SONY

Xperia™ in Business
Security

Read about how Xperia™ devices manage security in a corporate IT environment

System security

Secure storage

Network security

Device security

Digital certificates

Xperia™ Z1
Xperia™ Z1 Compact
Xperia™ Z Ultra

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Products covered

The services and features described in this document require the following combination of products and software versions:

Xperia™ Z1
Software version (build number): 14.2.A.0.xxx

Xperia™ Z1 Compact
Software version (build number): 14.2.A.0.xxx

Xperia™ Z Ultra
Software version (build number): 14.2.A.0.xxx

Android version: 4.3.x

Note: xxx in software versions denotes a number 001-999.

To find the software version of a device, select **About phone** in **Settings**.

Limitations to services and features

Some of the services and features described in this document might not be supported in all countries/regions or by all networks and/or service providers in all areas. Please contact your network operator or service provider to determine availability of any specific service or feature and whether additional access or usage fees apply.

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Security

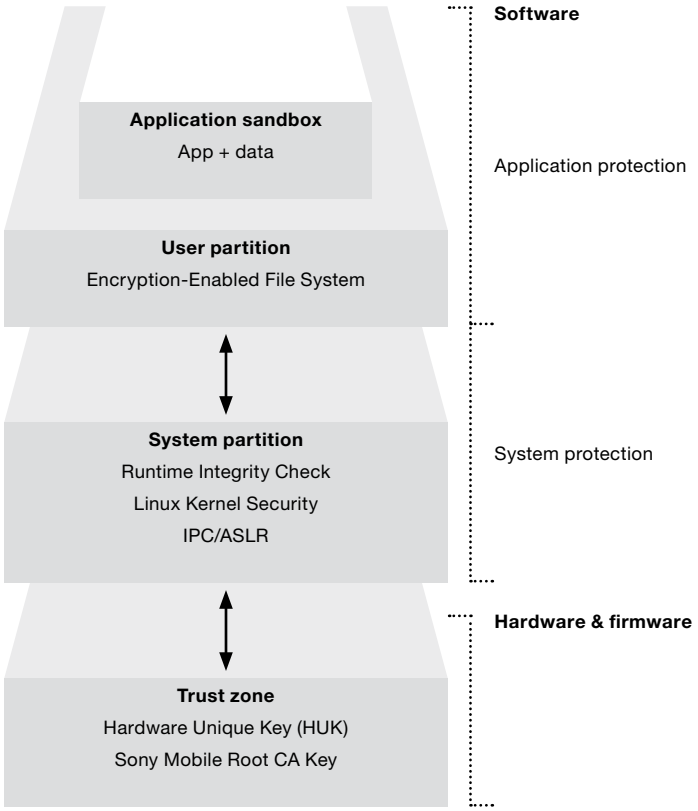
Xperia™ devices offer a robust security architecture to secure communications and to protect data stored on the device. The Android™ security model combines with Sony Mobile enhancements to provide a stable and secure platform.

Robust architecture with multiple layers

Xperia™ devices from Sony provide a multi-layer security architecture:

- **System security** - Xperia™ devices offer Linux kernel-level security from Android™ with Sony Mobile enhancements like Runtime integrity, HW and SW integrity and Secure Boot Chain.
- **Secure storage** - Devices can be protected by passwords, PIN codes and screen unlock patterns. Data on the devices can be encrypted.
- **Network security** - Transmissions are encrypted and Xperia™ devices have built-in support for industry-standard VPN protocols.
- **Device security** - Administrators can control the use of certain features or apps on devices. Data from lost devices can be wiped.
- **Digital certificates** - Xperia™ devices support digital certificates to enable authentication and authorisation of users connecting to corporate networks.

