

SONY®

White paper

March 2013



Xperia™ V
LT25i

Purpose of this document

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

Document history

| Version | | |
|----------------|-------------------------|-----------|
| August 2012 | First released version | Version 1 |
| September 2012 | Second released version | Version 2 |
| March 2013 | Third released version | Version 3 |

Sony Mobile Developer World

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This White paper is published by:

Sony Mobile Communications AB,
SE-221 88 Lund, Sweden

www.sonymobile.com

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First released version (August 2012)
Publication number: 1268-3049.1

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Product overview

Xperia™ V– The ultimate LTE smartphone experience

Feel the need for speed? Great gaming, super-quick surfing, fast downloads. Slim, sleek and durable, Xperia™ V lets you do what you want without the wait. Take great photos in any light condition, listen to music in soul-shaking clarity and enjoy a reality-like viewing experience on the 720p HD display. On a water resistant smartphone you can't resist.

Dedicated to speed

Stay in the fast lane. Watch beautifully flowing streaming video. Download apps in a snap and run them without a hitch. With Xperia™ V's super fast, latest generation Snapdragon S4 dual core 1.5 GHz processor and the speed of LTE, the wait is over. Forever.

No water worries

Take a call in the pouring rain. Check your email by the kitchen sink. Your smart, sleek and durable Xperia™ V doesn't mind getting wet. It has the highest level of water resistance of any smartphone.

In compliance with IP55 and IP57, Xperia™ V is protected against the ingress of dust and is water resistant. Provided that all ports and covers are firmly closed, the phone is (i) protected against low pressure jets of water from all practicable directions in compliance with IP 55; and/or (ii) can be kept under 1 metre of freshwater for up to 30 minutes in compliance with IP 57. The phone is not designed to float or work submerged underwater outside the IP55 or IP57 classification range and should not be exposed to any liquid chemicals. If liquid detection is triggered on the handset or battery, your warranty will be void.

Picture perfect and powerful HD Android™ phone

Au revoir, tristesse. Enjoy a reality-like viewing experience on your Xperia™ V. Watch TV shows, movies and your own video clips on the stunning 4.3" HD Reality Display powered by the Mobile BRAVIA® Engine 2. This smarter display technology automatically optimises the colour, sharpness and contrast of what you're watching to deliver the best viewing experience. Always.

Save the moment in full HD

Your team's top striker celebrating the winning goal. A golden sunset worth more than the plane ticket. Capture it all in full 1080p HD video. When a photo is the best option, the Sony 13 MP camera with Superior Auto and HDR helps you take your best shots in any light condition. Then relive great times - with the "Album" app you easily sort, browse and share your photos and videos.

Share the magic on any screen

Home at last. Time to relax with the latest blockbuster? The "Movies" app magically downloads info on all the films that you have downloaded or side loaded, and lets you view them in high quality. Or why not play your videos on a big screen by connecting a standard HDMI cable to your HDTV using an MHL adapter* or a compatible Xperia TV Dock* accessory? With live streaming in full HD, what looks gorgeous on your phone also looks gorgeous on your HDTV. If you prefer to go wireless, you can use the Screen Mirroring** feature to share content from your phone via the TV***. With just the touch of a button, you can watch your selected photo pop up on the TV screen or listen to the current music track play on the TV's speakers.

* Separate accessory, not included.

*** When using screen mirroring, the image quality may sometimes be negatively impacted if there is interference from other Wi-Fi networks.*

**** Your TV must support screen mirroring based on Wi-Fi CERTIFIED Miracast™ for the screen mirroring feature to work. If your TV does not support such screen mirroring, you need to purchase a wireless display adapter separately.*

The best music – in Sony sound

The original is back. Xperia™ V comes with the new “WALKMAN” app. Fill it with your playlists. Connect to your wireless speakers, find the right track and crank it up. Clear Audio + will automatically select the best audio quality settings so you can enjoy your favourite music in soul shaking clarity.



Signature features

The Sony Xperia™ V comes with a range of features as standard. Below is a summary of the key signature features.

Xperia™ Timescape™

Communication made easy

The Timescape™ application manages all your communication with one person in one place. You can effortlessly browse by category your Facebook™, Twitter™, email and text communications, as well as view your photos. Now everything is all together and in chronological order, so you don't have to open different applications to see what's going on.

Xperia™ Infinite button

Everything you want – from everywhere

Tap the infinite button in the Timescape™ application and smart filter each category of communication by person. For example, when viewing a text message from a friend in Timescape™, tap the infinite button to view a list of all chat messages with that friend.

