpp), AWB (.awb)
	AMR-NB	3GPP (.3gp, .3gpp), AMR (.amr)

<b>Image Playback</b>	<b>Decoder format</b>	<b>Supported in file format</b>
	BMP	BMP (.bmp)
	GIF	GIF (.gif)
	JPEG	JPEG (.jpg, .jpeg)
	ARW	ARW (.arw)
	WBMP	WBMP (.wbmp)
	CR2	CR2 (.cr2)
	DNG	DNG (.dng)
	NEF	NEF (.nef)
	NRW	NRW (.nrw)
	ORF	ORF (.orf)
	PEF	PEF (.pef)
	RAF	RAF (.raf)
	RW2	RW2 (.rw2)
	SRW	SRW (.srw)
PNG	PNG (.png)	
WebP	WebP (.webp)	
<b>Image Capture</b>	<b>Encoder format</b>	<b>Supported in file format</b>
	JPEG	JPEG (.jpg)
	PNG	PNG (.png)
	WebP	WebP (.webp)
<b>Video Playback</b>	<b>Decoder format</b>	<b>Supported in file format</b>
	MPEG-4	3GPP (.3gp, .3gpp), MP4 (.mp4, .m4v)
	H.263	3GPP (.3gp, .3gpp), MP4 (.mp4, .m4v)
	H.264	3GPP (.3gp, .3gpp), AVI (.avi), Matroska (.mkv), MP4 (.mp4, .m4v), MPEG-2 TS (.ts)
	H.265	Matroska (.mkv), MP4 (.mp4, .m4v)
	Xvid	AVI (.avi)
	VP8	Matroska (mkv.), WebM (.webm)
	VP9	Matroska (mkv.), WebM (.webm)

<b>Video Recording</b>	<b>Encoder format</b>	<b>Supported in file format</b>
	MPEG-4	3GPP (.3gp), MP4 (.mp4)
	H.263	3GPP (.3gp), MP4 (.mp4)
	H.264	3GPP (.3gp), MP4 (.mp4)
	H.265	MP4 (.mp4)
	VP8	WebM (.webm)
<b>Audio/Video Streaming</b>	Streaming transport	HLS HTTP progressive streaming RTSP
<b>DRM</b>	DRM (Digital Rights Management) – features the rights and copy protection of downloaded content	OMA OMA DRM v1.0 Widevine Level 1 PlayReady DRM (available in specific regions)

## Synchronisation (OMA DS, EAS, Google Sync™)

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OMA Data Synchronisation protocol versions 1.1.2 and 1.2

OMA Data Formats: vCard 2.1, vCalendar 1.0

Microsoft® Exchange ActiveSync® protocol version 2.5

Microsoft® Exchange ActiveSync® protocol version 12

Microsoft® Exchange ActiveSync® protocol version 12.1

Microsoft® Exchange ActiveSync® protocol version 14

Microsoft® Exchange ActiveSync® protocol version 14.1

Google Sync™

Related information:

[www.sonymobile.com/developer](http://www.sonymobile.com/developer)

## Web browser

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Google Chrome™ for Android™ is pre-installed in markets/regions where no restrictions apply.

Related information:

*<https://play.google.com/store/apps/details?id=com.android.chrome>*

# Memory in Android™ devices

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To use Android devices efficiently, users should be aware of the different types of device memory. This knowledge is important in order to understand, for example, where data such as music, photos and videos is saved; how many apps can be downloaded from Google Play™; and how photos can be copied to a PC.

Information regarding memory presented in this section may be useful to developers when optimising applications for mobile devices.

Generally, all Android devices share the same basic memory setup. What differs is how much memory is available to you via the different types of memory, and whether your device uses an external SD card or an internal memory chip. Any information specific to the particular device model described in this White Paper is noted as such.

## Types of memory

The types of memory described and numbered below are consistent with the terminology used in Sony mobile device menus and in other content relating to 2016 Xperia™ devices:

1. **Dynamic Memory** (also known as RAM) is used by applications that run when the device is turned on. The amount of Dynamic Memory influences how many applications and operating system services can run at the same time. The Android operating system automatically closes applications and services that are not being used.

However, such automatic functionality has limits. For example, if a lower amount of free RAM is available to applications after a new release of the operating system (due to increased capabilities in the system), device speed will eventually be impacted. This is the main reason that a device cannot be indefinitely upgraded to newer releases of Android™.

If you experience problems with RAM, for example, if the device runs slower than usual or if the Home application restarts frequently when you leave an application, you should minimise the use of apps that run all the time. Social networking apps that connect and update their data online and animated backgrounds are examples of apps that are always running and affect RAM performance. To minimise RAM issues, you could also consider using a static wallpaper instead of a live wallpaper.

To see which apps and services are currently active, go to **Settings > System > Developer options > Memory**. You should have at least 50 MB, and ideally 100 MB or more, of free RAM to avoid slowdowns and application restarts.

You should also be aware that if you update the device to a later Android release, the load on the built-in Dynamic Memory will increase due to the addition of more features. As a result, the device may run slower after an update.

The Xperia™ XZ has 3 GB of RAM available to the Android OS and any installed applications. 200 MB of the total RAM is in use during normal operation when the user starts using the device out of the box.

2. **System Memory** (also known as “System partition” or “/system”) is used for the Android OS and for most applications that are pre-loaded from the factory. This type of memory is normally locked, and can only be changed through a firmware upgrade. There is usually some free space available in this section of memory. However, since it is locked, you cannot save apps, photos or any other content to this memory. System Memory is reserved for future firmware upgrades, which almost always need more memory than the original firmware. You cannot see or influence the use of this memory.

- 3. Internal Storage is referred to as "working" memory.** It can be compared to the C: drive on a PC or to the startup disk on a Mac.

