White Paper

Z520

Sony Ericsson

Preface

Purpose of this document

This White Paper will be published in several revisions as the phone is developed. Therefore, some of the headings and tables below contain limited information. Additional information and facts will be forthcoming in later revisions.

The aim of this White Paper is to give the reader an understanding of technology and its main applications, as well as the main functions and features of the phone.

Note: This document contains general descriptions for this specific Sony Ericsson mobile phone.

People who can benefit from this document include:

- Operators
- Service providers
- Software developers
- Support engineers
- Application developers

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Sony Ericsson Developer World

On www.SonyEricsson.com/developer, developers will find documentation and tools such as phone White Papers, Developers Guidelines for different technologies, SDKs and relevant APIs. The website also contains discussion forums monitored by the Sony Ericsson Developer Support team, an extensive Knowledge Base, Tips & Tricks, example code and news.

Sony Ericsson also offers technical support services to professional developers. For more information about these professional services, visit the Sony Ericsson Developer World websites.

Document conventions

The screen images in this document are in JPG format and are thus of a lower resolution than the images actually shown on the screen.

The Picture Messaging feature is referred to as MMS (Multimedia Messaging Service) throughout this document.

Document history

Change history		
2005-06-09	Version R1A	First edition.
2005-09-27	Version R2A	Second edition.

Contents

Product Overview

The Z520 mobile phone features an attractive clamshell design and new communication experience that will allow the user to have more immediate fun with Instant Messaging and collaborative gaming. Also features a digital VGA camera, loop antenna, and Style-Up™ covers.

Easy to use video communication provides a dedicated camera button for taking and sending a picture or video clip.

There is optimized memory for video communication with up to 16 MB of built-in memory for storage of content such as pictures, music, ringtones, themes, games and video clips.

Easy access to Sony music, images, video and games.

A powerful gaming solution for Java 3D with cutting edge graphics; multi-player games; a large 1.8 inch, 65K color, and TFT internal display.

This phone supports GPRS (General Packet Radio Service) quad-band 850/900/1800/1900 (Class 10 meaning 4+2 sum 5), and GSM (Global System for Mobile Communications). In addition to packet switched (PS) data, it also supports voice and circuit switched (CS) data.

Note: To be able to give updated information about the implemented technology and functionality of this product as soon as possible, this White Paper will be released in updated revisions.

Key functions and features

This phone is the next step in imaging for Sony Ericsson products. The evolution of mobile communications towards imaging will greatly increase the scope for new applications and services. In the area of multimedia in mobile phones, Sony Ericsson can show its vast experience in consumer electronics and entertainment – music, pictures and games – as well as its mobile technology leadership.

An eye-catching feature of this phone is the large color screen. It measures 128 pixels wide and 160 pixels high (128 x 160) in portrait mode and has 65K colors, allowing high-quality color imaging and video.

You can listen to sound in the phone via the speaker (earpiece), the loudspeaker, the high-quality stereo headset or other accessory.

System

This phone supports GSM (Global System for Mobile Communications), GPRS and is a quad-band mobile phone (850, 900, 1800, 1900 MHz).

New system connector

A "Fast port" which is smaller, faster, more versatile and easier to connect than the former system connector. For example, different accessories can be connected in series, and you can have a phone conversation and upload music or synchronize simultaneously.

VGA camera

With a VGA camera, the Z520 is always available to take pictures. Taking a picture or recording a video clip and sending it as part of a multimedia message or as an email attachment is just a few clicks away. The camera also features a 4X zoom.

QuickShare ™

Sony Ericsson's constant ambition of making products easier to use, has had a great outcome: QuickShare™.

QuickShare is the fastest, easiest and smartest ever way to share images. With just a few clicks, moments can be captured with the integrated camera and be shared with friends! For example, to send a picture message with text and an attached image or video clip takes only 4 steps. Capture an image, press send, add text and press send again to add a recipient.

There is more to QuickShare than sending images with a picture or email message. QuickShare is about ease of use for all imaging features. Images can be shared phone to phone, with Bluetooth™, across the room or between a phone and other paired devices such as PDAs, computers or printers. For example, it would give the user the possibility of printing a picture directly from the phone using a Bluetooth enabled HP printer.

QuickShare™

MMS
Cable
Bluetooth
Memory stick
IR
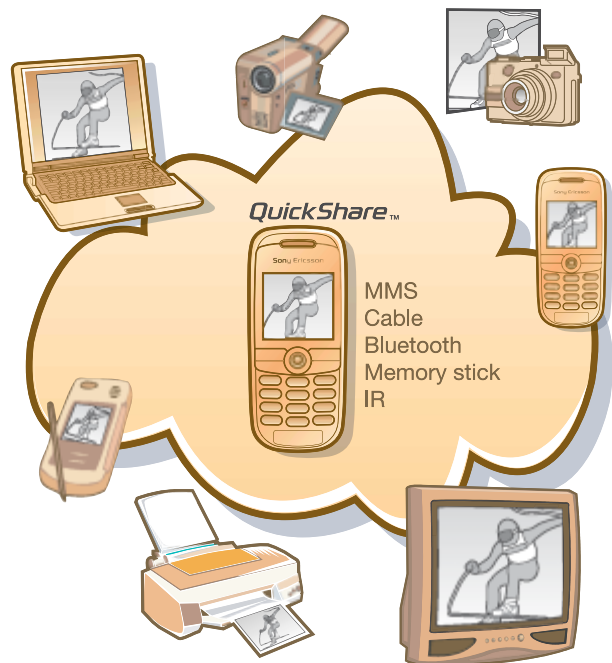
Full graphic 65K color display

The color screen, 128 x 160 pixels, enhances viewing, facilitating high-quality multimedia and entertainment. From standby, the phone features a user interface built on the "desktop" concept,

which is widely used in many computer operating systems. From here, navigation between different main functions in the phone is done by selecting the icons representing these functions.

Activity menu

Get direct access to new events, bookmarks and shortcuts. By using the activity menu (tilting up on the navigation key from anywhere in the phone), the user can easily handle missed calls, new text and picture messages, task reminders, shortcuts and get quick access to favorite Internet bookmarks.

MMS

Reacting to the enormous popularity of mobile phone messaging, Sony Ericsson has incorporated the latest messaging standard, along with a color display for an enhanced imaging experience.

Say it in words, say it with pictures, animate it, add sound. Have fun putting together Multimedia birthday and holiday greetings. On vacation, use the mobile phone to send a digital postcard with stylized text, digital pictures of the location, and authentic sound clips, to friends and family back home. When shopping, send a picture of a bargain that a friend has been looking for.

With MMS, there are many interesting applications to subscribe to, for example, stock information, movie trailers and weather reports.

Media player

The Media player converts the phone into a portable MP3, MPEG4, H263 player. Play music, watch pictures and slide shows, as well as streamed or downloaded video clips. The folder system enables you, for example, to organize your favorite songs into groups and create simple playlists. A Play and pause function has been added.

Streaming and downloading

You can view videos and listen to music that you find on a web site by streaming them to your phone. By streaming media such as audio and video clips, multimedia is available in realtime with minimal downloading or waiting time. This means that you can start to listen to the music or to view a video clip before the complete file is downloaded to the phone. Media can also be downloaded and saved in the phone memory and then used with the Media player. Media such as audio files, video clips or slide shows can be played back at any time.
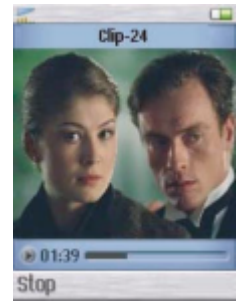
Content such as music, video and images may be previewed before purchase. A unique direct-link to download music, video, games, themes and images, which is easy to use and promises you best-selling content for mobile download. By selecting PlayNow™, you can, for example, go straight to a live list of Top Music Hits.

All formats that are supported in the phone will be possible to download. Music, video and images may be previewed before purchase. The music format is WAV, MP3 or MIDI (Polyphonic 40 voices or more).

How the service works

This service is owned by Sony Ericsson or hosted by Sony Ericsson for a network operator. The PlayNow™ or other premium content is maintained and managed, for example by Sony Music or Sony Pictures. The content on offer can easily be suited to a specific region or operator.

Implementation costs for network operators are minimal and server communication is based on existing, well-established standards. Sony Ericsson offers first or second line support according to the agreement on hosting a white label service or not. High level co-operation is available for the design, look and feel, of content management.

Operator benefits

This service is aimed at providing quality and quantity revenue for network operators. This is truly an ARPU driver with low costs for operators. The process involves:

- Downloading a list
- Previewing content
- Choosing content
- Buying content

Note: The availability of this unique application is limited to specific markets, where relevant infra-structure and agreements have been set up.

Other technical details

Security - Server communication is protected by TLS.

Forward lock - Content cannot be exchanged with other devices by the user, it is limited to use or delete.

Java™ 2 Micro Edition

Download extra content with Java™, for example, new information- and entertainment-based applications. This gives users a chance to personalize the functions and features in their phones, and developers the opportunity to create new applications.

Gaming

Gaming is already a very popular feature in mobile phones, and with Advanced Java, users can add new games and skill levels to further enhance the entertainment value of Sony Ericsson phones.

3D Games

Java 3D gaming software introduces and supports cutting-edge 3D graphics. Audio developments such as 40 tones polyphonic sound and force feedback (vibration) provide a much richer experience. With operator support, there is the possibility for multi player games to play against friends. The large 1.8 inch TFT screen adds to a lasting gaming experience. Downloading graphic intensive games, matching up to the size of the built-in memory, is also possible.

Bluetooth™ wireless technology

Using built-in Bluetooth™ wireless technology, communication with other Bluetooth devices is supported via a radio link. Unlike infra-red, Bluetooth wireless technology is not dependent on line-of-sight communication.

Several devices (simultaneous Bluetooth connections) can be connected to Z520 using Bluetooth wireless technology up to 33 feet (10 meters) away. For example, the phone can be answered with a Bluetooth headset, when it rings and the user can send images to another phone at the same time. Several mobile phones can take part in a Bluetooth supported game and the phone and a computer can exchange data such as images, video clips, business e-cards, music files and calendar data.

Copyright protection – DRM

DRM (Digital Rights Management) features the rights and copy protection of downloaded content (audio, pictures, Music tones, video, entertainment features such as games etc.).

Content-based services have great market potential, and to encourage this, Sony Ericsson plans to support DRM in all future multimedia products. Sony Ericsson regards DRM as a key enabler for content-based services, and is active in supporting the ongoing standardization work of the OMA (Open Mobile Alliance). Furthermore, any additional market requirements for DRM will be monitored.

Design features

Ergonomics and balance

The phone strives for a perfect balance in your hand. Ergonomics links together with design.

Displays

Internal

An eye-catching feature of this phone is the large color display. It measures 128 pixels wide and 160 pixels high in portrait mode and has 65K colors, allowing high-quality color imaging and video.

External

The phone has an appealing clamshell design with an external color display. The external display measures 80 pixels wide by 101 pixels high and has 4,096 colors. It offers at-a-glance phone status and access to some phone features without opening the clamshell. The standby screen for the external display shows the service provider, time, date, signal strength, battery charge level, and other information.

When using handsfree, voice control is also supported with the clamshell closed.

A long press on the camera button with the clamshell closed makes the external display function as a view finder. Zoom is controlled with the upper and lower side volume keys.

Display and keypad areas

The 1.8 inch display area accommodates relatively large keys on the keypad area.

The keys are aligned in a vertically grouped form.

The display and key areas are designed with a sophisticated look.

More in-phone functions

Navigation key

The 4-directional + select key is designed to easily navigate the menu system. In a menu, it can be gently pressed to select a feature. It can also be used as a **joystick** with games.

Improved User Interface (UI)

Selection keys and the key assignment give a very efficient interaction design with full flexibility to handle all the new features and applications. Sony Ericsson has focused on user-centered design and extensive usability testing to solidify the new UI paradigm. This ensures visibility in actions and system status and consistency between applications and similar actions. The large, high-resolution color screen is easily managed with the navigational key.

Setup wizard

The setup wizard makes it possible for the user to quickly and easily prepare the phone for use.

At the first start-up, the setup wizard starts and helps the user with some core settings while giving hints about the functionality of some important keys: back and clear.

The setup wizard includes:

- setting the language
- setting time and time format
- setting date and date format
- the possibility to import contacts from a SIM card
- hints about the **Back** and **C** keys.

PIM (Personal Information Management)

The user can stay up to date with their everyday events by synchronizing the phone contacts, calendar appointments and tasks in the phone with similar programs in a computer. The USB-cable which comes with the phone, the built in Infrared or Bluetooth feature can be used together with the synchronization software which is available at www.sonyericsson.com/support.

Polyphonic sounds - 40 voices

Polyphonic sounds and the MIDI format have revolutionized the sound quality of ringtones in mobile phones. With this format, the user can play, compose, edit and send melodies by using the MusicDJ™. The built-in sound synthesizer uses wave tables, real instrument sounds, with 40 voices polyphony. The new composer has an improved graphical user interface to simplify melody handling. All new and edited melodies are stored in MIDI format.