Xperia™ Local connectivity

More control over your media

Using Xperia™ Local connectivity, you can exercise more control over how media files get transferred and stored. For example, you can select MTP mode to transfer files if you want to limit the risk of data corruption or select MSC mode if you want to have more control over the data storage.

Xperia™ Home screen application

The place you call Home

Customise your Home screen with widgets, shortcuts, folders, themes, wallpaper and other items. Where's best for you? Email top right? Music player bottom left? You decide. With four extensions to your Home screen, you've got plenty of space to put things where you want. Just remember to flick left or right to find them.

Facts – dimensions, weight, performance and networks

| | |
|--------------------------|--|
| Operating system | Google™ Android™ 4.0 (Ice Cream Sandwich) |
| Processor | 1.5 GHz Qualcomm MSM8960 Dual Core |
| GPU | Adreno 225 |
| Size | 129 x 65 x 10.7 mm |
| Weight | 120 grams |
| Available colours | Black Pink White |
| SIM card | Micro SIM |
| Main screen | |
| Colours | 16,777,216 colour TFT |
| Resolution | 1280x720 pixels |
| Size (diagonal) | 4.3 inches |
| Scratch-resistant | Shatter-proof sheet on scratch-resistant glass |
| Input mechanisms | |
| Text input | On-screen QWERTY keyboard |
| Touch screen | Capacitive |
| Touch gesture | Yes – multi-touch, up to 10 fingers supported |
| Memory | |
| RAM | 1 GB |
| Flash memory | 8 GB eMMC* |
| Expansion slot | microSD™ card, up to 32 GB |
| Camera | |
| Camera resolution | 13 MP |
| Digital zoom | 16x |
| Photo light | Yes |
| Video recording | Yes – HD 1080p |
| Front Camera | Yes – VGA |
| Sensors | |
| Accelerometer | Yes |
| Proximity sensor | Yes |

| | |
|-----------------------------|--|
| Ambient light sensor** | Yes |
| Magnetometer | Yes |
| Gyroscope | Yes |
| Networks | |
| LT25i | UMTS HSPA+ 850 (Band V), 900 (Band VIII), 2100 (Band I) GSM EDGE 850, 900, 1800, 1900 LTE Band I, Band III, Band V, Band VII and Band XX |
| Data transfer speeds | |
| GSM EDGE | Up to 237 kbps |
| UMTS HSPA cat 6 (upload) | Up to 5.8 Mbps |
| UMTS HSPA cat 24(download) | Up to 42 Mbps |
| LTE cat3 | Up to 50 Mbps (upload), up to 100 Mbps (download) |
| Talk time (GSM) | Up to 7 hours*** |
| Standby time (GSM) | Up to 300 hours*** |
| Talk time (UMTS) | Up to 7 hours*** |
| Standby time (UMTS) | Up to 400 hours*** |
| Standby time (LTE) | Up to 270 hours*** |
| Music listening time | Up to 18 hours*** |
| Video playback time | Up to 4 hours*** |
| Battery | 1750 mAh typical 1700 mAh minimum |

* Memory comprises 1.2 GB of firmware, 2 GB of “Phone memory” for downloaded applications, and about 3.7 GB of “Internal storage” for music, pictures and movies, and some application data. For a more detailed description of the different types of memory and how they are used, see “Memory in Android™ phones” on page 16.







** There is no API for the light sensor.




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

NOTE: Battery performance may vary depending on network conditions and configurations, and phone usage.

NOTE: All performance metrics are measured under laboratory conditions.

Categorised feature list

| | | |
|---|--|--|
|  <p>Camera 13 megapixel camera 16x digital zoom Auto focus Face detection Flash/Photo light Flash/Photo flash Front-facing camera (VGA) Geotagging HD video recording (1080p) Image stabiliser Red-eye reduction Self-timer Send to web Smile detection Sony Exmor R™ for mobile image sensor Superior Auto Sweep Multi Angle Touch focus Video light Video recording</p> |  <p>Music Album art Bluetooth™ stereo (A2DP) Clear Audio+ Clear bass Clear stereo Manual equalizer Music Player TrackID™ music recognition “WALKMAN” application xLoud™ Experience</p> |  <p>Internet Bookmarks Google Play™ Google™ search* Google Voice™ Search* Google Maps™ for Mobile with Navigation, Places and Latitude™* NeoReader™ barcode scanner Pan & zoom Web browser (WebKit™)</p> |
|  <p>Communication Call list Facebook™ application* Google Talk™ application* Noise suppression Xperia™ Timescape™ Xperia™ with Facebook™ Speakerphone Twitter™ (Timescape™ integration)*</p> |  <p>Messaging Conversations Email Google Mail™* Messaging Multimedia messaging (MMS) Predictive text input Sound recorder Text messaging (SMS)</p> |  <p>Design Auto rotation Gesture input Gyroscope HD Reality Display with Sony Mobile BRAVIA® Engine 2 On-screen QWERTY keyboard Dustproof (IP5X) and Water resistant (IPX5/7) Screenshot capturing Wallpaper</p> |