Figure 1: Xperia™ system security



Security

System security in Xperia™ devices from Sony:

- SE Linux
- Application sandbox
- Application code signing
- User-based permissions for applications
- Interprocess Communication framework
- Malware scanning of apps
- Address space layout randomiser
- Secure boot chain
- Runtime integrity check

Protected APIs that cannot be accessed without a user's explicit permission:

- Camera functions
- Location data (GPS)
- Bluetooth® functions
- Telephony functions
- SMS/MMS functions
- Network/data connections

System security

The Android™ operating system offers a well-defined security architecture. As the Android OS is based on the Linux™ operating system, it takes advantage of the proven Linux kernel-level security model. The OS uses the Android Application Sandbox, which isolates application data and code execution from other applications. Since applications cannot interact with each other, and have limited access to the OS, sensitive information is protected if the user doesn't permit access.

Linux kernel security

The Android OS is built upon the Linux kernel. The Linux kernel has been developed and improved constantly for over 20 years, and it is used and trusted as a stable and secure kernel by many corporations and security professionals. Android 4.3 uses Security Enhanced (SE) Linux access control.

Application sandbox

The Application Sandbox in the OS kernel protects native code and OS applications. All software above the kernel, including libraries, application runtime and applications, runs inside the Application Sandbox. The fact that the Android platform does not allow applications on the device to interact with each other and limits their access to the OS is key to enforcing security in Android devices. This system is referred to as the Android Application Sandbox. The Android OS assigns a unique Linux user ID to each application. The application then runs as a unique Linux user in a separate process. This means that if one application tries to read data or start a process in another application without permission, this action is stopped by the OS since the instigating application doesn't have the appropriate user privileges.

Application code signing

Each application that is used in the Application Sandbox on an Android device must be signed. Without a legitimate signature, an application cannot be installed; it will get rejected by either Google Play™ or by the package installer on the Android device. The certificate of the signed application defines the user ID that is associated with that application. Application signing also ensures that one application cannot access any other application except through well-defined inter-process communication (IPC). In addition, apps available from Google Play are automatically scanned for malware.

User-based permissions for applications

Without a user's explicit permission, an Android application cannot access any system resources or sensitive APIs, with a few limited exceptions. Trusted applications can use sensitive APIs, but only after the user has given permission. Examples of sensitive APIs are camera functions; location data (GPS); Bluetooth wireless technology; telephony functions; SMS and MMS functions; and network and data connections. These API resources are only accessible through the OS. To be able to use a sensitive API on the device, an application must state which capabilities it needs. One of the steps when installing an Android application is to judge whether you want to approve the permissions that the application requests. At this stage in the installation process you can deny the application access and interrupt the installation. The permissions are only granted as long as the application is installed. If the user uninstalls the application, the permissions are removed.

Security

Interprocess Communication

The Android OS uses Linux interprocess communication (IPC). It is a well-defined and proven framework for how multiple processes are allowed to communicate with each other. The Linux IPC mechanism has been developed and tested for decades.

Malware scanning of apps

An important element in the security shield provided by the Android platform is the distribution of secure apps. Users can choose to enable “Verify Apps” and have applications checked for malware prior to installation. App verification can alert the user if they try to install an app that might be harmful; if an application is especially bad, it can block installation.

The server-side scanner, Google Bouncer, controls each app to verify that its signature does not match that of known malware. When a developer uploads an app to Google Play, it is automatically scanned. The app is then scanned at regular intervals.

Address space layout randomiser

The task of the Address Space Layout Randomiser (ASLR) is to make sure that system applications and libraries are stored in random locations in the memory. The Android OS uses this randomisation to protect the device against exploitation of the memory, and against malware getting installed on the device with the risk of corrupting the memory. ASLR prevents Return-Oriented Programming (ROP) attacks. Most binaries are randomised when executed because they are linked with the PIE (Position Independent Executable) flag. The linkers are randomised in the process address space. The Android OS has full stack, heap/brk, lib/mmap, linker, and executable ASLR.