VideoDJ™

Create a movie by mixing video clips, pictures, sound and text which has already been created or stored in the phone. The finished result can be sent by using email, Bluetooth or infrared. VideoDJ™ can also be used for editing video items.

Photo DJ™

Pictures that are stored in the phone memory can be edited by using Photo DJ™. The user can for example add clipart, frames, text, effects and much more to improve a picture's quality after it has been captured by the camera or received from another device.

File management

There is a file manager similar to that found on many computers. In the file manager, the user has an overview of the contents of the phone as well as how much memory is allocated to each function and feature. Folders can be created, renamed, deleted and files can be moved between them.

From the file manager, the user can view picture and slide shows, as well as play music and video.

GPRS (General Packet Radio Service)

GPRS uses Internet-style packet-based technology. GPRS gives the benefits of a permanently available connection to the mobile Internet, but only uses the radio link for the length of time it takes to transfer data. GPRS offers the user the speed needed for satisfactory mobile Internet usability. The phone supports GPRS Multislot Class 10 (4+2).

WAP 2.0 supporting XHTML™ MP 1.2

The WAP browser supports the markup languages of WAP 2.0 – XHTML Mobile and XHTML Basic. These two subsets of the Web standard XHTML are supported by all major Web browsers. An XHTML page can be viewed in both the WAP browser and in any standard Web browser. All of the basic XHTML features are supported, including text, images, links, check boxes, radio buttons, text areas, headings, horizontal rules and lists.

In addition to XHTML, the WAP browser supports WML. The user can navigate between WML and XHTML pages. WAP 2.0 also supports cookies, often used by Web sites to store site-specific information in the browser between visits to the site. Cookies are often used by e-commerce sites (in shopping carts and wish lists for example), and to save the user from entering the same information more than once.

Cascading Style Sheets (CSS)

Before style sheets were introduced on the Web, developers had little control over the presentation of their Web pages. An XHTML document specifies the structure of the content, which part is a paragraph, which part is a heading, and so on. It does not specify how it shall be presented. Browsers use a default presentation for documents without style

sheets. By adding a style sheet to the document the developer can control the presentation of the document, the colors, fonts, and layout.

On the Web, the de facto standard style sheet language is Cascading Style Sheets (CSS), specified by the W3C and implemented in IE, Netscape, and Opera. For mobile phones, the OMA has identified a subset of CSS and extended it with OMA specific style rules. The CSS subset and the OMA extensions are called Wireless CSS (WCSS).

The WAP browser supports WCSS 1.1.

My friends (Wireless Village)

To ensure inter operability of mobile instant messaging and presence services, Sony Ericsson, Ericsson, Motorola and Nokia have created the Wireless Village Solution, an open standard. The protocol is bearer-independent and can be implemented in different networks. The Wireless Village Instant Messaging and Presence Service (IMPS) includes three primary features:

Presence

Presence information of other Wireless Village users is received and displayed to indicate their willingness to communicate. The user's own presence information is also sent for others to view. If the user is interested in another person's presence status, he or she can search for this person. If the person is found, the user may subscribe to his/her presence information. The presence information is displayed in a contact list.

Instant messaging

Instant messaging means "point-to-point messaging" between Wireless Village users. Messages can be sent to an entire contact list or to a single user. Short message histories of the communication are logged in a file, which can be read off line. This is a sub-set file of the whole communication and is limited by memory.

Groups

The user may join a chatroom and chat with the other participants/members.

E-mail

With inbox, outbox, save draft and reply options, there are all the functions needed for effective e-mail communication in a powerful mobile phone. Constantly connected to a POP3, SMTP or IMAP4 e-mail server anywhere on the Internet, the phone stores messages dynamically, depending on available memory, and updates the inbox automatically and over the air. Check e-mail anywhere. Reply to e-mail on the move. Friends, family and business contacts know that when they send e-mail, it can be received, read and acted on immediately. Pictures can be included in outgoing e-mails and attachments that are received. Hyperlinks in e-mails are supported.

Personalization

With themes, the user can change many settings in the phone, for example colors, images and ringtones, making it more personal. The phone comes with a number of preloaded themes and pictures, and more can be downloaded and exchanged – sports, movie, seasonal and other themes will be available on Sony Ericsson or operator sites. Other personalizable features are the start-up screen and the screen saver. Specific pictures and ringtones can also be set for each separate name in the phonebook.

Power save

Power save is the default setting for the display light and is designed to optimize standby time. Your screen is turned off completely a few seconds after you last press a key. Press any key and the screen turns on again. Other display light options are on, off and automatic. The phone also has a keypad guidance light (turned off when in Camera mode).

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Technologies in detail

Imaging

VGA camera

VGA camera

With the integrated VGA camera, the user can take pictures and video clips and store them in the phone memory. The user can send them as an attachment in an email or a picture message (MMS).

Taking a picture

It takes only two clicks to take a picture with the dedicated camera button. The first click starts the application and the second click takes the picture. The large internal display acts as viewfinder. Taking self portraits is easy with the clam closed, using the external display as viewfinder.

The camera application is also available in the menu system.

Image formats

The camera is able to take and send pictures in the following resolutions:

- VGA (640x480 pixels)
- QVGA (320x240 pixels)
- QQVGA (160x120 pixels)
- Extended (1280x960 pixels)

Video format

Video clips can be recorded, played and sent using the following codec:

- H.263

Auto-exposure control

The camera has a fully automatic exposure control that selects the optimal exposure time needed to get an excellent picture. The exposure time is automatically adjusted whenever changes occur in the viewfinder.

Media player

The media player supports different audio and video formats, streaming as well as download and playback.

Music

The media player is a multi-format digital audio player which enables the user to carry and play a selection of favorite songs. A range of audio formats are supported:

- AAC
  Advanced Audio Coding. AAC is the latest audio coding standard, defined in the MPEG-2 standard and is used for high-quality audio compression. AAC provides higher quality than MP3 at the same bit rate, or for the same audio quality it uses a 30 percent lower bit rate. It supports the coding of multichannel audio, with up to 48 main channels and 16 low-frequency channels. The AAC offers three different profiles to facilitate trade off between quality, memory and processing power requirements. They are: Main Profile (MP), Low Complexity (LC) and Scalable Sampling Rate (SSR). AAC-LC is supported.

- AMR
  Adaptive Multi Rate. A medium quality compressed sound format.

- MIDI
  Musical Instrument Digital Interface.
  Unlike the other formats, MIDI is not a recording of music, but a description which enables a local synthesizer to play the music from the instructions included in the MIDI file. Since a MIDI file only represents player information, it is far more concise than formats that store the sound directly. An advantage is very small file

sizes. A disadvantage is the lack of specific sound control. MIDI is ideal for polyphonic ring-tones.

- MP3
  MP3 is the file extension for MPEG audio layer 3. Layer 3 is one of three coding schemes (layer 1, layer 2 and layer 3) for the compression of audio signals. Layer 3 uses a very efficient compression method, removing all irrelevant parts of a sound signal that the human ear cannot perceive. The result is, for example, CD digital audio (CDDA) converted to MP3 with almost untouched quality, compressed by a factor of around 12. The high compression of audio in MP3 files makes them relatively small, though MP3 files can be created with different size and quality compromises. The small file size, together with the excellent sound quality, are the main reasons for the MP3-format's massive popularity when sharing music over the Internet.

- WAV
  Windows media audio. A wave file is an audio file format created by Microsoft, that has become a standard PC audio file format for everything from system and game sounds to CD-quality audio. A wave file is identified by a file name extension of WAV (.wav). Used primarily in PCs, the wave file format has been accepted as a viable interchange medium for other computer platforms, such as MacIntosh. This allows content developers to freely move audio files between platforms for processing, for example.
  In addition to the uncompressed raw audio data, the wave file format stores information about the file's number of tracks (mono or stereo), sample rate, and bit depth.

Songs may be stored in the File manager. The folder system enables the user to organize songs into groups and create simple playlists of MP3 songs.

Songs may be collected in numerous ways, including Internet download and file transfer from a PC or other compatible device.

The media player is intelligently aware of other applications in the phone:

- Playback is paused when a telephone call is made or received.

- Playback is paused if the user starts another application which requires the audio channels to be dedicated to it.

- Playback of MP3 files continues if the user switches to another application, providing music while using other applications such as the phonebook or calendar, or playing games.

Polyphonic ringtones

Background
The word "polyphony" means producing several tones at the same time. Almost all music that we listen to consists of polyphonic melodies.

Early Ericsson mobile phones supported a proprietary non-polyphonic format called eMelody. Due to the musical limitations of eMelody, and the popularity of creating, sending and downloading ring melodies, Ericsson and Sony Ericsson, together with other manufacturers, created the more advanced but non-polyphonic sound format – iMelody.

The introduction of the MIDI format revolutionized sound quality. MIDI files are small, and perfect for mobile devices, which have limited storage capacity.

MIDI is a specification for a communications protocol principally used to control electronic musical instruments. MIDI is today a well known standard used by many musicians, composers and arrangers.

A MIDI signal or file does not contain any music. It contains binary data (information) of how a melody is played and when this data reaches a synthesizer, the synthesizer will translate the binary data to music, when connected to an amplifier with speakers so that the sound becomes audible.

Please visit www.midi.org for more information.

SP-MIDI
SP-MIDI stands for Scalable Polyphony MIDI. SP-MIDI is based on the MIDI format and adapted for mobile phones and other portable products. The objective is to secure interoperability between products with different sound capabilities.

Sound recorder
The sound recorder can record both voice memos and call conversations. Sound recorder saves recordings directly to memory. The size and length of recordings are limited by available storage space.

Sounds are recorded in AMR format and saved in the Sounds folder. Recorded sounds can also be set as ringtones.

Video clips
Moments can easily be shared with friends and family in other geographical sites by capturing the moment with the video recorder and then sending the video clip in a picture message. The video recorder supports QCIF.

The media player supports download and playback of MPEG-4 and H.263 formats for viewing video clips in the phone.

Video clips may be downloaded from the Internet or copied from a connected PC.

Files must be of types MP4 or 3GP, having video encoded in MPEG-4 Simple Visual Profile and audio in AAC or AMR format. Video can be encoded in H.263. The phone encodes video in H.263 Profile 0 Level 10 format.

Streaming support
The media player can be launched from hyperlinks in the WAP browser, SDP files in the file manager or in messages through hyperlinks. Content is streamed using RTSP (Real Time Streaming Protocol) session control.

Streaming

Streaming media is a method of making audio, video clips and other multimedia available in real-time.

The term streaming refers to the technique it is based on. Previously an entire file had to be downloaded before it could be played, whereas the use of streaming means the end user can almost immediately begin to watch or listen to the content of a requested file. The data in the file is broken down into small packets that are sent in a continuous flow, a stream, to the end user. It is then possible to begin viewing the file while the rest of the packets are transferred.

Applications

The applications which can be built on top of the streaming services can be classified into On-Demand, and live information delivery applications. Examples of the first category are music and video clips, news on demand as well as on demand instruction material. Live delivery of radio and television are examples of live information delivery. The following video and music codec is supported:

- MPEG-4 Simple Visual Profile Level 0
- H.263 Profile 0 Level 10
- AAC
- AMR
- MPEG4
- 3GPP

Examples of usage

Streaming of music (on demand)

Browse to a Web page to check out the latest top ten list of pop music, to see if there are any new cool songs. Select a few songs, stream the music to the phone and listen to the songs through the stereo headset or via the built-in loudspeaker.

Streaming of news (on demand)

Browse to a morning paper's Web page and decide to check the news. Select the five-minute version of the latest financial news, stream the news to the phone, and watch it on the bus on the way to work.

Streaming/download of music video (on demand)

Browses to a Web page and decide to check out the latest rock videos. Select a video to watch, click the link and then stream a one-minute version of the video. Download and pay for the complete video. A memory check is automatically performed to make sure that the phone has enough free memory.

Streaming of live radio (broadcast)

Check out and listen to a favorite radio station. Browse to the home page and stream the live broadcast content. The content is audio or audio with pictures of the artist.

Streaming of live traffic information (broadcast)

Find out if there is a traffic jam on the highway before heading home. Browse a page for local traffic information. If there is a traffic jam, take an alternative route home.

User-created content (Web album)

Show friends how fantastic the beach is while on vacation. Record a video clip and upload it to a Web album. Friends can then stream or download the clip to their PC or phone.

Market and revenue possibilities

As streaming means "seeing the product without having it", it can be extensively used in the music and film industry. There are also great revenue possibilities for subscription-based content; for example, the user can subscribe to several on demand services such as news and traffic information.