| | | |
|--|---|--|
|  <p>Entertainment 3D Album 3D games Media browser Motion gaming PlayStation® Certified Radio (FM radio with RDS) Sony Entertainment Network* TV launcher Video streaming YouTube™*</p> |  <p>Organiser Airplane mode Alarm clock Calculator Calendar Contacts Document readers eCompass™ Infinite button Notes OfficeSuite Setup guide Stopwatch Tasks Timer</p> |  <p>Connectivity 3.5 mm audio jack (CTIA) aGPS* Bluetooth™ wireless technology DLNA Certified® GLONASS* Media Go™* Media Transfer Protocol support MHL Micro USB support Native USB tethering NFC PC Companion Synchronisation via Facebook™ Synchronisation via SyncML™ Synchronisation via Google™ Synchronisation with computer Synchronisation via Microsoft® Exchange ActiveSync® USB High speed 2.0 support Wi-Fi® Wi-Fi® Hotspot functionality Xperia™ Link</p> |
|--|---|--|

* This service is not available in all markets.

Technologies in detail

NOTE: The information outlined below is general and levels of compliance to standards and specifications may vary between products and markets. For more information, contact Sony Mobile Developer World or your Sony contact person where applicable.

Device-to-device communications (local)

Bluetooth™ wireless technology

| | |
|--|---|
| Bluetooth™ profiles supported | Advanced Audio Distribution Profile v1.2 Audio/Video Remote Control Profile v1.0 Handsfree Profile v1.6 (Wide band speech) Headset Profile v1.1 Object Push Profile v1.1 Phonebook Access Profile v1.0 |
| Core version and supported core features | Version 4.0 |
| Connectable devices | Products supporting at least one of the profiles above. |

More information:

www.sonymobile.com/developer

www.bluetooth.com

Wi-Fi®

| | |
|---------------------|---|
| Supported standards | IEEE 802.11a/b/g/n and Wi-Fi® |
| Connectable devices | Wi-Fi® access points |
| Frequency band | 2.4 GHz/5 GHz |
| Data transfer rate | Up to 72 Mbit/s |
| Security | WEP 64 bit WEP 128 bit TKIP CCMP (AES) Open Authentication Shared Authentication EAP-SIM EAP-TLS EAP-TTLS/MSCHAPv2 PEAPv0/EAP-MSCHAPv2 PEAPv1/EAP-GTC WPA Personal and WPA2 Personal WPA Enterprise and WPA2 Enterprise |
| Encryption | WEP, TKIP and AES |
| Power save | WMM-UAPSD QoS, WMM |

DLNA Certified® (Digital Living Network Alliance)

| | |
|--------------------------|--|
| Supported Device Classes | <p>M-DMS – Mobile Digital Media Server Media Types: images Summary: The digital media server exposes the media files in your phone to a Wi-Fi® network. The files can then be accessed from other DLNA Certified® clients.</p> <p>+PU+ Media Types: image, video and music Summary: Play media in the phone on another device, such as a TV or computer using 2-box push technology. +PU+ is integrated into the Gallery and Music applications.</p> <p>M-DMP – Mobile Digital Media Player Media Types: image, video and music Summary: Play content stored on another device, for example, a server or a PC, directly on the phone.</p> |
| Supported Bearers | Wi-Fi® |
| DRM Support | The DLNA Certified® implementation does not support DRM-protected content. |

Messaging

MMS (Multimedia Messaging Service)

According to OMA Multimedia Messaging Service v1.0 + SMIL

Email

| | |
|------------------|---|
| Bearer type (IP) | GPRS, EGPRS, UMTS |
| 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 USASCII 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) |
| Secure email | SSL/TLS, both port methods (POPS/IMAPS) and START-TLS |
| HTML mail | Yes (read only) |

More information:

www.sonymobile.com/developer

www.openmobilealliance.org

Positioning – location based services

Supported standards:

- OMA Secure User Plane Location (SUPL)
- 3GPP™ Control Plane location (including Emergency location)
- Qualcomm® GPSTOneXtra™

Supported satellite systems:

- GPS
- GLONASS*

* **NOTE:** GPS and GLONASS are used together to calculate the position. Positioning is more robust and accurate in most conditions, if both systems are active. In conditions where the GLONASS receiver will not add any improvement it is automatically disabled to save power. The benefits of using GLONASS are automatically available for all applications using the Satellite Positioning API ("GPS Provider" in Android terminology).