Sony Mobile secure boot chain

Each step of the boot-up and the software update processes contains components that are cryptographically signed by Sony to ensure integrity. The processes proceed only after the chain of trust is verified. This includes the bootloaders, the kernel and the modem firmware. When a Sony Mobile device is started, its application processor immediately executes code from a read-only memory known as the Boot ROM. This unchangeable, permanent code is entered in the chip as part of the manufacturing process, and is implicitly trusted.

The Boot ROM code contains the Sony Root CA public key, which is used to verify that the Sony S1 bootloader is signed by Sony before it is allowed to load and run. This is the first step in the chain of trust where each step ensures that the next is signed by Sony. When the S1 bootloader finishes its tasks, it verifies and runs the Android OS, i.e. the Linux kernel. When you update the software on the Sony Mobile device, either by using a USB cable and a computer, or by updating directly in the device, over the air, all updates are signed by Sony.

This means that all software is verified at least twice: once when it is written to the device, and then every time the device is turned on. This secure boot chain ensures that the lowest levels of the software are not tampered with. If one step of this boot process is unable to load or verify the next step, boot-up is stopped and the device turns off. To be able to start and use the device again, you have to restore it by updating the software using a USB cable and one of Sony Mobile’s computer tools, PC Companion or Sony™ Bridge for Mac.

Security

Secure email S/MIME
In EAS and the native Email client
- SHA-1/SHA-256*
- Triple-DES, AES 128/192/256-bit*

*Only SHA-1 and Triple-DES support if S/MIME policies are enforced through EAS.

S/MIME policies supported by the Xperia™ Email application:
- Require signed S/MIME messages
- Require encrypted S/MIME messages
- Require signed S/MIME algorithm
- Require encryption S/MIME algorithm

Runtime integrity check
To further improve security in Xperia™ devices, Sony has introduced a runtime integrity check to detect runtime attacks. The runtime integrity check is integrated in the kernel and verifies that the mount table has not been modified. This is to prevent attackers from, for example, storing executables that remount and modify the system partition of the memory to make root access permanent. The runtime integrity check also verifies the integrity of DRM binaries.

Secure storage

Xperia™ devices provide proven methods for protecting sensitive information. Passwords, PIN codes and screen unlock patterns prevent unauthorised use. Data on the device can be encrypted, making the data unreadable to anyone but the intended user. The combined efforts of a strong password and encryption capabilities guarantee robust protection of sensitive data stored on Xperia™ devices, and a lost device can be remotely locked and wiped to protect sensitive content.

Encryption
Encryption can be activated in Xperia™ devices. Xperia™ devices offer full encryption with 256-bit AES for all user data in the internal memory, as well as any external SD™ card. This means that any data saved by and to applications, for example, email messages, email attachments, text and multimedia messages and contacts, is protected with a hardware encryption key against unauthorised access. A phone that ends up in the wrong hands does not risk having its file system broken into, thanks to the full file system encryption available in Xperia™ devices.

All data is encrypted by an encryption key protected by 256-bit AES, which uses a key derived from the user password or PIN. If a device gets lost, confidential corporate information stays safe, and can only be accessed by knowing the password. To strengthen protection and guard the device against systematic password guessing attacks, the password is combined with a random salt and hashed repeatedly with SHA1 using the standard PBKDF2 algorithm prior to being used to encrypt the file system key.

In addition, Xperia™ devices can defend themselves from dictionary password attacks by enforcing password complexity based on rules that your IT department can set. On Xperia™ devices, encryption can be enforced by an organisation's IT department through Microsoft® Exchange ActiveSync® (EAS) or Mobile Device Management (MDM). Encryption can also be activated on the device by the user.

The email application in Xperia™ devices can use SSL and TLS to encrypt data sent between the Android OS and corporate services. To further enhance security in email conversations, the Xperia™ email application offers S/MIME (Secure/Multipurpose Internet Mail Extensions). This protocol gives Xperia™ devices the possibility to view and send encrypted email messages. It can also be used to prevent users from moving email messages between accounts and from forwarding messages from an account other than the one that received them.