Gaming

Gaming is now seen as a standard feature in mobile phones, where Sony Ericsson promises to be a step ahead in this regard. This is not only due to faster download capability on the network. There are some other reasons why the actual gaming experience is better – the way Java has been implemented, the fact that more processing power has been dedicated to the games, the large 65k color screen and more sophisticated graphics with Java 3D and the Mascot API. The result is games with improved graphics that react faster to user commands when using the navigational key as a joystick or game controller. The phone takes mobile gaming to new heights.

Supporting J2ME (Java 2 Micro Edition), the phone lets users download and run new games and applications. This is a great way to upgrade the game gallery, install work-supportive programs and personalize the phone.

Light effects

The light effect is another customization option for the user. A crisp blue light illuminates around the outer rim of the mobile phone, alerting the user of a specific activity such as a new message or an incoming call. In addition to setting light effect patterns for indication of specific event, the user has the ability to associate an light effect pattern with a person in their contact list. The mobile phone will come preloaded with many different light effect patterns, including several that are synchronized to audio ringtones, so the lights will respond to the rhythms of the music.

SMIL

SMIL stands for Synchronized Multimedia Integration Language and is pronounced "smile". SMIL is an advanced XML-based protocol, and Sony Ericsson's MMS implementation supports a subset of the SMIL 2.0 protocol according to OMA MMS IOP document version 1.2.

The use of SMIL in a product allows the user to create and transmit PowerPoint-style presentations on the mobile device. Using a media editor, users can incorporate text, audio, images, video clips and animations to assemble full multimedia presentations. The user can decide in which order the image and text will be displayed, as well as for how long the images and text lines are to be shown on the display.

Media types

There are certain media formats that support continuous media (speech, audio and video). The following media types are supported for SMIL:

- AMR narrow band speech codec MIME media type
- MPEG-4 AAC audio codec MIME media type
- MPEG-4 video codec MIME media type
- H.263 video codec MIME media type

The media types for JPEG and GIF can be used both in the 'content-type' field in http and in the "type" attribute in SMIL 2.0. The following media types are to be used:

- JPEG MIME media type
- GIF MIME media type

All these media are indicated by MIME (Multipurpose Internet Mail Extensions) types.

Messaging

My friends

Sony Ericsson's application - My friends - is an enhanced messaging facility that offers a user friendly and versatile way to quickly get in touch with contacts.

The My friends application merges the Phonebook and messaging functionalities that we commonly find in phones. At a click you can access your list of contacts, and with another click you can choose how you want to communicate with them - via SMS, MMS, e-mail or chat.

The application also enables you to view the 'presence', or availability of the contacts in My friends. You can easily and quickly find out whether they are in a meeting or free to speak to you. You can then choose how you wish to contact them.

My friends contains all the information you need about your contacts.

You can have:

- a select list of up to 20 people
- their contact information such as phone number, e-mail, chat and mail addresses
- call information - calls to and from them
- presence information - their availability, online status (on or off), text or image they choose to show you.

You can present similar information about your own availability and status.

You have access to chatrooms, and can form wireless communities of business associates or contacts.

The main view

You can access the My friends sub-menu by clicking the Messaging desktop icon.
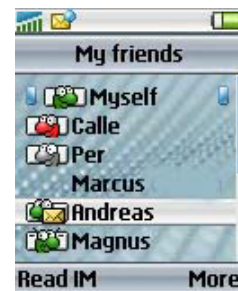
The icon in the status bar indicates the online status of the chosen friend in the list, and indicates new, unread messages if any.

The most likely action (which is context dependent) is available on the left softkey.

Additional actions become available to you when you press the More key.

Adding contacts to My friends

You can add a contact from your contacts list to the My friends list, and you can change the position of the friend in the list. This enables you to have your list of immediate business or social contacts at hand, so you can establish easy communication with them almost instantly.

Note: To realize this application's complete potential, access to a Wireless Village server is required.

Managing My friends

Your list of immediate contacts may change to suit business demands. You may need to interact with new sets of people depending on your current project or work at hand. Or you may simply want to alter your list of personal friends whom you want to keep in constant touch with.

You can manage the My friends list to quickly alter the list of contacts that you want displayed. You can sort the names, edit nicknames, block or delete a friend, or link a friend to the Contacts.

Viewing the status of contacts in My friends

You can view your contact's status and decide how you want to communicate with him or her. You may want to call or send an SMS, MMS, or e-mail, or join your friend in a chatroom.

Access to the chatroom

The My friends application supports creating chatrooms and inviting your friends (on your My friends list) to the chatroom. You can bookmark associates you would like to chat with. The application can establish connectivity between different service offerings that enable chat between terminals.

MMS

There are virtually no limits to the content of a Multimedia Messaging Service (MMS) transmission. An MMS message can contain text, graphics, animations, images, audio clips and ring melodies. For third party developers' information, please visit www.SonyEricsson.com/developer/ and look for the MMS developers guidelines.

MMS completes the potential of messaging. Sending digital postcards and PowerPoint-style presentations is expected to be among the most popular user applications of MMS. Eagerly awaited by young users in particular, MMS is projected to fuel the growth of related market segments by as much as 40%.

Multimedia Messaging uses WAP (Wireless Application Protocol) or http as bearer technology which also can be powered by the GPRS transmission technology. This allows users to send and receive messages that look like PowerPoint presentations. The messages may include any combination of text, graphics, photographic images, speech, music clips and video. MMS will serve as the default mode of messaging on all terminals, making

total content exchange second nature. From utility to sheer fun, it offers benefits at every level and to every kind of user.

Over the air (OTA) configuration

Users can easily get MMS into their phone. MMS supports OTA, meaning that the user does not have to configure the settings manually. The configuration is done by the operator via OTA.

Note: The specification is in accordance with Ericsson Nokia OTA configuration v7.1.

MMS objects

Although MMS is a direct descendant of SMS, the difference in content is dramatic. The size of an average SMS message is about 140 bytes, while the maximum size of an MMS message is 100 kb. That is why the key word to describe MMS content is rich. Complete with words, sounds and images, MMS content is endowed with the user's ideas, feelings and personality. An MMS message can contain one or more of the following:

Text

As with SMS and EMS (Enhanced Messaging Service), an MMS message can consist of normal text. The length of the text is unlimited. The main difference between an EMS and MMS message is that in an MMS message, text can be accompanied not only by simple pixel images or melodies but by photographic images, graphics, audio clips and video clips.

Templates

The phone comes with a number of MMS predefined templates, for example templates for birthday cards, meeting requests etc.

Audio

MMS provides the ability to send and receive full sound (MIDI, MP3, iMelody, AMR) messages. Not only can users share a favorite song or Music tone with a friend, they can also use the mobile phone to record a sound and send it along with a message. As sound includes speech as well as music, this extra dimension to an MMS message allows for a spontaneous and immediate personal expression in communication messaging. Rather than sending a downloaded birthday jingle in EMS, a user can, for example, send a clip of his or her own personal rendition of "Happy Birthday". The phone supports the MIDI format.

Pictures and themes

By using the integrated camera, users can take a picture or video clip and immediately send it to a recipient. The ability to send pictures is one of the most exciting attributes of MMS, as it allows users to share meaningful moments with friends, family and colleagues.

Mobile picture transmission also offers inestimable utility in business applications, from sending on-site pictures of a construction project to capturing and storing an interesting design concept for later review. Editing a picture by adding text allows users to create their own electronic postcards, an application that is expected to substantially cut into the traditional postcard market.

Themes (downloaded or pre-defined) can be exchanged via MMS.

PIM communication with MMS

By using MMS, it is easy to handle PIM (Personal Information Manager) information. The user can send and receive business cards (vCard), calendar entries such as appointments (vCal) and notes (text/plain).

Streaming content in MMS

Streaming makes it possible to view files while they are being downloaded to the phone. The MPEG-4 file format can be used for continuous media along the entire delivery chain envisaged by the MMS, independent of whether the final delivery is done by streaming or download, thus enhancing interoperability.

In particular, the following stages are considered:

- Upload from the originating terminal to the MMS proxy.
- File exchange between MMS servers.
- Transfer of the media content to the receiving terminal, either by file download or by streaming. In the first case, the self-contained file is transferred, whereas in the second case the content is extracted from the file and streamed according to open payload formats. In this case, no trace of the file format remains in the content that is transmitted over the wire or over the air.

Additionally, the MPEG-4 file format can be used for storage in servers and the "hint track" mechanism can be used to prepare for streaming.

MMS technical features

The MMS standard, just like that of SMS, offers store-and-forward transmission (instant delivery) of messages, rather than a mailbox-type model. MMS is a person-to-person communications solution, meaning that the user gets the message directly into the mobile phone. He or she does not have to call the server to get the message downloaded to the mobile. Unlike SMS, the MMS standard uses WAP as its bearer protocol. MMS will take advantage of the high speed data transport technology GPRS and support a variety of image, video and audio formats to facilitate a complete communications experience.

Architecture

The MMS Center (MMS-C) is comprised of the MMS Server, the MMS Proxy-Relay and the MMS Store. The MMS Center is the central element of

the MMS network architecture, providing storage and operational support, enabling instant delivery of multimedia messages from terminal-to-terminal and terminal-to-e-mail, and supporting flexible addressing. The center's MMS Proxy-Relay interacts with the application being run on the MMS-

enabled terminal to provide various messaging services. WAP or http is used as the bearer of an MMS message between the MMS-C and the MMS client (application). The WAP Gateway is used for delivery and retrieval of messages. Information is read in the WAP browser.
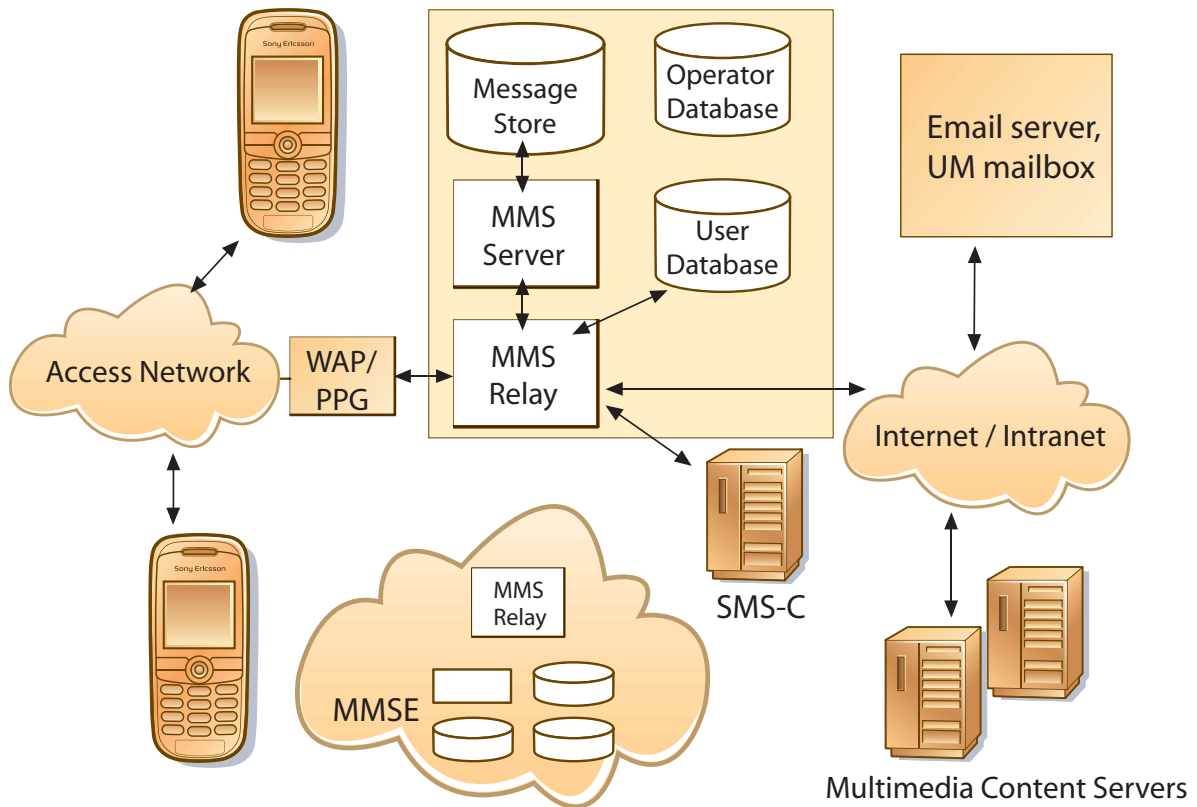
Figure 1. The architecture of MMS

Message conversion

The MMS-C is able to perform limited message conversion - for example, from MMS to SMS - so that processing and air time is not wasted in sending messages to mobile terminals that do not have adequate capability to receive them. It also handles service aspects such as store and forward, guaranteed delivery, subscriber preferences, operator constraints, and billing information. The MMS-C also vouches for high quality messaging, for example by format conversion. This means that the MMS-C recognizes which formats are supported in the mobile phone, and adapts the MMS messages to these formats.