Provisioning (OMA CP)

OMA CP version 1.1

Multimedia (audio, image and video)

| | | |
|------------------------|---|---|
| Audio Playback | Decoder format | Supported in file format |
| | Audio decoding MPEG-1/2/2.5, audio layer 3 | MP3 (.mp3), 3GPP (.3gp), MP4 (.mp4, .m4a) |
| | AAC, AAC+, eAAC+ | 3GPP (.3gp), MP4 (.mp4) |
| | AMR-NB, AMR-WB | 3GPP (.3gp) |
| | General MIDI (GM) | SMF (.mid) |
| | Linear PCM 16bit | WAV (.wav) |
| | OTA | OTA (.ota) |
| | vorbis | Ogg (.ogg) |
| Audio Recording | Encoder format | Supported in file format |
| | AMR-NB, AMR-WB | 3GPP (.3gp), MP4 (.mp4), AMR (.amr) |
| | AMR-NB, AMR-WB, AAC-LC stereo Sample rate: 48 kHz Bit rate: 128 kbps | 3GPP (.3gp), MP4 (.mp4) |
| Image Playback | Decoder format | Supported in file format |
| | 1, 4, 8, 16, 24 and 32 bpp and RLE encoded formats | BMP (.bmp) |
| | Single and multi-frame, bitmap mask support (GIF87a format and GIF89a format) | GIF (.gif) |
| | Joint Photographic Experts Group | JPEG (.jpg) |
| | Portable Network Graphics Bitmap mask support | PNG (.png) |
| | Wireless Bitmap | WBMP (.wbmp) |
| Image Capture | Encoder format | Supported in file format |
| | Joint Photographic Experts Group | JPEG (.jpg) |
| Video Playback | Decoder format | Supported in file format |
| | MPEG-4 Simple Profile Level 6, Advanced Simple Profile Level 5 | 3GPP (.3gp), MP4 (.mp4), Matroska (.mkv), AVI (.avi, .xvid), (.mov) |
| | H.264 High Profile Level 3.2 | 3GPP (.3gp), MP4 (.mp4), Matroska (.mkv) |
| | H.263 Profile 0 Level 70 | 3GPP (.3gp) |
| | VP8 | WebM (.webm) |

| Video Recording | Encoder format | Supported in file format |
|------------------------------|---|---|
| | Video H.263 Profile 0, H.264 Baseline Profile Audio: AAC-LC stereo, sample rate 48 kHz bit rate 128 kbps, AMR-NB | 3GPP (.3gp), MP4 (.mp4) |
| Audio/Video Streaming | Streaming transport | RTSP according to 3GPP™ HTTP streaming |
| DRM | DRM (Digital Rights Management) – features the rights and copy protection of downloaded content | OMA DRM 1.0 Marlin DRM |

Synchronisation (OMA DS, EAS, Google Sync™)

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

Web browser

Google™ Chrome for Android™ is pre-installed.*

Related information:

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

* Google™ Chrome is not available for all markets.

Memory in Android™ phones

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

Generally, all Android phones 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 phone uses an external SD card or an internal memory chip. Any information specific to the particular phone model described in this White Paper is noted as such.

Please note that when internal memory is used, the figures you see in the phone information menus may appear to not match with the total amount of stated physical memory. In other words, the figures might not seem to add up. The reason for this is that some sections of the memory may use two memory cells instead of one for every storage unit, in order to secure storage integrity. The need for such “double storage” depends on the type of memory chips used and may therefore differ between products.

Types of memory

The types of memory described below are consistent with the terminology used in Sony mobile phone menus and in other content relating to 2012 Xperia™ phones:

1. **Dynamic Memory** (also known as RAM, or non-persistent memory, because everything in RAM disappears when the power is turned off) is used as “working memory” when the device is actually running, and is shared between the operating system and all active applications and services. Therefore, the amount of Dynamic Memory influences how many applications and operating system services can run at the same time. In Android™ phones, the 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 RAM is assigned to a certain release of the operating system, phone speed will be impacted.

If you experience problems with RAM, for example, if the phone runs slower than usual or if the Home application restarts frequently when you leave an application, you should minimize the use of apps that run all the time. Such apps could include, for example, applications that frequently download social service updates. 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 > Applications > Running Services**. 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 phone 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 phone may run slower after an update.