Security

The Contacts Sync feature in PC Companion supports:

- Microsoft Windows Address Book (Windows XP)
- Windows Contacts (Microsoft Windows Vista and 7/8)
- Microsoft Outlook 2000, XP (2002), 2003, 2007, 2010/2013 (32bit and 64bit)
- Lotus Notes™ 5.0, 6.0, 6.5, 7.x (Windows XP)
- Lotus Notes 8.x (Windows XP, Vista and 7/8)

The Calendar Sync feature in PC Companion supports:

- Microsoft Windows Calendar (Windows Vista)
- Microsoft Outlook 2000, XP (2002), 2003, 2007, 2010/2013 (32bit and 64bit)
- Lotus Notes 5.0, 6.0, 6.5, 7.x (Windows XP)
- Lotus Notes™ 8.x (Windows XP, Vista and 7/8)

The Backup & Restore feature in PC Companion supports:

- Backup of the call log and contacts stored locally in the phone memory
- Backup of text messages, bookmarks, system settings, application settings and data (availability depending on application)
- Media files

Data protection

The combination of a strong password and 256-bit AES software encryption creates a robust encryption key that safeguards corporate data. This setup hinders data from becoming available to unauthorised users when the device is locked, and keeps device content secure even if the device comes under virtual or physical attack. To activate data encryption, the user simply has to set up password protection from the Settings menu on the device. A strong password is recommended to ensure effective data protection. IT departments can enforce strong passwords using Microsoft® Exchange ActiveSync® or MDM solutions.

Remote wipe

On an Xperia™ device that gets lost, stolen, or otherwise compromised, the administrator can remotely remove all data from the device and deactivate it. This remote wipe procedure can be performed using the Exchange Management Console (Exchange Server 2010) or Exchange ActiveSync Mobile Administration Web Tool (Exchange Server 2003 or 2007). Users can wipe their devices remotely themselves using Outlook Web Access if they use Exchange Server 2007. Xperia™ devices can also be remotely wiped using third party MDM solutions or the 'my Xperia' service, even in situations where Exchange server is not used.

Local wipe

Xperia™ devices can be set up to wipe all data and shut down after a set number of failed login attempts. This ability, known as local wipe, makes sure that brute force cracking attempts are unsuccessful. The number of failed attempts allowed before a local wipe occurs can be set in a configuration profile using MDM, or by using Microsoft® Exchange ActiveSync® policies enforced over the air.

Secure and local storage of information with software from Sony

Small- and medium-sized companies that don't want to rely on Microsoft® Exchange ActiveSync® or MDM solutions for synchronisation and remote storage of information can use free-of-charge software from Sony Mobile that is made for Microsoft® Windows® and Mac OS® computers. These tools can be used to back up and restore data locally on a computer. There is no need to create accounts or access the Internet.

Tools for Microsoft® Windows® users

PC Companion is a software program developed by Sony Mobile for computers running Microsoft® Windows®. It offers local backup and restore functions. When the PC Companion software is installed on a computer, users simply connect their Xperia™ device to the computer using a USB cable or a Wi-Fi® connection. All necessary drivers for the connected Xperia device are installed by PC Companion (Windows XP 32 bit, Windows Vista 32/64-bit, Windows 7/8 32/64-bit). PC Companion features software update and software repair functionality, enabling Xperia™ devices to be kept up to date and to run smoothly. Users can also use the tool to synchronise their device contacts and calendars directly with computers or local servers, using a USB cable.

PC Companion is available for free download at www.sonymobile.com. The Backup & Restore function supports the backup of the call log as well as contacts stored locally on the device memory. Users can also back up text messages, bookmarks, system settings, application settings and data (availability depends on the application), and media files. The backup and restore procedure is performed between the Xperia™ device and the computer or a local server, that is, using a local connection that does not require Internet access.

