White Paper

April, 2002

T68i/T68ie

Sony Ericsson

Contents

Preface

Purpose of this document

The Ericsson T68i/T68ie White Paper is designed to give the reader a deeper technical understanding of how the T68i/T68ie is designed, and of how it interacts with other media. This document will make it easier to integrate the T68i/T68ie with the IT and communications solutions of a company or organization. People who can benefit from this document include:

- Corporate buyers
- IT Professionals
- Software developers
- Support engineers
- Business decision-makers

More information, useful for product, service and application developers, is published at http://www.Ericsson.com/mobilityworld/, which contains up-to-date information about technologies, products and tools.

This White Paper is published by:

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

Phone:+46 46 19 40 00
Fax: +46 46 19 41 00
www.SonyEricssonMobile.com

First edition (February 2002)
Publication number: EN/LZT 108 5416 R2A

Product overview

The T68i comes in two versions, T68i and T68ie. The only difference between the two versions is the languages they support. In this document, the name T68i stands for both versions.

The T68i is small, sleek and impressively designed. The most innovative of its features is a large 256 colour display allowing high-quality colour imaging and a host of new interface-enhancing functions.

With a GPRS (General Packet Radio Services) modem built in, the T68i offers a fast and satisfying mobile Internet experience. And with *Bluetooth* wireless technology, connecting the T68i to other devices is smooth and simple. The T68i is a triple band 900/1800/1900 premium product which is planned to be available Q1, 2002.

Key functions and features

Multimedia Messaging - Digital greetings

Reacting to the enormous popularity of mobile phone messaging, Sony Ericsson has incorporated the latest messaging standard into the T68i, along with a colour display for an enhanced imaging experience.

Say it in words, say it with pictures, animate it, add sound. Multimedia birthday and holiday greetings are great fun to put together using the T68i. On vacation, use your mobile phone and accessories to send a digital postcard with stylized text, digital pictures of where you are, and authentic sound clips to friends and family back home. If, when shopping, you find something a friend might like, you can instantly send a digital picture of the item and ask if they like it.

With MMS, the subscription applications get more interesting, for example stock information, movie trailers and weather reports

Imaging

With a digital camera attached to your T68i, you can take, view, store and send high-quality pictures over the air to another mobile phone, as MMS messages, or you can send them to an e-mail address or Web photo album. Downloading images from the Web is another alternative. Thousands of online image collections already exist on the Web and many sites are already gearing up to include images for use in mobile phones.

There are various ways to incorporate images and other multimedia into your communication. You can attach pictures to people listed in your phone book and have pictures or icons of the caller identifying them in your display.

The pictures are stored in the picture browser in the phone. From here, the user can select view, thumbnail or full view, as well as keep track of the number and size of the pictures stored in the phone.

WAP 2.0 supporting XHTML™

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, checkboxes, 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 in the T68i 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 (shopping carts and wish lists), and to save the user from entering the same information more than once.

Full graphic 256 colour display

The large colour display of the T68i enhances viewing, facilitating high-quality multimedia messaging and personalized imaging. The standby display looks like the desktop in a computer, with the menus presented as icons.

Joystick navigation

The T68i has an easy-to-use 5-directional joystick function. Using finger or thumb, you can easily navigate the new T68i menu system. When you arrive at the required function in a menu, instead of pressing Yes, just gently press the joystick and the feature is activated. The T68i MMI is adapted for easy joystick navigation.

Bluetooth wireless technology

The T68i is among the first mobile phones on the market with built-in *Bluetooth* wireless technology. Using this reliable and secure connection, the T68i can communicate with your *Bluetooth* headset or mobile computer via a radio link instead of a cable, when the two devices are within 10 metres of each other. Unlike infrared, *Bluetooth* wireless technology is not dependent on line-of-sight communication. With a *Bluetooth* headset, wherever your phone is when it rings, you can answer it. The phone can be in your briefcase, your coat pocket or even in another room.

Two or more mobile phones with *Bluetooth* wireless technology can exchange data such as images, business e-cards, ring signals, contacts, notes and calendar data. It is also possible to play interactive games between phones. You could be at a meeting with your laptop open in front of you and a new e-mail message is displayed on the screen. In this case, your T68i, which could be in your briefcase under the table, has received an e-mail message and passed it on to your laptop by way of a *Bluetooth* connection.

GPRS

GPRS uses Internet-style packet based technology. It lets you be permanently connected to the mobile Internet, but only uses the radio link for the duration of time that it transfers data. GPRS offers the user the speed needed for satisfactory mobile Internet usability. The T68i supports GPRS 3+1.

More in-phone functions

E-mail

The T68i is one of the first mobile phones on the market with a built-in fully functional e-mail client. With inbox, outbox, save draft and reply options, you have all the functions you need for effective e-mail communication in a small and powerful mobile phone. Constantly connected to a POP3, SMPT or IMAP4 e-mail server anywhere on the Internet, your T68i stores messages (without attachments) dynamically, depending on available memory, and updates your inbox automatically and over the air. Check your e-mail anywhere. Reply to e-mail on the move. Friends, family and business contacts know that when they send you e-mail, you receive it and can read it and act on it immediately. You can include pictures in outgoing e-mails, but not receive attachments. Hyperlinks in e-mails are supported.