Connectivity

GPRS

The introduction of GPRS was a big step in the evolution of the GSM networks for enhancing the capabilities of data communication. Data traffic has increased (over both wired and wireless networks), with the growth in demand for Internet access and services paralleling that of mobile communications.

We can now see that the demand for fast Internet access is the key driver for coming generations of wireless multimedia and entertainment services.

GPRS is able to take advantage of the global coverage of existing GSM networks. Applications developed for GPRS have been deployed on a large scale and have thus reaped the associated benefits.

With a GPRS subscription, transmission capacity is only used when data "packets" are sent or received via a connection.

Instead of occupying an entire voice channel for the duration of a data session, the product sends and receives data in small packets, as needed, much like IP on the Internet. Thanks to this, the phone appears to be always online, using transmission capacity only when data is sent or received. The phone is compatible with "3GPP Release 1999 Compliant".

The phone uses up to four time slots for receiving data, and two slots for transmitting.

Phone identity information and characteristics of the connection are described in the PDP (Packet Data Protocol) context. This information is stored both in the phone and in the mobile network, so that each phone is identified and "visible" to the system.

Using GPRS has many advantages, for example:

- Cost efficient
  Use transmission capacity only when needed, thus reducing costs.
- WAP over GPRS
- Access the Internet via WAP at high speed.
- E-mail over GPRS
  Remain connected to an e-mail system while reading and preparing messages, (which are then sent at high speed).
- Data communication
  Transfer data and access the Internet or an intranet with a PC, PDA or handheld device connected via infrared or cable.
- Provide settings
  Receive GPRS configuration settings from the provider OTA (over the air), making manual configuration unnecessary.
- User-controlled settings
  Take advantage of full user control in the data connections menu, establishing multiple descriptions and accessing advanced settings for GPRS.

Bluetooth™ wireless technology

Bluetooth™ wireless technology is built-in. It has Bluetooth power class 2, using maximum 4 dBm radio link, which operates in the globally available 2.4 GHz radio frequency band, ensuring fast and secure communications up to a range of 10 metres.

Note: In the few countries where the use of Bluetooth wireless technology is not allowed, the Bluetooth function will be disabled. In countries where only 0 dBm is allowed, the output power will be limited accordingly.

Bluetooth wireless technology facilitates instant connections, which are maintained even when the devices are not in the line of sight. Enhanced audio quality voice transmission is provided under adverse conditions, making it possible to use a headset connection to the phone at all times.

Using Bluetooth wireless technology in Z520

True wireless connection

Connect without cables to headsets, car handsfree equipment, computers/PDAs, digital still cameras and other devices.

Simultaneous Bluetooth connections

The Bluetooth profile lets the user connect to several units simultaneously. For example, the user can talk on the phone using a Bluetooth headset and send an image to another phone at the same time. It is also possible to let several players join a Bluetooth supported game. The Z520 supports Bluetooth specification 2.0.

Up to 16 paired devices

The phone identifies and maintains up to 16 paired devices which are displayed in a list.

Radio link

No line of sight required; the phone can remain in a briefcase or in a pocket (whereas infrared requires line of sight).

Secure and user-friendly

Data connection with a Bluetooth computer/laptop or PDA turns the phone into a modem for connecting to the Internet and for data transfer.

Synchronization

Fast synchronization, even without line of sight, of calendar, notes and phone book with computer/laptop.

Range

The range is up to 10 meters. When searching, devices in close range are discovered first.

Business cards

Quick exchange of business cards, notes and calendar events with other phones and devices.

Imaging and music

Music files, images and video clips can be exchanged with another mobile phone, computer or laptop. Images and video clips can also be exchanged with a digital still camera.

Audio quality

The phone uses an algorithm that repairs lost audio packets. When needed, a new packet is inserted with content based on previous packets. This, in conjunction with re-transmissions, the high sensitivity and high output power radio will enhance the audio quality compared to a standard Bluetooth device.

File sharing

By using the Server role of the File Transfer Profile, the phone enables the user to use a computer to manage content files that reside in the phones file system. Most computer Bluetooth applications provide an explorer like user interface for the file transfer service. When connecting to the phone, the computer application will show some of the folders that the user can find under the File Manager icon on the phones standby screen, i.e. Pictures, Sounds, Videos, Themes and Others. The content in the Games and Applications folder is not exposed in the file transfer server. Opening one of these folders will show a list of files related to that folder, e.g. images in the Pictures folder. Using the computer application the user can now: retrieve files from phone to computer, delete files from the phone and transfer files from the computer to the phone using the normal drag and drop mechanisms provided by the computer.

Media viewing

The phone can send images and sounds to a media viewer device, for example the Bluetooth media viewer MMV-100 or the Bluetooth Media Center MMV-200. This allows the user to conveniently run a slide show on the TV showing a set of phone camera pictures for family and friends. After selecting an image in the Pictures folder under the File manager icon, the user can select the Remote screen option under More. The phone will then

connect to a Bluetooth device that can receive images and when the user then selects View, the image is transferred to the remote screen and displayed. When the user then selects another image, that image is transferred to the remote screen and displayed.

Profiles

The following Bluetooth profiles are supported in the phone:

- Dial-up Networking Profile
- Generic Access Profile
- Generic Object Exchange Profile
- Object Push Profile
- Serial Port Profile
- Handsfree Profile
- Headset Profile
- Synchronization Profile
- Basic Imaging Profile
- File Transfer Profile
- Human Interface Device (HID) Profile
- SyncML OBEX binding
- JSR-82 Java API

Remote control

By using the Bluetooth HID (Human Interface Device) Profile v1.0, the phone is able to act as a HID device. This means that when connected to a computer, the phone works like a combined keyboard and mouse. By assigning specific combinations of computer keyboard key presses to each key on the phone keypad, the user can use the phone as a remote control device for computer applications.

The phone keypad is configured for control of a certain computer application through a special type of HID configuration file consisting of an XML file for the keypad and an image for the display. HID configuration files can be dowloaded into the

phone using the normal file transfer mechanisms. Users can even modify the files themselves on their computers. A few configuration files pre-loaded in the phone enable the user to navigate on a computer desktop and control presentations and media players.

System Functions

User Settings

The following keys can be configured through the HID configurations files: 0-9, #, * and volume up and volume down. For each of these keys, a UsageID from the HID usage tables can be assigned.

The navigational key and the two action keys are not configurable, they always provide functions for moving the mouse and performing right and left mouse clicks.

Characteristics

The HID configuration files, and the set of preloaded HID configuration files, are customizable. The configuration files can be modified by the user if transferred to, and opened on, a computer.

Used Enablers and bearers

The HID based remote control function works over Bluetooth. It is possible to download the HID configuration files via Bluetooth, IR or a cable as well as via WAP. It is also possible to transfer the files to another device using Bluetooth or infrared.

Power save mode

The phone uses sniff mode on headset, handsfree and HID connections which means reduced power consumption and shorter connection set-up times.

IrDA

IrDA (Infrared Data Association) is a point-to-point communication link between two infrared ports. The infrared beam has to be directed towards the target infrared port and as long as the two infrared ports are within sight and range, the devices can exchange data. For optimal performance, place the

phone within 20 centimetres and at an angle of max 30 degrees to the infrared port on the PC/PDA, or other phone. An advantage of the necessary proximity of devices is reduced risk of transmitting data to other nearby devices.

An infrared link is a serial connection, which means that data bits are sent one after another in a long stream. The IrDA–SIR Data Link Standard is a protocol that makes transmission of data faultless. The standard provides a high level of noise immunity, which means that the connection is not affected by fluorescent light and electromagnetic fields – making it suitable for the modern office environment.

Object Exchange via infrared (IrObex) supports transferring objects between compatible phones. These objects are not only limited to ring signals, but even pictures, bookmarks and other files in the file system.

Key benefits of using the phone with its built-in infrared transceiver:

- True wireless communication
- Low power consumption
- Secure data transmission with the IrDA DATA standard

- Ability to send and receive e-mail and data on the connected PC/PDA
- Ability to connect to the Internet from the connected PC/PDA
- Ability to synchronize the phone book from a PC
- Exchange of business cards and calendar events with vCard/vCalendar compatible devices
- Exchange of ringtones and other files between compatible phones
- Ability to attach a photo from a digital camera in outgoing e-mail
- Ability to send and exchange notes with vNote compability devices

Connection via cable

The infrared connection is not always the best solution when connecting to a PC/PDA. Indeed, it is not always even possible. The USB cable provides connectivity between the phone and a PC and can be purchased as an optional accessory.

Synchronization and data transfer

In everyday life, access to an updated calendar, notes and details of friends and business colleagues is greatly appreciated. To be truly mobile, users must be able to carry their important information with them. Equipping mobile phones with Personal Information Manager (PIM) programs such as calendars, task lists and address books gives users access to their most important data anywhere and anytime. The information is kept updated by synchronizing with the information at the office or at home. The growing use of groupware such as Microsoft® Outlook® means that more and more meetings are booked electronically in daily business life.

The phone uses the SyncML 1.1 protocol for synchronization. This means that it has compatibility to synchronize with a wide variety of devices over a number of different communications media.

SyncML – an open standard for synchronization

SyncML background

Leading the way in providing remote synchronization capability, Sony Ericsson realizes that interoperability of remote synchronization is of utmost importance if mobile data usage is to become as widespread as generally predicted. That is why Ericsson, along with IBM, Lotus, Motorola, Matsushita, Nokia, Palm Inc., Psion and Starfish Software, founded the SyncML initiative in February 2000. Supported by more than 600 software and hardware developers, the SyncML initiative seeks to develop and promote a globally open standard for remote synchronization, called SyncML. Unlike many other synchronization platforms, SyncML is an open industry specification that offers universal interoperability. Because it uses a common language, called Extensible Markup Language (XML), for specifying the messages that synchronize devices and applications, SyncML has been called the only truly future-proof platform for enabling reliable and immediate update of data. The benefit for the end user is that SyncML can be used almost anywhere and in a wide variety of devices, regardless of application or operating system.

What is SyncML?

SyncML is the common language for synchronizing all devices and applications over any network. SyncML leverages XML, making SyncML a truly future-proof platform. With SyncML any personal information, such as calendars, task lists, contact information and other relevant data, will be consistent, accessible and up to date, no matter where the information is stored. For example, a calendar entry made to a mobile device on a business trip is equally available to a secretary in a network calendar. SyncML is the ultimate choice for remote synchronization.

The phone uses SyncML for both local synchronization (for example, with a cable connection) and remote synchronization over WAP and http.

Designed for the wireless world

SyncML is designed specifically with the wireless world's tight requirements in mind. SyncML minimizes the use of bandwidth and can deal with the special challenges of wireless synchronization, such as relatively low connection reliability and high network latency. SyncML supports synchronization over WAP, http or OBEX. As an open, future-proof standard, SyncML is the synchronization choice for any device or application of the mobile information society.

What information can be synchronized in the phone?

| Application	Remote sync	Local sync
Contacts	Yes	Yes
Calendar	Yes	Yes
Tasks	Yes	Yes
Notes	Yes	Yes

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Remote synchronization

Remote synchronization takes place over the air using and is the ideal way to keep the phone up to date. Using GPRS, the phone can be continuously connected to the remote synchronization server.
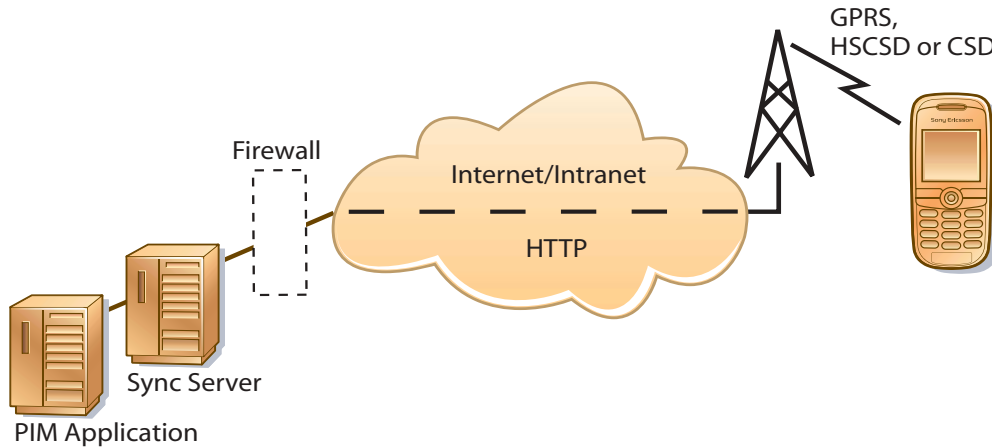
Third-party service providers offering synchronization services to corporate personal information management (PIM) applications, such as Microsoft® Exchange, can also supplement added capability with SyncML.