All the memory types described below (in sections 2 to 5) together comprise “persistent” memory. What this means is that all data and content stored on these sections of memory will “persist” after the power is turned off (in contrast to the non-persistent RAM). Persistent memory can therefore be used for storing applications, images, music and any other content which can only disappear after being explicitly deleted.

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. **Phone Memory** (also known as “Data partition” or “/data”) is a memory type that is used as working memory. It can be compared to the C: drive on a PC or to the startup disk on a Mac. All applications downloaded from Google Play™ or other sources are installed (at least initially) to this type of memory. Some can later be moved to another memory.

In this type of memory, as with System Memory, all applications have an allocated area which no other applications can access and to where the applications can and usually do save their data (such as phonebook, calendar, notes, and email applications).

Phone Memory will tend to fill up as a result of normal use, the use of applications saving their data, and you downloading and installing new applications. Therefore, the larger this memory is from the start, the more applications you can download and use.

If the Phone Memory starts to get full, the phone 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 50 MB of free Phone Memory. If not, you should consider removing some apps that you seldom use, or move some applications from the Phone Memory.

You can see how much Phone Memory is free under **Settings > Storage > Phone memory**. You can also view Phone Memory availability and usage information under **Settings > Applications > Manage Applications**. In the Xperia™ V, about 2 GB of Phone Memory is available out of the box.

4. **Internal Storage/SD card** (also known as “/sdcard”) is the memory used for:

- Content such as photos, movies and music which is added, for example, as a result of the user taking photos with the camera, downloading media files, and performing file transfers.
- Certain applications to store data in cases where larger amounts of content are involved. For example, applications for games and maps need to store larger files which would not fit in the Phone Memory.
- Applications that can be moved after installation from the Phone Memory. Note that not all applications can be moved, and in such cases the option to move the particular application will not be available. Typically, apps running as services, apps with widgets, or apps for live wallpapers cannot be moved. Also note that when apps are moved to the Internal Storage or to the SD card memory, a small part of the app will still remain in the Phone Memory.

This type of memory differs most between different Android phone models. In some models, a large amount of internal memory is built into the phone and is referred to in the user interface as “SD card” memory. In other cases, the phone features a memory card slot and a removable memory card that is bundled with the phone. No Android phone can be shipped without this memory type whether it comes as built-in storage or in the form of a removable memory card. The advantage of having an external memory card slot is that a user can replace the memory card with a larger one later on. In contrast, built-in internal memory cannot be extended. The drawback for the manufacturer is that a removable card is more expensive. Therefore, at a certain price level, a manufacturer can offer a larger amount of memory if it is built in, everything else being equal.

You can see how much Internal Storage is available under **Settings > Storage > Phone memory**. In the Xperia™ V, about 3.7 GB is available as Internal Storage.

In the Xperia™ V, the three areas of persistent memory (System Memory, Phone Memory, and Internal Storage), together with some small memory allocations for system operations, share 8 GB of built-in eMMC memory.

Note that in some products you may find both a large internal memory and a memory card reader slot. However, on the current Android platform, the card reader slot does not work in the same manner in a phone with large internal memory, for example, a phone with only a memory card slot. Generally, while

you can access content (such as videos, photos and music) on this optional memory card, you cannot in general save anything to the card. However, some applications, for example, a backup service application, may still be allowed to do so. In effect, this means that some products feature a fourth type of persistent memory, called “External Card”:

5. **External Card** (also known as “/ext-card”) is the name for the removable SD memory card in products where there is also Internal Memory and where this Internal Memory is referred to in the phone’s user interface as the “sdcard” memory. This External Card memory can generally not be written to from the phone, but it can be used (by the user) to store content from other sources. For example, you can write to this memory from a PC when the phone is connected to a PC and when the External Card is mounted. Some applications on the phone may in some cases, however, also have permissions to write to the External 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 phone. If something should happen with the hardware, or if the phone is lost or stolen, the data stored on the phone’s internal memory is gone forever.

In a phone 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 transferred over a network (mobile or Wi-Fi) or via a cable. To facilitate the transfer of data via a cable, the Xperia™ V supports the Microsoft standard, Media Transfer Protocol (MTP), which makes it possible to easily transfer content back and forth between your phone and a PC. For Apple Mac computers, a special application is available with built-in support for MTP. This application can be downloaded from the Xperia™ V Support page.

Note that you do not need to back up or make a copy of applications that you downloaded from Android Market/Google Play™. They can normally be downloaded again if you have set up a Google account to work in your phone. You can find the apps which you have purchased under “My apps” in Android Market/ Google Play™, so you will not need to either pay for or search for them again.

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