Enhanced voice control

Lets you dial, answer, reject, change profiles and use a “magic word” to activate voice control. Instead of having to press a sequence of keys to activate voice control, you simply say a user-defined word or phrase and the voice control function is automatically activated. You can also redial a number by simply saying “redial”.

EMS (Enhanced Messaging Service)

You can send text, pictures and sounds in easy-to-create and fun messages. EMS has been adopted by several leading mobile phone manufacturers, making it possible for T68i users to send enhanced text messages to users of other makes of mobile phones. EMS makes it possible for the user to use text formatting (style, size, alignment and paragraphs) in a text message. At purchase there are several pre-defined images and animations in the T68i.

Predictive Text Input Software

Text messaging with your T68i is made easier than ever with the introduction of predictive text input software. Instead of having to press keys several times for a letter, software in your T68i chooses from a dictionary of words and phrases and anticipates what word or phrase you are writing, giving your mobile phone keyboard ease of use comparable to that of a full-size keyboard.

Screen saver and sleep mode

The screen saver is activated when the phone has been idle for 26 seconds. There is a pre-

defined screen saver at the purchase of the phone, but the user can choose his/her own image/animation as a screen saver. After a short period of time the screen saver changes to sleep mode, to save power.

Memory management

All applications in the T68i share the same memory, allowing for efficient memory usage. When the memory runs low, the user gets information about the current memory situation, where each application's usage is displayed. In the memory manager menu, the user can delete items from any application, in order to set memory free. The memory available for the user is approximately 800 kBytes.

Notes (vNote)

With the Notes function, the user can make quick notes that can be stored in the phone or sent to others. One note can be displayed in standby as a reminder. vNote can be sent via *Bluetooth* wireless technology, infrared or MMS.

Mobile chat

Mobile chat makes text messaging easier, since a chat-session opens up immediately when a text message is received from a phone. Because the user stays connected during the session, the messages open up automatically. All previous messages from both persons are visible on screen, each writer being distinguished by a nickname.

Picture phone book

The phone book in the T68i lets the user assign a picture, a personal ring signal or a voice command to a certain phone number. When the user gets a call from this person, the picture (instead of the number) is shown in the display. If a personal ring signal or a voice command is assigned to the phone number, that particular sound is heard instead.

Calendar (vCalendar)

The T68i calendar supports week numbering and lets you create, edit and delete both appointments and tasks. It is a versatile mini organizer. It stores appointment details, offers day, week and month views and effectively reminds you when something is due. Using the advanced data capabilities built into the T68i, you can also synchronize calendar, tasks and contacts between your mobile or stationary PC or other device and your mobile phone. vCalendar entries can be sent via *Bluetooth* wireless technology, infrared or MMS.

SyncML - for remote synchronization

SyncML is an open standard that allows you to synchronize calendars, files and phone books with any mobile device irrespective of model and make. In the T68i, SyncML is used for remote synchronization. This means that e-mails read on the mobile phone, for example, automatically show up as read e-mail messages on the desktop computer. When the time for a meeting is being changed at the office, the user gets the correct update in the mobile, after having performed a synchronization over WAP.

iMelody and Melody Composer

The audio iMelody format enhances the sound quality in the T68i. With this format, the user can play, compose, edit and send melodies within the improved Melody Composer. The new composer has an improved graphical user interface to simplify melody handling. All new and edited melodies are stored in the iMelody format.

Sound browser

From the Sound browser function, the user can handle all sounds (for example eMelodies, iMelodies and sound recordings) stored in the phone. The user can play, edit, send and view information on the sounds. Ring signals (eMelody, iMelody, vMel) can be downloaded via WAP or exchanged via SMS (iMelodies), infrared, *Bluetooth* wireless technology and MMS (iMelodies). Sound recordings can be exchanged via infrared, Bluetooth and MMS. The maximum number of sounds is limited only by the amount of free memory.

Camera application

The camera application in the T68i supports the Communicam MCA-20. The user can browse, view, send and store pictures in the phone. It is also possible to set different picture sizes.

Themes

With themes, the user can change the appearance of the display, for example, the text, the background colours and the background picture. The phone comes with three pre-defined pictures. It is possible to download and exchange additional themes. The maximum number of themes is limited only by the amount of free memory.

Multimedia in the T68i

The T68i is a multimedia phone. The colour display together with the audio functionality gives the user several multimedia possibilities. Sounds can be recorded and pictures can be created and edited. By using themes, it is easy to change the appearance of the display. Pictures, audio, animations and themes can be transmitted via MMS.

Graphics

Graphics (tables, charts, diagrams and layouts) has a major impact on the way we work. The T68i supports JPG (max 640x480), GIF (max 160x120), WBMP (max 320x320) and animated GIFs. With MMS, the user can personalize the appearance of the display – for example the text, the background colours and the background picture.