Local synchronization

Synchronization software can be downloaded from www.sonyericsson.com/support.
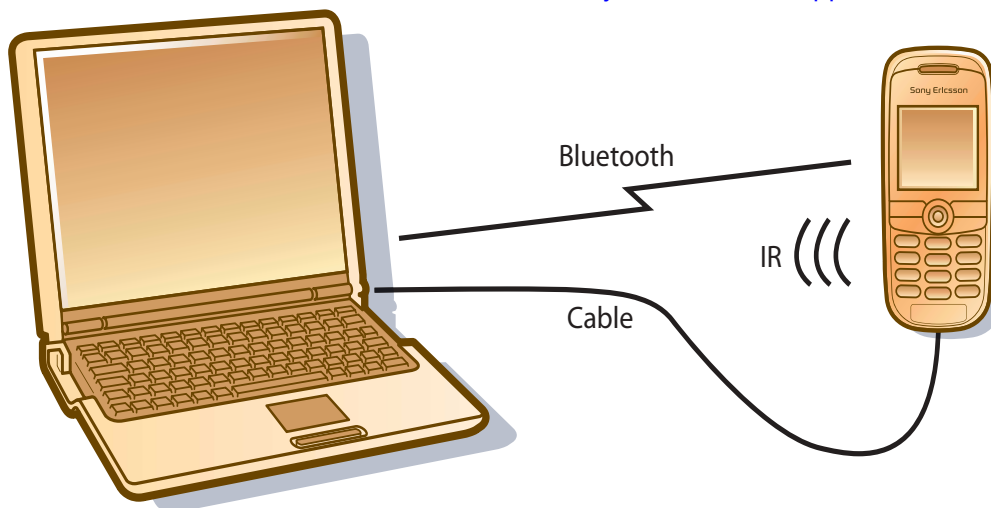
Bluetooth™, Infrared or Cable

The phone synchronizes using SyncML, regardless of connection type. It connects via Bluetooth™ wireless technology, infrared or cable. The cable is connected directly to the phone or alternatively via a desktop charger connector.

Ways of synchronizing:

- via a USB cable.
- via Bluetooth wireless technology.
- via the infrared port.

Intelligent process

A synchronization engine performs the task of synchronizing. For local synchronization, the synchronization engine is an application that runs on the desktop computer. The synchronization engine compares, updates and resolves conflicts to ensure that the information in the phone is the same as that in the computer.

Compatibility

PC software supplied with the phone enables synchronization with the following:

- Microsoft® Outlook® 98, 2000, 2002, 2003
- Lotus Notes® 5, 6, 6.5

PC requirements are as follows:

- Microsoft® Windows® 2000, XP Home, XP Pro
- Minimum recommended hardware configuration for the version of Windows in use
- 400 MB free space on hard disk

File Transfer Utility

A utility is provided which enables files to be transferred to and from the phone connected to a PC. Typical uses for this include:

- Archiving pictures taken on the phone to PC storage
- Moving images to the phone to use in personalization, MMS messages etc.
- Moving sound clips to/from the phone for personalization
- Synchronizing mobile phone contacts, appointments, tasks and notes (PIM).

DRM

Digital Rights Management, DRM, is a technology that enables secure distribution, promotion, and sale of digital media. Examples of such content include images, wallpapers and screen savers with themes from films, Music tones from musical artists, and branded games. In other words, content providers can control how users may use different types of content in devices, such as mobile phones, smartphones or PDAs. Content providers can also control the use of content in related services, such as MMS.

Sony Ericsson is actively focusing on technology standardization for the DRM concept, and supports the ongoing standardization work and activities of the OMA (Open Mobile Alliance). Sony Ericsson is fully committed to open standard solutions in the mobile environment and is a principal driver of many open standard initiatives. This will ensure the interoperability of mobile terminals in the DRM area and also result in a strong, competitive DRM standard.

How DRM works

The control of the content in digital media is executed by defining usage rights for the content. The usage rights give the content providers flexibility in the way they can publish and sell content. Rights can be defined so that a picture can be used by subscribers only, and rights can be defined so that a Music tone can be played only a limited number of times or for a limited period of time. Rights can also be defined so that the user is not able to forward content to other devices.

Note: All supported image, audio and video formats can be protected by DRM.

Packaging of rights and content

Rights and content can be packaged together and delivered to the device as one DRM package. As an alternative, content can be delivered to the device first, followed by the rights later being pushed to the device, for example via SMS. The kind of service and business model adopted by the content provider determines how the content and rights should be packaged and delivered to the device.

Protection properties

Content protection according to the OMA DRM standard gets special properties. Content with forward lock protection has the "Send to" option disabled, which prevents it from further distribution.

Unless the content is encrypted, the user cannot copy DRM content to other devices since the Send to option is disabled for pictures, Music tones, etc. that are OMA DRM protected. Content providers may choose to protect some content, but leave some content unprotected.

Package and delivery

The OMA DRM standard defines two ways to package and deliver rights and content to a device: combined or separated.

Combined delivery

Rights and content are packaged together into one DRM Package and delivered to the device. In the simplest case, no special rights are defined. The content is just put into a DRM package, thus protected from being copied out from the device by the user. This special case is called forward-lock. It is useful for all types of content that the provider wants to charge for.

Separate delivery

Rights are defined and sent in a push message. The content is encrypted and made available for users to download to their devices. The decryption key is put into the rights file. Since the content is encrypted, users cannot access it before the rights have also arrived in the device. In this case, the content can be freely distributed on the network, only users with the rights file can access the content. Content providers can deliver the rights to the user using push technology.

Downloading servers and publishing servers

When using a mobile phone, the users do not have to be aware of the network architecture. During a content downloading session, typically many physical servers are involved. Sometimes transactions may take place between different companies' servers.

The actual content may be put on one server, the downloading server. The content can be reached, for example, through references from one or many other servers, the publishing servers. The content creator puts his or her content on the downloading server through an interface to the content provider.

The user navigates to the publishing server and selects the content, or rather a link to or description of the content. The content is then downloaded from the actual downloading server.

When content is downloaded to the device, operators generate revenues from the user via, for example, their billing system. Operators might in their turn be billed for rights by the content aggregator, content provider or directly by the content creator.
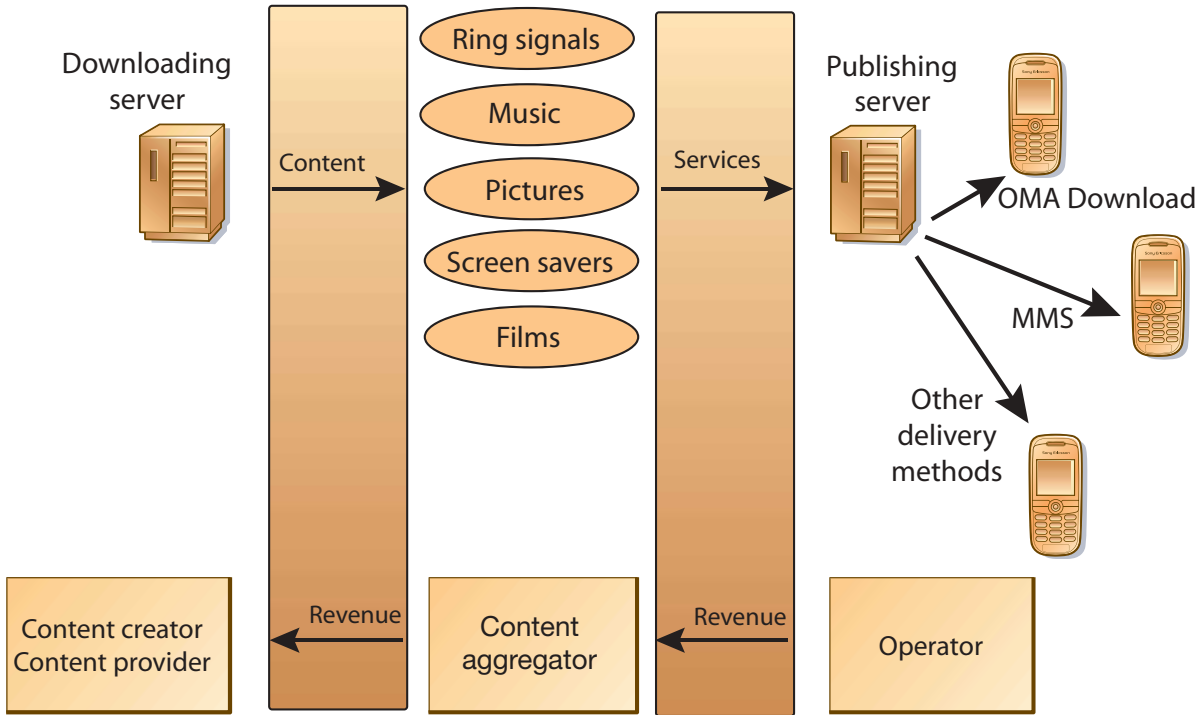

Figure 2. The flow of revenues and content. The content is viewed and selected from a publishing server and downloaded to the mobile phone from a downloading server. The revenue is in this case collected from the user by the operator and transferred to the content creator via the content aggregator.

Object exchange – 'Send as'

The phone makes it possible to transfer objects via Bluetooth, infrared and messaging. This is presented to the user via 'Send as' commands in applications. Simply select an item such as a contact, select 'Send as' and select the method to be used for sending. Typical applications are to beam an appointment to other people, or to receive a new wallpaper.

Application	Cable	Infrared	Bluetooth	SMS/EMS	MMS	Email
Contact	Yes	Yes	Yes	Yes	Yes	No
Appointment	Yes	Yes	Yes	No	Yes	No
Tasks	Yes	Yes	Yes	No	Yes	No
Notes	Yes	Yes	Yes	No	Yes	No

*Only an iMelody can be sent in an EMS.

| Application	Cable	Infrared	Bluetooth	SMS/EMS	MMS	Email
Image	Yes	Yes	Yes	No	Yes	Yes
Sound	Yes	Yes	Yes	Yes*	Yes	Yes
Bookmark	Yes	Yes	Yes	Yes	No	No
Voice memo	Yes	Yes	Yes	No	Yes	Yes

*Only an iMelody can be sent in an EMS.
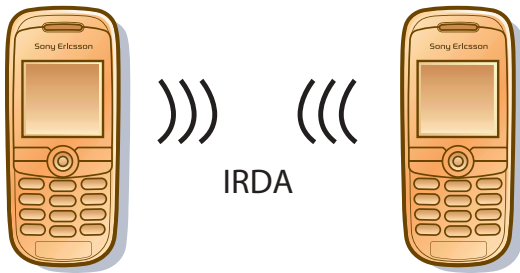
To perform a 'Send' beam operation using infrared, the two devices are lined up and the sender initiates the transfer.
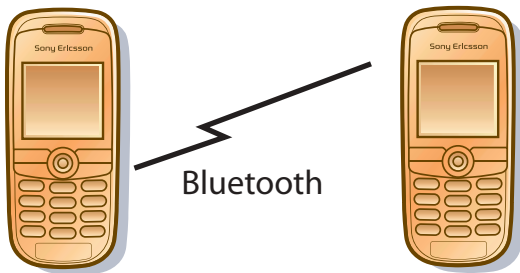
To beam over Bluetooth, a scan finds the other activated (discoverable) devices within range. The user can then select the required device and send the information across.
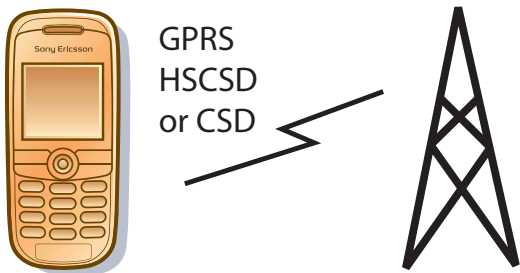
When sending via SMS, MMS or email, the required message type is created with the selected object attached. It is then sent over the air.

Java

Java 2 Micro Edition (J2ME)

The phone supports Java 2 Micro Edition. The functionality consists of:

- JSR 139 CLDC 1.1
- JSR 118 MIDP 2.0
- JSR 120 Wireless Msg API (the SMS part, not cell broadcast).
- JSR 75 File and PIM API
- Java™ API for Bluetooth (JSR 82)

- The following functions of the JSR 135 Mobile Media API:
  - Audio playback
  - Video playback
  - Camera snapshot.