Security

The Backup & Restore feature in Bridge for Mac supports:

- Backup of the call log, and contacts stored locally on the device memory
- Backup of text messages, bookmarks, system settings, application settings and data (availability depends on the application)

Media files

Encryption of email and other data in transmission supported by Xperia™ devices from Sony:

- Secure Sockets Layer (SSL) version 2.0 and 3.0
- Transport Layer Security (TLS) versions 1.0, 1.1, and 1.2
- StartTLS (with IMAP/POP3 accounts)

VPN protocols supported by Xperia™ devices from Sony:

- PPTP with PPP encryption (MPPE)
- L2TP/IPSec PSK/RSA
- IPSec Xauth PSK/RSA
- IPSec Hybrid RSA
- SSL VPN (available through 3rd party applications)

VPN features supported by Xperia™ devices from Sony:

- API for VPN solutions from leading vendors certificate-based authentication support
- Always-On VPN

Tools for Mac OS® users

Bridge for Mac is a software program developed by Sony Mobile for Mac OS® computers. It offers an interface to access Xperia™ devices from a Mac OS® computer, and includes MTP connectivity as well as a dedicated file manager. Xperia™ users can also back up and restore data locally to a Mac. When the Bridge for Mac software is installed, all the user has to do is connect the Xperia™ device to the Mac using a USB cable. Furthermore, users can keep their Xperia™ devices up to date and fault-free by using the software update and software repair features.

The Backup & Restore function supports the backup of the call log as well as contacts stored locally on the device memory. Users can also back up text messages, bookmarks, system settings, application settings and data (availability depends on the application), and media files. The backup and restore procedure is performed between the Xperia™ device and the Mac, that is, using a local connection that does not require Internet access.

Network security

Xperia™ users within businesses and various organisations expect to be able to access corporate networks wherever they are. At the same time, they require that their data is protected over a reliable connection, with robust user-authorising methods in place. Xperia™ devices based on the Android OS meet these security requirements whether users are connected via a mobile network or a Wi-Fi connection.

Using tethering, an Xperia™ device can also be turned into a mobile hotspot to access the Internet safely from a computer. In the corporate environment different network access methods and levels can be set to match corporate IT policies, depending on where the device is used and which tools are available.

Secure connections

To encrypt communication between Xperia™ devices and corporate services, Xperia™ devices use the following security standards: Secure Socket Layer (SSL) 2.0 and 3.0, and Transport Layer Security (TLS v1.0, v1.1 and v1.2). Internet-based applications, such as the web browser, Email application and the Calendar, use SSL/TLS to encrypt information sent over the Internet. There is also support for StartTLS with IMAP/POP3 accounts.

Virtual private network (VPN)

Xperia™ users can connect to a corporate network with VPN access by using industry-standard protocols and user authentication. Xperia™ devices and the Android OS support several VPN technologies, which makes the integration of Xperia™ devices into an existing VPN solution easy. Compatibility with a wide selection of VPN technologies combined with the Xperia™ device support for user authentication using the X.509 Digital Certificate Standard results in robust protection for all remote connections. Xperia™ devices support clients using standard Android APIs from leading VPN solution providers such as Cisco and Juniper.

Security

Wireless authentication methods supported by Xperia™ devices from Sony:

Industry-standard security protocols
- WAPI (for China)
- WEP
- WPA/WPA2 Personal
- WPA/WPA2 Enterprise

802.1x authentication methods
- EAP-SIM
- EAP-AKA
- EAP-TLS
- EAP-TTLS
- EAP-PWD
- PEAPv0 (EAP-MSCHAPv2)
- PEAPv1 (EAP-GTC)

Certificate-based authentication support

Proxy support

Wi-Fi Protected Setup (WPS)

Wi-Fi®
To provide the highest level of protection for data transmissions over a Wi-Fi connection, Xperia™ devices use WPA2 Enterprise with 128-bit AES encryption. In addition to the encryption, protection is enhanced by requiring authentication for access to a wireless network. X.509 digital client certificates authenticate a user as a valid user before permitting access to the network. Xperia™ devices also support 802.1x wireless authentication methods, which means that they can be used with numerous RADIUS authentication solutions.