Audio

The user of the T68i can use the mobile phone as a sound recorder. With the sound recorder function, it is easy to make a voice recording, for example a personal rendition of “Happy Birthday”. The audio function in the T68i also allows downloading of sounds and melodies.

Pictures

With a digital camera attached to your T68i, you can take, view and store pictures. It is also possible to download colour pictures to your T68i. The pictures are stored in the picture browser in the phone. From here, the user can select view, thumbnail or full view, as well as keep track of the number and size of the pictures stored in the phone.

The pictures stored in your T68i can be used for creating your own digital postcards. This is easily done by adding text to the pictures and sending them via MMS.

Themes

With themes, the user can change the appearance of the display, for example the text, the background colours and the background picture. The phone comes with a number of pre-defined pictures, and it is possible to download additional themes. The maximum number of themes is limited only by the amount of memory.

Image formats

For information on Image formats and downloading of images, see “Image format technical data” on page 67 and “Images – downloading to phone” on page 67.

MMS (Multimedia Messaging Service)

One of the key features in the T68i is the Multimedia Messaging Service (MMS), expected to become the preferred messaging method of mobile terminal users, since there are virtually no limits to the content of an MMS transmission. An MMS message from the T68i can contain text, graphics, animations, images, audio clips and ring melodies. For more detailed information, see “Multimedia message service” on page 54. For third-part developers’ information, please visit www.ericsson.com/mobilityworld/ and look for the *MMS Developers’ guidelines*.

Defined and specified by 3GPP as a standard for third generation implementation, 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 forty percent.

Using the Wireless Application Protocol (WAP) as bearer technology and powered by the high-speed transmission technologies EDGE, GPRS and UMTS (W-CDMA), Multimedia Messaging allows users to send and receive messages that look like PowerPoint-style presentations. The messages may include any combination of text, graphics, photographic images, speech and music clips . 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.

Figure 1. An MMS message can contain images, music, audio and graphics.

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 limited only by the memory. 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, an MMS message can consist of normal text. The length of the text is unlimited, and it is possible to format the text. 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 in the future, video sequences.

Templates

The T68i comes with a number of MMS pre-defined templates, for example templates for birthday cards, meeting requests etc.

Audio

MMS provides the ability to send and receive full sound (iMelody and AMR) messages. Not only can users share a favourite song ot ring signal with a friend, they can also use the mobile phone to record sound and send it along with a message. Because sound includes speech as well as music, this extra dimension of an MMS message makes for enhanced immediacy of expression and communication. Rather than sending a downloaded birthday jingle in EMS, for

example, a user can send a clip of his or her own personal rendition of “Happy Birthday”.

Pictures and themes

By using either a digital camera attached to the T68i with a cable, or a snap-on camera accessory, users can take a snapshot 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-sending market.

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

SMIL presentations

SMIL stands for Synchronized Multimedia Integration Language and is pronounced “smile”. SMIL in the T68i allows the user to the create and transmit PowerPoint-style presentations on the mobile device. SMIL is an advanced XML-based protocol, and Sony Ericsson MMS supports a subset of this protocol. Using a simple media editor, users can incorporate audio and animated GIFs along with still images, animations and text to assemble full multimedia presentations.

The idea of SMIL is to allow the user to customize the page timing in Powerpoint-style 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 in the display

PIM communication with MMS

With MMS in the T68i, it is easy to send and receive business cards, calendar entries and notes.

Business card (vCard)

With MMS in the T68i, the user can send his/her business card.

Calendar entry (vCal)

With the vCal function the user can enclose a vCal entry when sending a meeting request via MMS.

Notes

The T68i supports vNote. Notes can be sent via MMS.

.

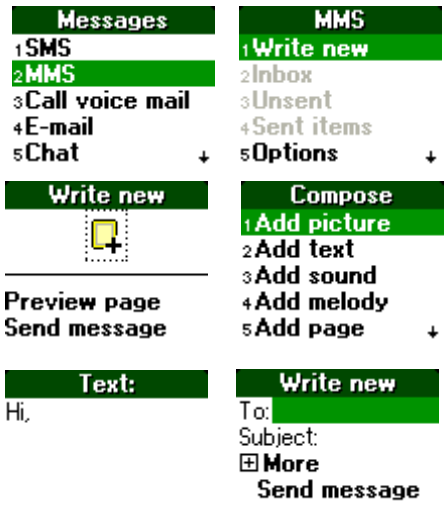


Figure 2. Example of the creation of an MMS message.

Benefits

Essentially enabling the mobile terminal to serve as image processor and conveyor, Multimedia Messaging accommodates the exchange of important visual information as readily as it facilitates fun. Business and leisure usage of MMS will be dynamically merged, resulting in enhanced personal efficiency for users and increased network activity for operators. In short, MMS affords total usage for total communication

Because MMS uses WAP as its bearer technology and is being standardized by 3GPP, it has wide industry support and offers full interoperability, which is a major benefit to service providers and end users. Ease-of-use resulting from both the gradual steps of the messaging evolution and the continuity of user experience gained from interoperability is assured.