More information about the specific J2ME features support is available in J2ME Developers Guideline at Sony Ericsson Developer World www.sonyericsson.com/developer

Java 3D

This phone supports real-time 3D graphics rendering. This handset supports two different 3D graphics APIs:

- Mascot Capsule Micro3D Version 3

- Mobile 3D Graphics API for J2ME (JSR 184)

More information about Java 3D on Sony Ericsson mobile handsets, refer to the Java 3D Developers Guidelines available at Sony Ericsson Developer World www.sonyericsson.com/developer

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Facts and figures

Technical specifications

General technical data

System	Quad-band phase 2 recommendations. GSM850 (3GPP 31.101-1), GSM 900 (CTR 19 and CTR 20), GSM 1800 (CTR 31 and CTR 32), GSM 1900. GPRS in all bands.
Speech coding	Support of FR, EFR, AMR according to 3GPP release 4
GSM SIM/ USIM card	GSM SIM - GSM 11.11. Small plug-in card, 1,8 V and 3 V
Memory (user free)	Up to 16 MB (depending on software configuration/file content)

Exterior description

Length	83.2 mm, 93.5mm including antenna
Width	45.7mm
Height	23.9 mm x 27.5 mm
Thickness	23.9 mm at thickest point
Weight	96 grams
Internal Display	Type: Full graphical Resolution: 128 x 160 pixels Technology: TFT Colors displayed together: 65K (16 bit) Backlight color: White
External Display	Type: Full graphical Resolution: 80 x 101 pixels Technology: CSTN Colors displayed together: 4,096 (16 bit) Backlight color: White
Antenna	Loop antenna

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Colors	Silver frame, with Style-Up™ covers in:
	• Blue
	• Sandy Grey
	• Peach
	• Mint
	• Espresso Brown
	White frame, with Style-Up™ covers in:
	• Light Blue
	• Pale Purple
	• Pale Pink
	• Pale Yellow
	• Chalk White
Battery	3.6V, 900mAh, Lithium Polymer Battery Pack
Network LED	No
Keypad	Includes 4-way navigation with select key, dedicated internet key, +/- volume keys, side camera key, and two soft buttons.
Co-branding area	Co-brand Bezel (outside): 16mm x 5.5mm Co-brand Nameplate (inside): 7.6mm x 22mm
Exchangable covers	Yes

Performance and technical characteristics

Dimension	GSM 850	GSM 900	GSM 1800	GSM 1900
Frequency range	TX: 824 – 849 MHz RX: 869 – 894 MHz	TX: 880 – 915 MHz RX: 925 – 960 MHz	TX: 1710 – 1785 MHz RX: 1805 – 1880 MHz	TX:1850 –1910 MHz RX:1930 – 1990 MHz
Channel spacing	200 kHz	200 kHz	200 kHz	200 kHz
Number of channels	124 Carriers *8 (TDMA)	174 Carriers *8 (TDMA)	374 Carriers *8 (TDMA)	299 Carriers *8 (TDMA)
Modulation	GMSK	GMSK	GMSK	GMSK
TX Phase Accuracy	< 5º RMS Phase error (burst)	< 5º RMS Phase error (burst)	< 5º RMS Phase error (burst)	< 5º RMS Phase error (burst)
Duplex spacing	45 MHz	45 MHz	95 MHz	80 MHz
Frequency stability	+/- 0.1ppm	+/- 0.1ppm	+/- 0.1ppm	+/- 0.1ppm
Voltage operation (nominal)	3.6 V	3.6 V	3.6 V	3.6 V
Transmitter RF power output	33 dBm Class 4 (2 W peak)	33 dBm Class 4 (2 W peak)	30 dBm Class 1 (1 W peak)	30 dBm Class 1 (1 W peak)

Dimension	GSM 850	GSM 900	GSM 1800	GSM 1900
Transmitter Output impedance	50 ohm	50 ohm	50 ohm	50 ohm
Transmitter Spurious emission	< -36 dBm up to 1 GHz < -30 dBm over 1 GHz (according to spec.)	< -36 dBm up to 1 GHz < -30 dBm over 1 GHz	< -36 dBm up to 1 GHz < -30 dBm over 1 GHz (according to spec)	< -36 dBm up to 1 GHz < -30 dBm over 1 GHz (according to spec
Receiver RF sensitivity	Better than – 102 dBm	Better than – 102 dBm	– 102 dBm	– 102 dBm
Receiver RX Bit error rate	< 2.4%	< 2.4%	< 2.4%	< 2.4%

Battery information

Dimension	Value in GSM/GPRS
Standard battery (LiPolymer) 3.6V, 900 mAh	Charging time: 90% charged after 2hours with standard charger.

Power save	Yes, default setting for the display light.

VGA Camera

Facts and figures	
Picture sizes (resolution) VGA camera	VGA (640x480 pixels) QVGA (320x240 pixels) QQVGA (160x120 pixels) Extended (1280x960 pixels) - TBD
Color depth	24 bit (8 bit per RGB channel), 16.78 million colors
Viewfinder resolution internal display	128 x 96 pixels
Viewfinder resolution external display	96 x 64 pixels
Camera memory	Using phone memory, no memory dedicated to the camera only

Facts and figures	
Digital zoom	2x - VGA (640x480 pixels) 1x- 4x (in 0.1 increments) - QVGA (320x240 pixels) 1x- 4x (in 0.1 increments) -QQVGA (160x120 pixels) No zoom - Extended (1280x960 pixels) - TBD

Media player

File types	Formats	Extensions
Audio	MP3 (192 kbit/s for local playback) MP4 M4A 3GP (Audio encoded in AAC or AMR) AMR WAV (PCM) G-MIDI (level 1 with 40 voices polyphony)	.mp3 .mp4 .m4a .3gp .amr .wav .mid
Video (including audio part)	MP4 (video: MPEG-4 audio: AAC or AMR) 3GP (video: MPEG4 or H.263, audio: AAC or AMR)	.mp4 .3gp
Streaming transport	RTSP according to 3GPP	
Video coding	MPEG-4 Simple Visual Profile Level 0 H.263 Profile 0 Level 10 H.263 Profile 3 Level 10	
Audio coding	AMR	
Features	Automatic loop of songs in folder Automatic pause on telephone call.	

Pictures

Formats	JPEG, BMP, GIF (including animated), PNG, WBMP, and Scalable Vector Graphics
Sharing via	IR, Bluetooth, MMS, E-mail, PC file transfer or cable

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Image decoders

Decoder	Details	Size	Color depth	File format
GIF	87a/89a			
JPEG	ISO/IEC JPEG Baseline DCT Progressive DCT Non-differential Huffman coding Symbol 'SOF2'	VGA		JFIF v1.02 EXIF
BMP	The bitmap image format used by Windows®.	XRAM dependent, default is VGA	24 bit	
WBMP				
PNG				

Image encoders

Decoder	Details	Size	Color depth	File format
GIF	87a			
JPEG	ISO/IEC JPEG Baseline DCT Non-differential Huffman coding Symbol 'SOF0'	VGA		JFIF v1.02
BMP	The bitmap image format used by Windows®.	XRAM dependent, default is VGA	24 bit	
WBMP				

Short Messaging Service

Feature	Support
SMS Center Number	It is possible to pre-load the SMS Center Number.
Pictures	It is possible to insert a picture or an icon into the text message. EMS compliant mobile handsets will be able to see the picture correctly.
Input methods	Predictive text input and multitap.

Feature	Support
Reply to messages	It is possible to reply to received messages by SMS, phonecall or e-mail.
Message creation methods support	Predictive writing and multitap.
Copy, cut and paste words	No
Teaching of predictive words that are not in the predictive dictionary	Yes
Possibilities when creating a message:	
save a sent message in a "sent items" folder	Yes
insert a line in the message	Yes
assign a validity period to the message	Yes
use pre-defined messages	Yes
Possibilities when receiving a message:	
reply to the sender	Yes (only to the sender, not to all or part of the message recipients)
forward the message	Yes
save the message on SIM	Yes
get delivery time and date	Yes
Possibilities of the previously sent message:	
delivery report of the message	Yes
forward the message	Yes
save the message on SIM	Yes
know the remaining capacity storage	Yes
Possibilities of the previously received message:	
reply to the sender	Yes (only to the sender, not to all or part of the message recipients)
save the message in the Inbox	Yes
forward the message	Yes
know the remaining capacity storage	Yes
Supported ways for replying to a received SMS:	
via SMS	Yes
via phone call (set up a call to the number contained in the message body)	Yes

Feature	Support
via WAP call (go to the WAP address contained in the message body)	Yes
via USSD session	No
Print via IrDA	No
Possibility to offer the user the ability of sending an SMS to a list of recipients	Yes, using phonebook groups
Possibility to write an e-mail address as a recipient address	Yes, if SMS type=e-mail
SMS storage	In the SIM and in the handset.
Nokia Picture Messaging	Yes

Enhanced Messaging Service

Feature	Support
Level of compliance supported by the handset regarding the specifications described in release 99.	Enhanced Messaging Service (EMS) according to the standard 3GPP TS 23.040 v4.3.0, with the addition of the ODI feature from 3GPP TS 23.040 v5.0.0.
Number of messages that the handset is able to handle to generate a concatenated message	20
Capacity storage	100 and the space left on the SIM card.
Outgoing messages	It is possible to... • see how many short messages an EMS message consists of before sending it. • choose whether to send the message or not after writing it.
Incoming messages	• A signal is heard once all parts of the message have been received or when a timeout occurs. • It is possible to re-use the content of an EMS message. Sounds, pictures, and animations can be inserted in a new message, if the object is not protected using ODI.
Concatenated messages	A receipt is received in the handset when all parts of a concatenated message have been delivered.
Insert objects	It is possible to add pictures, animations and sounds to an EMS message.
Sounds	Chimes high, chimes low, ding, tada, notify, drum, claps, fanfare, chords high, chords low.

Feature	Support
I-melody	Yes, version 1.2.
Melodies	It is possible to... • send and receive melodies via EMS, if the melodies are not protected by copyright. • download melodies and commercial tunes from WAP/WAP portals. • create melodies on WAP/WAP portals.
WBMP	Yes
Picture sizes	16 x 16 mm, 32 x 32 mm, variable size in black and white.
Pictures	It is possible to... • edit pictures by using the phone keypad. • send and receive pictures via EMS, if the pictures are not protected by copyright. • create pictures on WAP/WAP portals. • download pictures from WAP/WAP portals. • receive pictures in enhanced messages originated by service providers.
Animations	The handset supports the following animations: I am ironic, I am glad, I am sceptic, I am sad, WOW!, I am crying. Plus the other nine animations defined in 3GPP TS 23.040 v4.3.0. It is possible to... • send and receive animations.
TP-PID field value given by the handset before sending an EMS message	0x00

Multimedia Messaging Service

Feature	Support
MMS/CSD parameters and MMS/GPRS parameters placement	MMS is bound to a WAP profile. A WAP profile is bound to a Data Account. A Data Account contains either CSD parameters or GPRS parameters.
Possibility to pre-configure the MMS parameters in factory	• MMS/CSD: Yes • MMS/GPRS: Yes
Possibility to configure the MMS parameters by OTA provisioning	• MMS/CSD: Yes • MMS/GPRS: Yes

Feature	Support
Possibility for all the parameters from the parameters set to be OTA provisioned at the same time	• MMS/CSD: Yes • MMS/GPRS: Yes
Possibility for only one parameter from the parameters set to be OTA provisioned	• MMS/CSD: No • MMS/GPRS: No
OTA provisioning solution	OTA Settings Specification v7.1 © Ericsson and Nokia
Supplier indication of realized interoperability tests between its MMS User Agent and MMS Relay/Server from other suppliers	Yes
Support of a standard or a proprietary procedure for OTA provisioning of MMS parameters	Proprietary
Functionalities that the user is able to set during message composition:	• message subject • message priority • e-mail recipient address • message Cc recipient(s) address(es) • delivery report request • read report request • MSISDN recipient address
From where can the user insert multimedia elements into multimedia messages:	• File Manager • directly from camera • Contacts • Calendar
Possibility for sent messages to be memorized into a folder in handset memory	Yes
Actions that the user can perform after message notification:	• Auto Download • Always Ask
Actions that the user can perform after message retrieval:	• reply to the sender of the message SMS/MMS • reply to the sender and to Cc people SMS/MMS • forward the message MMS • delete the message • save message into terminal • call the sender of a message
Multimedia codecs/formats supported for audio	AMR
Multimedia codecs/formats supported for video	MPG4, 3GPP, SDP
Multimedia codecs/formats supported for image	JPEG, GIF87, GIF89A, PNG, SVG, WBMP, BMP
Supported formats for message presentation:	• message body + attachments (e-mail presentation) • SMIL version as described in OMA MMS IOP document version 1.2

Feature	Support
Maximum message size that can be handled by the handset for message	Content Class and Creation mode are applied. Also maximum size is possible to customize.
MMS User Agent will report problems to user in case of:	• message not sent causes no user subscription to service, if included in ResponseText (please see WAP209) • message not sent causes required functionality not supported by MMS Relay/Server, if included in ResponseText (please see WAP209) • message not sent causes insufficient credit (in case of prepaid charging), if included in Response-Text (please see WAP209)

Bluetooth technical data

Dimension	Support
Bluetooth capability statement	This phone is manufactured to meet Bluetooth Specification 2.0.
Bluetooth functions	Dial-up Networking Profile Generic Access Profile Generic Object Exchange Profile Headset Profile Object Push Profile Serial Port Profile Synchronization Profile Basic Imaging Profile Handsfree Profile Headset Profile Basic Imaging Profile File Transfer Profile Human Interface Device (HID) Profile SyncML OBEX binding JSR-82 Java API
Connectable devices	All products supporting Bluetooth spec. 1.1, or higher, and at least one of the profiles above.
Coverage area	Varies due to radio performance on remote device and the occurrence of obstacles. Up to 10 metres (33 feet).
Transmission power	2mW (3 dBm)
Frequency band	2.4 GHz - the unlicensed ISM band.
Power consumption	GSM host processor excluded: • Standby, Bluetooth On mode: <0.9mA • Voice mode: 24 mA • Data mode average: 25mA
Data transmission rate	Up to 600 kbps asynchronous and up to 350 kbps synchronous from an application level.