This type of memory is used to store all application downloaded from the Google Play™ Store (and other sources) as well as their settings and data (such as emails, messages and calendar events, for example). All applications have an allocated area for application data. Memory dedicated to an application is inaccessible to other applications.

Some game applications also store content such as game music and game level information outside their own designated area. In most cases, an application can choose to save its data in a location of its own choosing (outside the protected application settings area). Generally, such content is not deleted when an application is uninstalled; it must be removed manually by connecting the device to a computer with a USB cable, or by using a file manager application.

Internal storage is also used for all added user content. For example, photos taken using the device's camera, media files downloaded from the Internet and file transfers are stored in this area. Typical user content includes:

- photos
- movies
- music
- Email attachments

Internal Storage will tend to fill up as a result of normal usage. Devices with a large initial Internal Storage can handle more applications and store more user content.

If the Internal Storage starts to get full, the device slows down, and in some cases it might no longer be possible to install more apps. You should always ensure that you have at least 100 MB of free Internal Storage. If not, you should consider removing some apps that you seldom use, or move content that you do not frequently access to external storage.

You can see approximately how much Internal Storage is free in **Settings > Storage**. You can also view more details about how much memory is used by applications under **Settings > Apps & notifications**. In the Xperia™ XZ, about 21.5 GB of Internal Storage is available out of the box.

Please note that in Sony Mobile 2016 products, "Internal Storage" is now the combination of what was previously known as "Device Memory" or "Phone Memory" (for applications and their data – also previously known as "/data") and "Internal Storage" (for user's content – also previously known as "/sdcard"). The changes in Internal Storage were made so that memory usage could be more flexible and to allow encryption of user content.

### **Memory card slot**

Some products include both a large internal memory and a built-in memory card reader. Android manages devices with a built-in memory card reader and internal memory differently from a device that includes only a built-in memory card reader.

Since most applications expect only a single location for storage, such applications will not generally allow you to SAVE anything to the memory card (i.e., they do not offer the option to choose a storage location). However, some applications (for instance, the Sony Mobile "Camera" application) may actually allow you to do so. Other applications, for example, backup applications such as the Sony Mobile "Memory" application, will by definition be configured to copy content from the Internal Storage to the external SD card.

On the other hand, when it comes to reading from an external SD Card, you will be able to access content (for example, videos, photos and music) on a memory card inserted in this slot without any special consideration since the Android system searches all available memory for content. Therefore, such products may be regarded as supporting a fourth type of memory, called “External Card” or “SD Card”.

4. **SD Card** (known as “/ext\_card” from a programmer’s point of view, or by other names in other Android products) is the name for the removable SD memory card in all 2016 Sony Mobile products. As described in the previous section, this External Card memory is generally more limited in that any application can read from it, but many applications cannot save to this card. Only a few applications, including backup applications and file manger applications, have the capability to save to this card.

#### **Backing up data to different memory types**

Generally, you should not save photos, videos and other personal content solely on the internal memory of a device. If something should happen with the hardware, or if the device is lost or stolen, the data stored on the device’s internal memory is gone forever.

In a device where an SD card reader is the main memory, it is relatively easy to take the card out and copy all content to a PC or Mac, or to an entertainment device with a memory card slot. In a product featuring Internal Storage as the main memory, it is not possible to physically remove the memory. Instead, any critical or high-value content must either be copied to an external SD card by a special backup application, transferred to remote storage over a network (mobile or Wi-Fi), or to a computer via a USB cable.

To facilitate the transfer of data via a cable, the Xperia™ XZ supports Media Transfer Protocol (MTP), which makes it possible to easily transfer content back and forth between your device and a Windows® PC or an Mac® computer. This application is called Xperia™ Companion and it can be downloaded from the Xperia™ XZ support page.

Note that you do not need to back up or make a copy of applications that you have downloaded from the Google Play™ Store. They can normally be downloaded again after you have set up your Google account to work in a new device (or in a device where the memory has been completely erased).

#### **Note 1:**

Some Android devices, including Sony Mobile devices from 2012 and Sony Ericsson devices from 2011 and earlier, do not use a single “Internal Storage” for both applications (and their data) and user content. Instead, these devices use either an external SD card for user content, or a corresponding area of internal memory to reproduce the functionality of an SD card. In such devices, there is a fixed limit between the application area (“/data”) and the user content area (“/sdcard”), with the result that user content can build up and reach this limit. When the user content reaches this limit, no additional data can be added using any application. For example, the camera application would no longer be able to capture additional photos even if a considerable amount of free space was available in the application area. This limit also applies to the application area. Downloading and installing new applications would not be possible even if there was enough free memory in the user content area.

#### **Note 2:**

Some devices with integrated storage have abandoned the distinction between the application area and the content area when it comes to a Factory Data Reset. As a result, there is no option in such devices to perform a Factory Data Reset and preserve content. In such devices, all content is completely deleted from the device when a reset is performed.

In contrast, Sony Mobile’s memory integration solution makes it possible to preserve user content in this situation. Therefore, when performing a Factory Data Reset, the default action will still be to only remove applications and their data, and an option box must be checked if all content is to be removed as well (as might be desirable when selling the device second-hand).



**Note 3:**

For a developer, it is important to note that from a programming point of view the location names used to refer to the different memory areas described in Note 1 are still valid, i.e., the area used for applications (“/data”) is still present, as is the area used for content (“/sdcard”).

In reality, “sdcard” is a “symbolic link” to “/data/media”. However, from inside an Android application, “/sdcard” can still be used. For example, you can use “sdcard/DCIM/100Android” to find all camera images. The continued use of “/sdcard” to access the content area ensures compatibility across different products and Android releases in this regard.

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