The MMS server, through which MMS messages are sent, supports flexible addressing (to both normal phone numbers (MSISDN) and e-mail accounts), which makes user interface more friendly and allows greater control for operators. The MMS server, moreover, is responsible for the instant delivery feature of MMS.

MMS technical features

The MMS standard, just like 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. He or she doesn't 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 technologies EDGE and GPRS and support a variety of image, video and audio formats to facilitate a complete communication experience.

Architecture

The MMS Centre (MMS-C) is comprised of the MMS Server, the MMS Proxy-Relay and the MMS Store. The MMS Centre 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 centre's MMS Proxy-Relay interacts with the application being run on the MMS-enabled terminal to provide various messaging services. WAP is used as 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

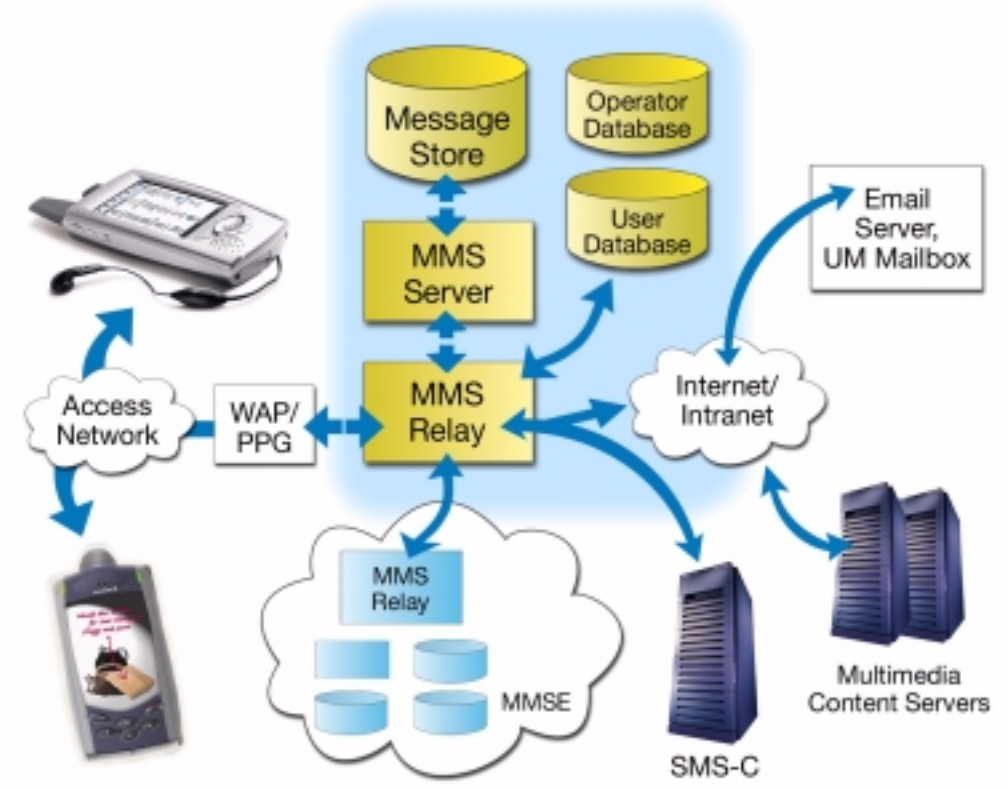


Figure 3. The architecture of MMS

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, e.g. 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.

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.

EMS (Enhanced Messaging Service)

Enhanced Messaging Service (EMS) adds new powerful functionality to the well-known SMS standard. With it, mobile phone users can add life to SMS text messaging in the form of pictures, animations,sound and formatted text.This gives the users new ways to express feelings, moods and personality in SMS messages. As well as messaging,users will enjoy collecting and swapping pictures and ring signals and other melodies, downloading them from the Internet or editing them directly on the phone.

EMS uses existing SMS infrastructure and industry standards, keeping investments to a minimum for operators and providing a familiar user interface and compatibility with existing phones and with other manufacturers.

EMS – more than just words

Sounds and melodies

EMS gives the user the ability to send and receive sounds. These can be pre-defined sounds, such as “Chime high” and “Notify ”, or melodies (ring signals in the phone), downloaded from the Internet, received in SMS messages or composed by the user on the phone keypad or a PC.

Several sounds and melodies can be inserted in one message, and they can be combined with pictures.

Pictures, animations and formatted text

Phones supporting EMS include a set of pre-defined pictures for inserting in SMS messages. New pictures and animations are downloaded from the Internet or received in SMS messages.

Pictures can be created and edited in the phone using a built-in Picture Editor. Several pictures can be inserted in one message,and they can be combined with sounds and melodies. The users can format text in messages with different styles and sizes.

Concatenated messages

A part of the EMS standard is the support for concatenated messages, which means that the phone is able to automatically combine several messages both when creating and receiving EMS. This is useful to be able to build,and display,messages with rich content,since the amount of information in each SMS is limited by the SMS standards.