To enable easy setup when connecting to Wi-Fi networks, Xperia™ devices support Wi-Fi Protected Setup™. Xperia™ devices can be set to automatically connect to Wi-Fi networks within range. Once set up, networks that require login credentials or other information are quickly accessed via automatic identification and web browser support. Once login credentials have been entered, they are reapplied when needed as long as the original login window in the web browser is kept in the background. In addition, Xperia™ devices support roaming based on the RSSI (Received Signal Strength Indicator) level, which improves the Wi-Fi connection and authentication for devices moving between access points. RSSI-level roaming improves connection reliability by automatically switching from an access point with a weakening signal to a neighbouring access point with a stronger signal.

Xperia™ devices support Wi-Fi connections to internal or external network resources via a proxy server. To enhance the battery life in Xperia™ devices, users can set Wi-Fi to be turned off when a device is out of range of known access points. In order to reduce power consumption in idle mode, Xperia™ devices support WMM® Power Save and IEEE-PS.

Bluetooth™
Xperia™ devices support secure connections to other devices supported by Bluetooth technology, for example, computers, tablets, phones, printers or headsets. With support for Bluetooth version 4.0, Xperia™ devices supply faster data transfer with Enhanced Data Rate (EDR). Bluetooth version 4.0 also has Secure Simple Pairing (SSP), enabling Public Key Infrastructure (PKI) encryption that protects against Man-in-the-middle (MITM) eavesdropping attacks and safeguards the integrity of the communication.

Device Security

The screen lock combined with a passcode (a PIN or an alphanumeric password) is the first security barrier in preventing unauthorised users from gaining access to the entire device. It protects business as well as personal information. The passcode can be set by the user or enforced by the IT department. The complexity of the password and other password-related requirements can be configured and enforced via MDM or Microsoft® Exchange ActiveSync® policies over the air. In addition to enforcing passcode policies, the use of device management solutions with Xperia™ devices enables you to control device policies and device administration features. For example, you can restrict the use of certain features or apps on devices, or wipe data from lost devices.

Security

Passcode policies supported:
- Password recovery enabled
- Require password
- Allow simple password
- Min password length
- Min password complex characters
- Require alphanumeric password
- Max password failed attempts
- Restrict password history
- Password expiration timeout
- Max inactivity time lock

Device policies supported:
- Allow Wi-Fi®
- Allow Bluetooth™
- Allow storage card
- Allow browser
- Allow tethering
- Allow desktop sync
- Application white/black listing
- Require storage card encryption
- Allow roaming
- Require device encryption
- Allow camera
- Allow / Block / Quarantine (ABQ) list
- Unapproved in ROM application list

Device commands supported:
- Add EAS account
- VPN configuration
- Track data usage
- Wipe storage card only
- Get Rooting status
- Prompt new password
- Lock device
- Wipe device
- Locate device
- Sound an alert

Passcode policies

IT administrators can choose from a wide range of passcode requirements when deploying Xperia™ devices in a corporate environment. In addition to requiring that an Xperia™ device is supplied with a passcode, you can enforce what length a PIN or a password must have through the Minimum password length policy. By using the Restrict password history policy, you can force users to create a new passcode that is different from their current passcode or a recently used passcode. This policy is often combined with the Password expiration timeout policy which forces users to update their passcode after a specified time period.

Device policies and administration

For an even higher level of security, you can add policies restricting the use of certain features on a device, or determine which features should be disabled or enabled. Security policies developed by Sony Mobile for Xperia™ devices include encryption of the external SD card. This is an addition to the Android OS support for device policies. You can, for instance, require that the storage of the device has to be encrypted, or that the camera should be disabled.
Xperia™ devices also support application blacklists and whitelists. This feature allows 3rd party MDMs (Mobile Device Management) to add and remove applications to the lists. Applications on the blacklist are disabled, and if they are started the user will get a notification that says that the application is blocked due to device policies.