Specific commands working with the SIM card	No

SIM AT services supported

Service	Mode		Support
CALL CONTROL BY SIM			Yes
DATA DOWNLOAD TO SIM	Cell Broadcast		Yes
	SMS		Yes
DISPLAY TEXT		Text of up to 240 characters (120 UCS2 coded).	Yes
	bit 1:	0 = normal priority	Yes
		1 = high priority	Yes
	bit 8:	0 = clear message after a delay	Yes
		1 = wait for user to clear message	Yes
GET INKEY		General: The GET_INKEY requires that the user confirms his/her choice	Yes
	bit 1:	0 = digits (0-9, *, # and +) only	Yes
		1 = alphabet set	Yes
	bit 2:	0 = SMS default alphabet	Yes
		1 = UCS2 alphabet	Yes
	bit 3:	0 = character sets defined by bit 1 and bit 2 are enabled	Yes
		1 = character sets defined by bit 1 and bit 2 are disabled and the Yes/No response is requested	Yes

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Service		Mode	Support
GET INPUT		General: No. of hidden input characters	252
	bit 1:	0 = digits (0-9, *, # and +) only	Yes
		1 = alphabet set	Yes
	bit 2:	0 = SMS default alphabet	Yes
		1 = UCS2 alphabet	Yes
	bit 3:	0 = ME may echo user input on the display	Yes
		1 = user input not to be revealed in any way (see note)	Yes
	bit 4:	0 = user input to be in unpacked format	Yes
		1 = user input to be in SMS packed format	Yes
	bit 8:	0 = no help information available	Yes
		1 = help information available	Yes
LAUNCH BROWSER			Yes
MORE TIME			Yes
PLAY TONE			Yes
POLLING OFF			Yes
POLL INTERVAL			Yes
PROVIDE LOCAL INFORMATION		'00' = Location Information (MCC, MNC, LAC and Cell Identity)	Yes
		'01' = IMEI of the ME	Yes
		'02' = Network Measurement results	Yes
		'03' = Date, time and time zone (DTTinPLI)	Yes
		'04' - Language setting	Yes
		'05' - Timing setting	Yes
REFRESH		General: The reset option requests the user to wait while the phone restarts	Yes
		'00' =SIM Initialization and Full File Change Notification	Yes
		'01' = File Change Notification	Yes
		'02' = SIM Initialization and File Change Notification	Yes
		'03' = SIM Initialization	Yes
		'04' = SIM Reset	Yes

Service	Mode		Support
SELECT ITEM			Yes
SEND DTMF			Yes
SEND SHORT MESSAGE	bit 1:	0 = packing not required	Yes
		1 = SMS packing by the ME required	Yes
SEND SS			Yes
SEND USSD			Yes
SET UP CALL		General: Capability configuration	Yes
		Set-up speech call CallParty	No
		Subaddress DTMF support	Yes
		'00' = set up call, but only if not currently busy on another call	Yes
		'01' = set up call, but only if not currently busy on another call, with re-dial	Yes
		'02' = set up call, putting all other calls (if any) on hold	Yes
		'03' = set up call, putting all other calls (if any) on hold, with re-dial	Yes
		'04' = set up call, disconnecting all other calls (if any)	Yes
		'05' = set up call, disconnecting all other calls (if any), with re-dial	Yes
SET UP EVENT LIST		'00' = MT call	Yes
		'01' = Call connected	Yes
		'02' = Call disconnected	Yes
		'03' = Location status	Yes
		'04' = User activity	Yes
		'05' = Idle screen available	Yes
		'06' = Card reader status	Not Applicable
		'07' = Language selection	Yes
		'08' = Browser termination	Yes
		'09' = Data available	No
		'OA' = Channel status	No
SET UP IDLE MODE TEXT			Yes, 1 row of text is supported

Service	Mode	Support
SET UP MENU		Yes
TIMER MANAGEMENT		Yes
OPEN CHANNEL		No
CLOSE CHANNEL		No
RECEIVE DATA		No
SEND DATA		No
GET CHANNEL STATUS		No

User Interaction with SIM AT

Display text

Text of up to 240 characters (120 UCS coded) is supported.

Text clearing times are 5-20 seconds and a 60-second time-out limit for the user to clear the text. 'Key' responses:

- 'Long Back' – Proactive session terminated by user.
- 'Back' – Backward move in proactive session.

Any other key clears the display if the command is performed successfully.

Get inkey

Prompt for a one-character input. Pressing 'Ok' without entering a character gives warning message "Minimum 1 character". 'Key' responses:

- 'C' clears current character.
- 'Long Back' terminates the proactive session.
- 'Back' – Backward move in proactive session.
- 'OK' – Command performed successfully.

Get input

Prompt for character input. The phone will refuse to accept further input when maximum response length is exceeded. UI Maximum Response lengths:

- Digits Only – 160 characters
- SMS default alphabet characters – 160 characters
- Hidden Characters (digits only) – 20 characters

'Key' responses:

- 'C' clears current character.
- 'Long Back' terminates the proactive session.
- 'Back' – Backward move in proactive session.
- 'OK' – Command performed successfully.

Select item

Scroll to highlight item for selection. 'Key' responses:

- Navigational key press down – Scroll down list.
- Navigational key press up – Scroll up list.
- Long 'Back' terminates proactive session.
- 'Back' – Backward move in proactive session.
- 'OK'– Command performed successfully.

Send short message

Default message "Sending message, please wait" can be replaced for the Alpha Identifier text, or suppressed completely if a null text is provided. Default responses are "MESSAGE FAILED" or "MESSAGE SENT". 'Key' responses:

- Long 'Back' or 'Back' ends the proactive session.

Set up call

If the ME is on a call when the command 'Set up Call', 'putting all other calls on hold' is sent, the user will see the text 'Setting up a call current call will be held'. If 'OK' is pressed the current call will be put on hold and the new call set up. If the ME is on a call when the command 'Set Up Call, disconnecting all other calls' is sent, the user will see the

text 'Setting up a call current call will be discon-nected'. If the 'OK' key is pressed the current call will be disconnected and the new call set up.

Set up menu

Incorporates a SIM Application Toolkit Menu Item into the ME's main menu structure.

If an Alpha Identifier is supplied in the Set Up Menu command, this is used as the SIM AT entry in the ME's main menu. If no alpha identifier is supplied and several items are found in the menu, a default title is used. If the SIM AT Menu Item is selected by pressing 'Select', all the items sent in the Set Up Menu command will be available for selection, in the same way as the Select Item command.

WAP browser technical data

Feature	Support in the browser
Back to previous page	Yes
Bearer type GPRS (IP)	Yes
Bearer type GSM Data (IP)	Yes, HSCSD, ISDN and analog
Bookmarks	Yes, up to 100 named bookmarks for easy access to frequently vis-ited pages
Bookmark Export/Import	Yes, can be sent and received using vBookmark format via Infrared, Bluetooth, SMS, MMS and email.
Cache	Yes (size 300 KB)
Character sets *	UTF-8 (Default), UTF-16, USASCII, Latin1, UCS2
Clear cache	Yes
Color	Color display
Home page	Yes, up to 10 different; one for each WAP profile
HTML version for WAP browser	XHTML, Mobile Profile 1.2
Hyperlinks in Text	Yes, highlighted by inverse video
Hyperlinks in Images	Yes, indicated by a frame
Image Animation	Yes
Image Formats	GIF (interlaced and non-interlaced) WBMP, no transparent layers, JPEG, PNG
Network Settings	Up to 10 different settings available by selecting WAP profile (Internet, Banking, Gateway etc.)
OTA Support	Yes
PPP Authentication	PAP, CHAP supported
Reload page	Yes

Feature	Support in the browser
Security	WTLS class 1-3 TLS 1.0, client authentication WIM on SIM ICC X.509 certificate support, WAP Profile WMLScript signText WPKI OTA download of trusted and client certificates
Tables	Yes
User Agent Profiles	Yes, list of client characteristics - for example display size
WAP/WML WAP	WAP 2.0/WML 1.3
	*) When creating WML applications, it is recommended that to always save the page contents as UTF-8, and that this is clearly indicated in the pages before publishing. This ensures that the contents of the application can be viewed, regardless of character sets used in gateways and the phone. All characters are not supported in all phones. The software version depends on which market the phone is associated to. Also, please note that the phone may not support input on a WAP Service which uses certain characters (languages), even if those characters are supported for browsing in the phone.
WAP browser	WAP 2.0
WAP profiles	Dynamic - up to 10 WAP profiles, each with its own settings

WAP operator technical data

Feature	Support for WAP	
WAP Browser		
Version	2.0 baseline	
HTML	XHTML Mobile Profile	
WAP Provisioning types	The Ericsson-Nokia OTA solution Over the Air Settings Specification, v7.1 © Ericsson and Nokia	OMA Client provisioning (v1.0)
Total Parameter sets	10 (shared between the WAP provisioning types). < or = 10 (total number of WAP profiles).	

Feature	Support for WAP	
Parameter set list	name, homepage and homepage title (1st book-mark element), proxy/GW address, bookmarks (remaining bookmark elements), CSD phone number, CSD data rate, CSD dial type, GPRS APN, protocol authentication, GW authentication, secure connection on/off	name, homepage, proxy/GW address, CSD phone number, CSD data rate, CSD dial type, CSD response timer, GPRS APN, protocol authentication, GW authentication, GPRS QoS
Parameter sets include	WAP/CSD, WAP/GPRS (different sets)	
Factory pre-configuration	WAP/CSD (possibility to lock a setting), WAP/GPRS	
OTA	WAP/CSD, WAP/GPRS configuration possible	
Security mechanism		
Bearer	The Ericsson-Nokia solu-tion	OMA Client Provisioning
OTA via SMS	Operator verification through a code that can be included in the OTA configuration data. This code is shown to the user, who can choose to install or not.	Uses security mechanism (SEC) methods according to WAP-183-ProvCont-20010724-a (see www.openmobilealliance.org).
Interface		
Bearer	The Ericsson-Nokia solu-tion	OMA Client Provisioning
OTA via SMS	A question whether to install with the code if it is available. The user may have to choose whether to create a new WAP pro-file or to replace an exist-ing WAP profile.	For NETWPIN the user is asked to accept to install received settings. For USERPIN, USERNETWPIN and USERPINMAC the user is subse-quently asked to enter a PIN code that is a shared secret between the service provider and the user.
OTA via Cell Broadcast	-	The user is asked whether to accept the received settings or not.
Re-provisioning Interface	The Ericsson-Nokia solu-tion	OMA Client Provisioning

Feature	Support for WAP	
OTA via SMS	Same interface as above.	If the settings previously installed were privileged or have higher priority, the settings might not be possible to install again unless the terminal is reset, otherwise as above.
OTA via Cell Broadcast	-	If the settings previously installed were privileged or have higher priority, the settings might not be possible to install again unless the terminal is reset, otherwise as above.
Carrier reset/provisioning	Yes, but not if the set is pre-configured in the factory and locked.	
SWIM	Not used for provisioning. The SWIM is only used for WAP security, both WTLS connections and digital signatures.	
SWIM certificate	Both client and trusted certificates can be used for WTLS connections and digital signatures.	
Applicative provisioning		
Preferred bearer customization	Yes	
E-mail customization	Yes, but not through WAP provisioning.	
Other applications/features	Yes. MMS, SyncML	
Technologies		
OMA Client provisioning	Yes, WAP provisioning document v1.0.	
Openwave OTA	No	
Other	Yes. The Ericsson-Nokia solution. OTA Settings Specification v7.1.	
Provisioning bearer	SMS, Cell Broadcast	
Parameter sets available	< or = 10 (total number of WAP profiles)	
Parameter sets for OTA modification	< or = 10 (total number of WAP profiles)	
PUSH		
Content types		
Service Indication (SI)	Yes	
Service Loading (SL)	Yes	
Cache Operation (CO) content type	Yes	

Feature	Support for WAP
Session Initiation Application (SIA)	Yes
Man Machine Interface	
SI/content retrieval postponing	Yes
SI menu structure accessability	Messaging, Inbox
SL reception warning	The user can make a choice if a dialogue is wanted or not before loading the SL. Messaging/Settings/Push messages/Allow push msg/Always ask
SIA reception warning	Yes
Cache size limitations	The oldest push in the inbox will be discarded.
Number of push messages	Depending on the size of the push messages. Around 20 push messages with a size of 500 bytes can be stored.
Push de-activate	Yes. Messaging/Settings/Push/Allow push msg
Dynamic push menu changes	No. There are no changes in the menus when activating/deacti-vating push
Security	
Mechanisms for push	None
Trust with PPG	Sending a SIA is the most trustful.
WSP push sessions	The White List is supported.
Denial of service/spoofing	
User agent profile	
UA profile content sent at begin-ning of WSP session	No
OA profile content size	
URL sent pointing to the UA profile at the beginning of WSP session	Yes
URL location	On the manufacturer WAP site.
WTAI	
WTA Make Call	Yes
WTA Send DTMF	Yes
WTA Add Phone Book	Yes
Other WTA/WTAI	No

DOWNLOAD

Feature	Support for WAP
WAP solutions	
SAR/WSP/http GET solution to download content over WAP	Yes
Download Fun from Openwave	No
Other download content over WAP	Yes. Content download limited to 300 kB when using WTP protocol. No download limit when using http protocol.
Features	
Download application/product memory check	Yes
Downloaded object solution	Yes. The user is asked if the content is to be saved.
UAP indication for downloading	Yes
Other features	Yes. Store, delete, forward, use, manage.
Object formats	
	All formats that are supported in the phone will be possible to download.
GRAPHICAL USER INTERFACE	
Man Machine Interface	
Selection keys	Yes
Separate/dedicated back or erase keys	Yes
Display backlight on when browsing	Yes
Predictive writing	Yes
"http://" string displayed automatically when entering URLs	Not displayed but the "http://" is added automatically to the URL.
Elements	
Number of display lines for a WAP connection	Up to 8 rows (or 7 rows plus 1 title row), depending on the selected font size. Each row is 21 pixels in height (a title row is 28 pixels).
Pop-up menus	Yes, in XHTML.
Radio buttons	Yes, in XHTML.
Check boxes	Yes, in XHTML.
Buttons	Available as XHTML form controls.