New possibilities with messaging

The EMS standard is now a part of the SMS standard and supported by the major network operators and mobile phone manufacturers. This universal approach enables a fast penetration and development of new services and applications within messaging.

Creativity explosion

Users will be inspired to create and swap their own melodies and pictures. But more importantly, professional content creators and providers are already preparing to offer imaginative and creative contents for use with EMS. Based on subscriptions, fees or ads, network operators will be able to provide wide ranges of ring signals, operator logos and corporate icons, as well as personal and mood-related pictures and melodies. Movie, music and game companies can promote new products and events with designer melodies, animations and pictures.

Huge business potential

Network operators can now enhance their services and attract more customers by offering pictures, animations, ring signals and melodies for download at their portals. Operators can charge more per EMS message since it contains more data. Thereby EMS adds more value to the operators and to the end users.

Increase SMS revenue

EMS uses the same basic network support as ordinary SMS, and with the same familiar user interface. From an operator's point of view, SMS is low tech because minimal investment is needed to provide an effective SMS service to subscribers and little maintenance is required. EMS will create additional revenue for service providers and network operators by increasing SMS traffic.

Compatible with SMS standards

Users will find EMS as easy to use as SMS. At the moment 15 billion SMS messages, are sent every month worldwide. Roughly 80% of this traffic is user-to-user i.e. mobile phone users sending short messages to each other using the keypad of the phone to enter text. The remaining 20 % is shared by downloads and notifications of different kinds.

The Enhanced Messaging Service (EMS) was first submitted to the standards committees by Ericsson. Ericsson presented the outline structure of EMS to the relevant ETSI/ 3GPP committees. The major mobile phone manufacturers and most operators are actively contributing to the 3GPP standards. Hence the EMS standards have evolved and are now stable and complete as part of the 3rd Generation Partnership Project (3GPP) technical specification.

An EMS message can be sent to a mobile phone that does not support EMS, or only supports part of EMS. All the EMS elements i.e. text formatting, pictures, animations and sounds are located in the message header. The EMS contents will be ignored by a receiving phone that does not support the standard. Only the text message will be displayed to the receiver. This is true consumer-friendly standardization. EMS is compatible to SMS across most of the range of mobile phones from the oldest to the newest.

Some companies in the mobile phone industry have developed their own messaging technologies, which only work with their own phone models. Network operators are in favour of EMS because it is universal – many of the major mobile phone manufacturers are constructively improving and developing the EMS standards even further for implementation in their products.

Examples of EMS contents and applications

A wide range of contents, applications and services may be developed. Below is a list of examples and areas where messaging can be enhanced with EMS.

User-to-user message

Messages usually originating from the keypad of a mobile phone can include pictures, melodies, formatted text with EMS.

Voice and e-mail notifications

Notifying mobile phone users that they have new voice or fax mail messages waiting - including icons or melodies with EMS.

Unified messaging

The user typically receives a short message notifying them that they have a new message in their unified messaging box, with icons or formatted text further enhancing the message.

Internet e-mail alerts

An Internet e-mail alert is provided in the form of a short message that typically details the sender of the email, the subject field and first few words of the email message, and in this case formatted text is excellent to identify mesage elements.

Ring signals

Downloading ring signals from the Internet

News & commercials

World news illustrated, sports scores and news headlines, finance and stock market news with diagrams and tickers, commercial product promotions, weather reports with maps, tunes from TV commercials as ring signals.

Info & entertainment

Ring signals, e-greetings, football club logo, joke-of-the-day illustrated by pictures or sound, horoscopes, movie related animation or theme song, TV show promotions, music artist promotions, lottery results, food and drinks pictures and recepies, mood-related pictures.