Within the device administration area, the Android OS provides a toolbox of administration features, ranging from the possibility to remotely lock a device and wipe its content (including the content on the external SD card) all the way through to remotely installing applications and updating installed applications.

Enforcing policies

By using device management solutions, an IT administrator can reach the whole fleet of Xperia™ devices used in a company. By managing devices from one central point, you can guarantee a high level of security by being able to enforce and monitor a wide range of parameters in the devices that access your corporate network and its sensitive data. You can achieve a comprehensive security setup as all devices in your network follow the same set of rules. You can configure different rule sets based on different user types.

When using Xperia™ devices, you can take advantage of the policies added by Sony Mobile as well as standard policies supported by the Android OS. You can remotely configure password settings, and push out policies to Xperia™ devices over the air using MDM solutions that support standard Android APIs. If the Xperia™ device uses a Microsoft Exchange account, you can push Microsoft® Exchange ActiveSync® policies over a mobile or Wi-Fi network.

Digital certificates

Xperia™ devices support digital certificates, providing businesses and organisations with a way to authenticate and authorise users to securely and efficiently transfer information to and from corporate networks. In addition, digital certificates enable the encryption of data exchanged between servers and permitted devices. The security is built around the Public Key Infrastructure (PKI) framework, which uses trusted encryption keys to protect transmitted data.

Security

Client and CA (Certificate Authority) certificates:

- X.509 standard based
  - DER encoded (*.crt, *.cer)
  - PKCS#12 key store files (*.p12, *.pfx)
- Stored in trusted credentials storage
- Install from several sources:
  - SD card
  - Email
  - Web browser
  - MDM provider

Certificate-based authentication support in multiple apps

- Exchange ActiveSync (EAS)
- Wi-Fi
- VPN
- Web browser
- Other 3rd party apps

Certificate Pinning

- Protection against compromised Certificate Authorities

Certificates are issued and approved by a Certificate Authority (CA). The CA could be an independent external company which is recognised and mutually trusted, or an internal organisation within your business. Digital certificates can also authenticate a client or a device interacting with a network, attesting that the device really is the device that it claims to be. Moreover, certificates are used to verify the sender of, for example, email messages or documents, with the option of making sure the content is encrypted.

Server certificates

Xperia™ devices support client-server communication using Transport Layer Security (TLS) or Secure Socket Layer (SSL). Authentication with server certificates follows the X.509 digital certificate standard. Server certificates are stored in the internal credential storage. Server certificates enable encrypted communication between the client and the server.

Client certificates

You can use client certificates as an efficient alternative to authentication by requiring a user name and password, or a token. EAS servers, VPN gateways or Wi-Fi access points can identify Xperia™ devices using client certificates before giving them access to a corporate network. In this setup, users must obtain and store the certificate on the Xperia™ device before they can configure the device to use a VPN gateway or a corporate server. Client certificates may also be used to enable secure messaging using S/MIME. Client certificates are stored in the secure credential storage and protected by a user-selected password.

Installing or removing digital certificates

When opened, a PKCS#12 keystore file triggers the KeyChain installer, which installs a bundled private key/certificate pair. IT administrators can distribute certificates by making the required files available for download from a secure server area to the SD card. The user can then install the files on the device from the SD card.

Certificates can also be distributed via email, since the email application allows the installation of certificate files directly from an attachment. In such cases, you can simply attach the files in an email and then let the user install the files by opening them. Alternatively, several browsers support the installation of digital certificates. So users can download the certificate files from a secure corporate website to the Xperia™ device.

You can also distribute digital certificates over the air through an existing MDM solution. You can remove an installed certificate via the Settings menu in the Xperia™ device. Alternatively, you may use an MDM server to check and remove certificates from a device over the air.

Certificate Pinning

Xperia™ devices support certificate pinning. Pinned domains will receive a certificate validation failure if the certificate does not chain to a set of expected certificates. This protects against possible compromise of Certificate Authorities.

Trademarks and acknowledgements

Visit www.sonymobile.com for more information.