USSD technical data

Feature	Support
USSD support	GSM Phase 1/2 (Cross-phase compatibility). GPRS behaviour according to class B.
Mode support -mode	UI-mode supported. SAT initiated USSD supported.
UI-mode details	• It is possible to scroll the text up and down in USSD messages. • It is possible to highlight embedded numbers and take actions accordingly.

GPRS technical data

Dimension	Support
Compatible GPRS and SMG specifications	Release 99 according to ETSI specification.
Data rates	Multislot class 10 supported (4+2) CS-1, CS-2, CS-3, CS-4 9,050 bps, 13,400 bps, 15,600 bps, 21,400 bps supported (network-dependent)
Medium Access Modes	Dynamic allocation
Support of Packet Control Channels (PBCCH/PCCCH)	Yes. Available at launch.
Network operation mode	NOM I, II, III
Support of GPRS/CS combined procedures	Yes
Network control mode	NC0 and 2
Support of access in 2 phases	Yes
Support of PRACH on 11 bits	Yes
Support of GPRS re-selection C31/C32	Yes
Support of static and dynamic addressing	Yes
Support of power control Uplink and Downlink	Uplink = yes, Downlink is a network feature
Support of ciphering algorithms	GEA1, GEA2

Dimension	Support	
Support of compression algorithms	Yes, V42bis and IP header compression	
Mode of operation	Class B and Class C modes of operation supported.	
R Reference point	Physical layer: Support of RS232 PPP is supported as L2 layer in the R reference point Authentication algorithms PAP, CHAP supported	
IP connectivity	PDP type IP is supported IP termination in mobile or TE (laptop, PDA) supported	
PDP context	10 PDP context descriptions stored in mobile PDP context description is edited via application in mobile, AT-command or via OTA Simultaneous PDP contexts are supported, maximum 2.	
SIM	GPRS aware, as well as non-GPRS aware; SIM cards are supported.	
AT commands supported	AT+CGDCONT - DEFINE PDP CONTEXT AT+CGQREQ - Quality of Service Profile (REQUESTED) AT+CGQMIN - Quality of Service Profile (Minimum Acceptable) AT+CGATT - PACKET DOMAIN SERVICE ATTACH OR DETACH	AT+CGACT - PDP CONTEXT ACTIVATE OR DEACTIVATE AT+CGDATA - ENT

SyncML technical data

Feature	Support for Sync ML
SyncML compliance	The handset is fully SyncML 1.1 compliant (it passed SyncML Conformance testing).
Basic data formats	Contacts: vCard 2.1, Calendar: vCalendar 1.0, vTasks v1.0, vTodo v1.0, Notes: text/plain, v Notes: not supported.
Possibility for operators to extend SyncML functionality.	No
Possibility to synchronize other handsets using SyncML.	No
Transport method for SyncML messages.	WSP (i.e. using a WAP connection), OBEX (RS232, IR, USB, Bluetooth).
Synchronization application placement.	Inside the handset

Feature	Support for Sync ML
Possibility for the user to configure login parameters (e.g. username and password) to access the remote database.	Yes
Configuration parameters that can be entered/modified by the user.	Server URL, Server UserID, Server PWD, Paths to databases (Calendar, Contacts, Tasks) UserID and PWD for Databases, Databases to be synchronized (on/off), WAP Account. Ericsson Nokia OTA Settings Specification v7.1.
Mechanisms used by the handset to capture changes made by the end user (i.e. how does the SyncML client in the handset know which changes were made to the address book).	It uses a change log where it marks the contact as updated.
Ability to deal with multiple servers.	Yes
Ability to perform conflict resolution actions.	No

Terminology and abbreviations

3GPP

3rd Generation Partnership Project

AAC

Advanced Audio Coding

ACELP

Algebraic Code Excited Linear Prediction

AMR

Adaptive Multi Rate.
Audio format for speech sounds.

API

Application Programming Interface

ARPU

Average Revenue Per User

Bearer

The method for accessing WAP from the phone, for example GSM Data (CSD) and SMS.

Bookmark

A URL and header/title stored in the phone.

Browsing session

The period from the first access of content until the termination of the connection.

CLI

Calling Line Identification shows the number of the caller, or a picture assigned to the number of the caller in the mobile phone display. Not all numbers can be displayed. Network-dependent service.

Card

A single WML unit of navigation and user interface. May contain information to present to the user, instructions for gathering user input, etc.

CDDA

Compact disc digital audio.

CDMA

Code Division Multiple Access. A generic term that describes a wireless air interface based on code division multiple access technology.

Cell-ID

Cell identification

CS

Circuit Switched

CSD

Circuit Switched Data

CSS

Cascading Style Sheet

Deck

A collection of WML cards.

DRM

Digital Rights Management; controlling copying and distribution of contents, with respect to intellectual property rights.

DTMF or Touch Tone

Dual Tone Multi-Frequency signal – codes sent as tone signals. Used for telephone banking, accessing an answering machine, etc.

e-GSM

Extended GSM. New frequencies specified by the European Radio Communications Committee (ERC) for GSM use when additional spectrum is needed (Network-dependent). It allows operators to transmit and receive just outside GSM's core 900 frequency band. This extension gives increased network capability.

EFR

Enhanced Full Rate, speech coding.

EMS

Enhanced Messaging Service. Allows the user to add simple pixel pictures and animations, sounds and melodies to a text message. The EMS 3GPP standard also includes text formatting.

ETSI

European Telecommunications Standards Institute.

FM

Frequency Modulation of the (radio) carrier wave.

FR

Full Rate, speech coding.

Gateway

A WAP Gateway typically includes the following functions:

- A Protocol Gateway – the protocol gateway translates requests from the WAP protocol stack to the WWW protocol stack (http and TCP/IP).
- Content Encoders and Decoders – the content encoders translate Web content into compact encoded formats to reduce the size and number of packets travelling over the wireless data network.

GIF

Graphics Interchange Format

GPRS

General Packet Radio Services

GSM

Global System for Mobile Communications. GSM is the world's most widely-used digital mobile phone system, now operating in over 100 countries around the world, particularly in Europe and Asia-Pacific.

GSM system

The GSM system family includes GSM 850, 900, 1800 and 1900. There are different phases of roll-out for the GSM system and GSM phones are either phase 1 or phase 2 compliant.

GSM 1800

Also known as DCS 1800 or PCN, this is a digital network working on a frequency of 1800 MHz. It is used in Europe and Asia-Pacific.

HR

Half Rate, speech coding.

HSCSD

High Speed Circuit Switched Data

HTML

HyperText Markup Language

http

HyperText Transfer Protocol

IrMC

Infrared Mobile Communications standard

IrDA

Infrared Data Association

ISP

Internet Service Provider

ITTP

Intelligent Terminal Transfer Protocol

LED

Light Emitting Diode

LAN

Local Area Network

LPC

Linear Predictive Coding

LTP

Long Term Predictor

MIDI

Musical Instrument Digital Interface

ME

Mobile Equipment

Micro browser

Accesses and displays Internet content in a mobile phone, using small file sizes and the bandwidth of the wireless-handheld network.

MIME

Multipurpose Internet Mail Extensions.

MMI

Man-Machine Interface. See UI.

MP3

Short for "MPEG layer 3", an effective audio coding scheme.

MPEG4/MPG4

MPEG-4 extends the earlier MPEG-1 and MPEG-2 algorithms with synthesis of speech and video, fractal compression, computer visualisation and artificial intelligence-based image processing techniques.

MS

Mobile Station

MT

Mobile Termination

Music tones

Ringtones or mastertones, a name for shortened and DRM-protected MP3 ringtones.

ODI

Object Distribution Indicator

OMA

Open Mobile Alliance

OTA

Over-the Air Configuration. To provide settings for the phone by way of sending an SMS message over the network to the phone. This reduces the need for the user to configure the phone manually.

PDA

Personal Digital Assistant

PDP

Packet Data Protocol

Phonebook

A memory in the mobile phone or SIM card where phone numbers can be stored and accessed by name or position.

PIM

Personal Information Management

Quad band

GSM 850/900/1800/1900.

QCIF

Quarter Common Intermediate Format

QVGA

Quarter Video Graphics Array

RPE

Regular Pulse Excited codec.

RTSP

Real Time Streaming Protocol session control.

SMS-C

Service Center (for SMS).

Service provider

A company that provides services and subscriptions to mobile phone users.

SI

Service Indication

SL

Service Loading.

SIM card

Subscriber Identity Module card – a card that must be inserted in any GSM-based mobile phone. It contains subscriber details, security information and memory for a personal directory of numbers. The card can be a small plug-in type or credit card-sized, but both types have the same functions. The Z520 uses the small plug-in card.

SMS

Short Messaging Service. Allows messages of up to 160 characters to be sent and received via the network operator's message center to a mobile phone.

SP-MIDI

SP-MIDI stands for Scalable Polyphony MIDI.

SS

Supplementary Services

TA

Timing in Advance

TCP/IP

Transmission Control Protocol/Internet Protocol

UI

User interface

UMTS

Universal Mobile Telecommunications System. The telecommunications system, incorporating mobile cellular and other functionality, that is the subject of standards produced by 3GPP.

URL

Uniform Resource Locator.
The global address of documents and other resources on the World Wide Web.

USSD

Unstructured Supplementary Services Data

vCard

vCard automates the exchange of personal information typically found on a traditional business card, for use in applications such as Internet mail, voice mail, Web browsers, telephony applications, call centers, conferences, PIMs /PDAs, pagers, fax, office equipment, and smart cards. vCard is specified by IETF.

VGA

Video Graphics Array

VHF

Very high frequency. A band of radio frequencies falling between 30 and 300 Megahertz.

WAP

Wireless Application Protocol. Handheld devices, low bandwidth, binary coded, a deck/card metaphor to specify a service. A card is typically a unit of interaction with the user, that is, either presentation of information or request for information from the user. A collection of cards is called a deck, which usually constitutes a service.

WAP Application

A collection of WML cards, with the new context attribute set in the entry card.

WAP service

A WML application residing on a web site.

WAV

Windows media audio video.

WBMP

Wireless BitMap.
A graphic format optimized for mobile computing devices.

WML

Wireless Markup Language. A markup language used for authoring services, fulfilling the same purpose as HyperText Markup Language (HTML) does on the World Wide Web (WWW). In contrast to HTML, WML is designed to fit small handheld devices.

WMLScript

WMLScript can be used to enhance the functionality of a service, just as, for example, Java Script may be utilized in HTML. It makes it possible to add procedural logic and computational functions to WAP-based services.

WSP

Wireless Session Protocol

WTLS

Wireless Transport Layer Security

WWW
World Wide Web

XML
Extensible Markup Language

XHTML
Extensible HyperText Markup Language

Related information

Documents

- Sony Ericsson User's Guide
- Sony Ericsson FAQ
- AT Command Reference Manual
- WAP 2.0 Specifications

Links

- www.SonyEricsson.com
- www.SonyEricsson.com/support
- www.SonyEricsson.com/fun/
- www.SonyEricsson.com/developer/
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