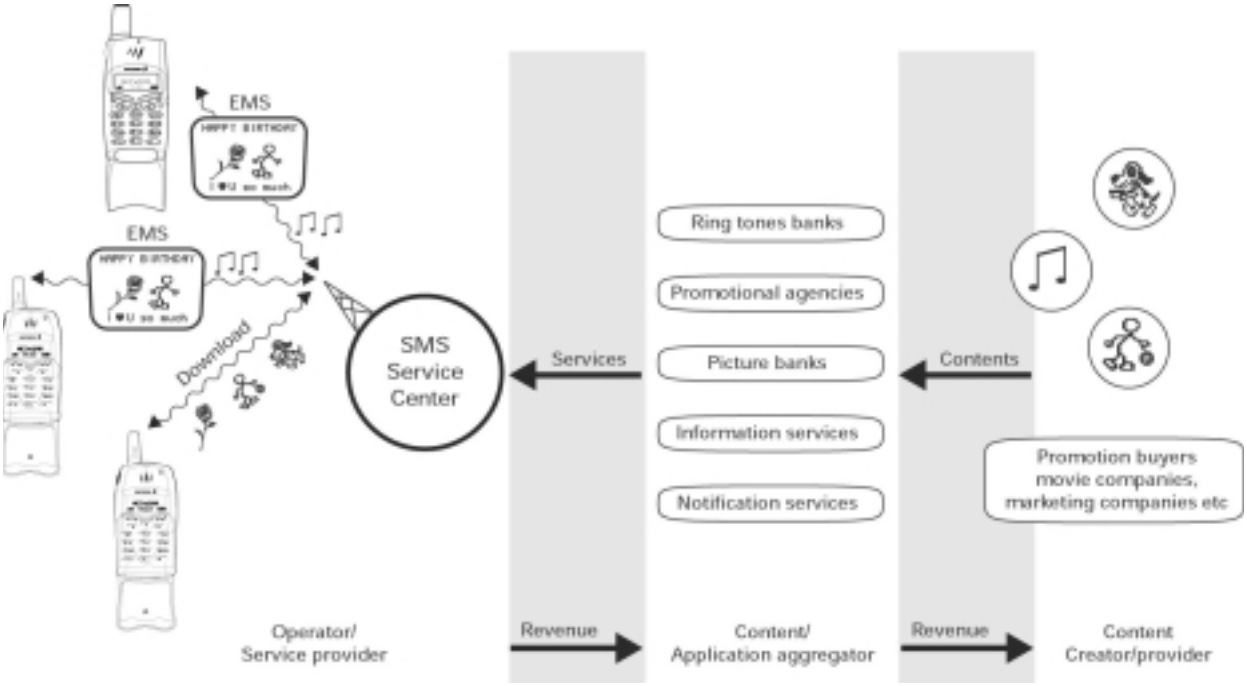
Corporate

Flight schedules, preinstalled corporate logos, map snippets and travel info, company branded icons and ring signals, corporate e-mail notifications, affinity programmes where companies notify customers of product updates etc, banks notifying customers about new services and interest rates, call centres providing answers to questions about a product, vehicle positioning combining EMS with Global Positioning System (GPS) position information, job dispatch with delivery addresses for sales or courier package delivery, using EMS in a retail environment for credit card authorization, remote monitoring of machines for service and maintenance purposes.

Using Web, WAP And SMS for download

Already today services exist on the Internet where users can create melodies, and view icons and pictures, subscribe to entertainment and informations services. These may develop further in the future to support access via PC over the Internet, from the phone using WAP and even

with an SMS request interface.



The diagram shows a model over the possibilities with Enhanced Messaging Service:

- When the Operator/Service provider enables EMS in the network, users will enjoy adding life to messages with sounds, melodies, pictures and formatted text.
- New ranges of Content/Application aggregators on the operator network or the Internet can provide EMS contents and services to the users over SMS.
- Content Creators/providers can see a new demand for creative contents. Also, promotional activities from movie companies, record labels etc can provide ring signals, movie snapshots etc.

The added value in SMS messaging will create new revenue which can be shared between the network operators, the application aggregators and the content providers.

Bluetooth™ wireless technology

The T68i features built-in *Bluetooth* wireless technology. Its short-range radio link operates in the globally available 2.4 GHz radio frequency band, ensuring fast and secure communications up to a range of 10 metres. Please note that in countries where the use of *Bluetooth* wireless technology is not allowed, the Bluetooth function should be switched off. Contact a Sony Ericsson representative to check if the use of *Bluetooth* wireless technology is restricted in your country.

Bluetooth wireless technology is designed to be fully functional, providing high transmission speeds, even in noisy radio frequency environments. All data transfer is protected by advanced error-correction methods, ensuring a high level of data security. For more information, see “Bluetooth technical data” on page 56.

Bluetooth wireless technology facilitates instant connections, which are maintained even when the devices are not within line of sight. High-quality voice transmission is provided under adverse conditions, making it possible to use a headset connection to the T68i at all times. A blue LED (Light Emitting Diode) is used for the indication of Bluetooth activity.

Ericsson is a founding partner of the Bluetooth Special Interest Group (SIG). *Bluetooth* wireless technology devices that are expected to be available in the near future, include:

- Headsets for wireless voice transmission and remote call control
- PCs, laptops, PDAs, palmpads for data transfer, synchronization etc.
- PC cards for *Bluetooth* wireless technology in laptops and PDAs
- MP3 music player
- Other phones for exchanging business cards, ring signals, playing games etc.
- Digital still and motion video cameras
- Printers, hard disks and other storage devices
- Handheld scanners for text, barcodes and images
- Household appliances with built-in logic, as well as games and entertainment devices
- Access points in hotel lobbies and airports for connecting to computer networks and the Internet

Using Bluetooth wireless technology in the T68i

Key benefits include:

- True wireless connection
  Cable replacement for connecting to headsets, computers, networks, printers and other devices.
- Several devices
  The T68i identifies and maintains several devices in a pairing list.
- High speed
  High transmission speed, faster than infrared or cable.
- Radio link
  No line of sight required; the phone can remain in a briefcase or in a pocket, as long as no solid objects are in between (whereas infrared requires line of sight).
- Secure and fast
  Data connection with a Bluetooth PC/laptop turns the phone into a modem for connecting to the Internet and for data transfer (faster than infrared or cable).
- Synchronization
  Fast synchronization, even without line of sight, of calendar and phone book with PC/laptop and PDA, and quick exchange of business cards, calendar events and melodies with other phones and devices.
- Low power consumption.

Synchronize calendar and phone book

In everyday life, access to an updated calendar and addresses 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, to-do 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.

Hierarchical phone book with contacts

The T68i features a hierarchical phone book. For every contact, details such as name, home, work and mobile numbers, pager number, e-mail address and other information can be stored. The hierarchical phone book in the T68i is compatible with most groupware and agenda programs, such as Microsoft Outlook, enabling smooth local synchronization of contact information between the phone and a PC, via cable, *Bluetooth* wireless technology or IR. For remote synchronization of Contacts and Calendar over WAP, the T68i supports SyncML.

SyncML, an open standard for remote synchronization in the T68i

SyncML – background

The SyncML Initiative Ltd. was founded by Ericsson, IBM, Lotus, Motorola, Matsushita, Nokia, Palm Inc., Psion and Starfish Software in February 2000. Supported by more than 600 software and hardware developers, the SyncML Initiative Ltd. 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 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.

For more detailed information, see “SyncML technical data” on page 68, or go to www.syncml.org.

What is SyncML?

SyncML is the common language for synchronizing all devices and applications over any network. SyncML leverages Extensible Markup Language (XML), making SyncML a truly future-proof platform. With SyncML any personal information, such as e-mail, calendars, to-do 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.

In the T68i, SyncML supports remote synchronization of the calendar and phone bookDesigned for the requirements of the wireless world

SyncML is designed specifically with the wireless world’s tight requirements in mind. SyncML minimizes the use of bandwith 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, fixed networks, infrared, cable or *Bluetooth* wireless technology.

In the T68i, SyncML enables synchronization over WAP – an ultimate solution for travellers.

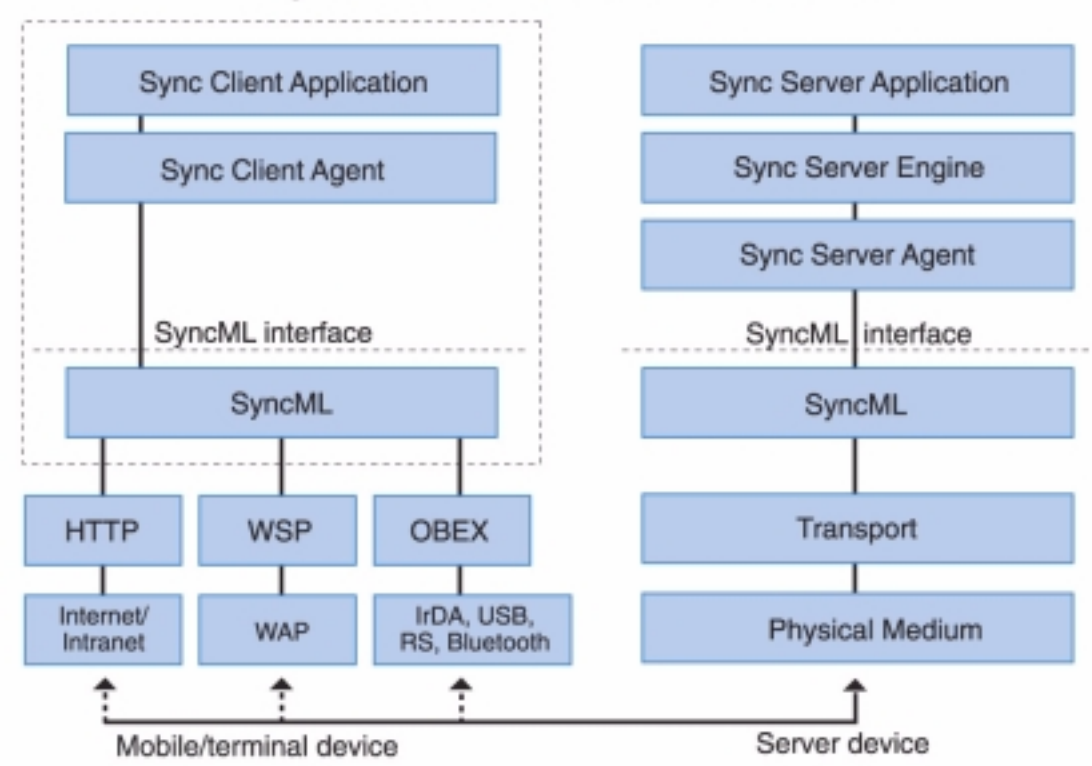


Figure 4 SyncML architecture

Benefits of a common synchronization protocol

- **End users**
  Today's user of mobile devices probably uses a different synchronization product with every device. Each technology can synchronize only a few applications, or is limited to a particular type of network connection. This arrangement is expensive to install, confusing to configure and operate, and costly to administer. With SyncML, users will be able to buy devices that synchronize with a broader range of data.

- **Device manufacturers**
  Device manufacturers will benefit from a common protocol that will make the device interoperable with a broader range of applications, services, and network and transmission technologies.

- **Service providers**
  Service providers moving into the growth arena of application hosting are particularly concerned that a proliferation of synchronization technologies will make it impossible to deploy and support their customers in a cost-effective manner. To support the range of data types and devices in use today, service providers must install and configure multiple server infrastructures, maintain and support that infrastructure, and maintain compatibility and performance. The alternative now available, to use a single solution for data connectivity, involves the risk of a tight coupling to a propriety solution. With SyncML, they will be able to provide connectivity to a wider selection of applications.

- **Application developers**
  Choosing to support multiple synchronization technologies enables an application to support more types of devices and networked data, but that choice comes at a cost. With SyncML, application developers will be able to develop an application that can connect to a more diverse set of devices and network data.

- **Network operators**
  As multiple applications that need remote synchronization over WAP are developed, there will be an automatic growth of revenue for network operators.

Local synchronization

Open standard

Synchronization is possible with almost any groupware or office program, since the synchronization method complies with the open standard IrMC 1.1, as specified by the Infrared Data Association – reference http://www.irda.org. IrMC 1.1 brings together the following standards:

- vCard 2.1 for address book information
- vCalendar 1.0 for appointment and to-do information
- ObEx (Object Exchange) for data exchange

Bluetooth wireless technology or infrared

The T68i synchronizes using the same protocol, regardless of connection type. It connects via *Bluetooth* wireless technology, infrared or cable. The cable is connected either directly to the phone or to the desktop charger.

Automatic synchronization

When infrared or *Bluetooth* wireless technology is switched on in the phone, the synchronization process starts automatically, as soon as the phone is within range of a compatible port on a PC or handheld device (a suitable synchronization program must be running on the device).

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.

Local synchronization software and the T68i

PCs equipped with XTNDConnect PC For Ericsson will perform synchronization with Microsoft Outlook. For other groupware environments (Lotus Notes, etc.), the full version of XTNDConnect PC is required. By using *Bluetooth* wireless technology, infrared or the RS 232 Cable, you can easily perform a fast, local synchronization.

Integration between XTNDConnect PC For Ericsson and Microsoft Outlook provides an embedded menu for one-key synchronization.

To enhance functionality and compatibility further, the synchronization software can easily be upgraded.

The number of units that can talk to each other is unlimited. One phone can be partner with several PCs. This ensures that information from both the work PC and the home PC can be synchronized with the phone. For users that have both a desktop PC and a laptop (free version XTNDConnect PC) or a PDA (free version XTNDConnect PC), it is an efficient way to synchronize data with the phone. This way, data can also be transferred between PCs to keep them in sync.

If the synchronization software is upgraded to a full version of XTNDConnect PC, one PC can be partnered with several different phones. This is vital if, for example, each member in a work group has his/her own T68i, and needs to synchronize with a PC. It makes it easy, for example, to download a common company phone directory to the phone book in each company mobile phone. With the full version of the synchronization software, other phone types and handheld devices, such as PDAs and Windows CE computers, can also be synchronized.

XTNDConnect PC For Ericsson

This synchronization software can be downloaded from www.SonyEricssonMobile.com and provides a powerful set of functions:

- T68i phone book and calendar synchronization with Microsoft Outlook.
- An embedded synchronization in Microsoft Outlook, providing one-key synchronization and allowing the user to control the synchronization process with easy-to-use settings.
- PC applications supported by XTNDConnect PC For Ericsson:
  Microsoft Outlook 97, 98, 2000
- Platforms for using XTNDConnect PC For Ericsson:
  Windows 98, Me (Millennium Edition), Windows NT 4.0 and 2000.

Pentium II recommended
64 MB RAM recommended
(minimum 32 MB)

- Other requirements:
  20 MB free hard disk space
  Bluetooth wireless technology, infrared, or cable connection
- Support is handled by Sony Ericsson.

XTNDConnect PC

All users of the T68i can easily upgrade to the full version of the synchronization software. A number of features and supported applications will then be added, including XTNDConnect Phone Viewer.

- Phone book and calendar synchronization for the T68i.
- XTNDConnect Phone Viewer for easy data entry. All data can be created, viewed and edited on a PC.
- PC applications supported by XTNDConnect PC (full upgraded version):
  Microsoft Outlook 97, 98, 2000
  Lotus Notes 4.5, 4.6, R5
  Lotus Organizer 4.1, 5.0, 97, 97 GS, 6.0
  Symantec ACT! 3.05, 4.0, 2000
  NetManage Ecco Pro 4.0
  GoldMine 3.0, 4.0 (Standard-Edition)
- Platforms for using XTNDConnect PC:
  Windows 98, Me (Millennium Edition), Windows NT 4.0 and 2000.
  Pentium II recommended
  64 MB RAM recommended
  (minimum 32 MB)
- Other requirements:
  20 MB free hard disk space
  Bluetooth wireless technology, infrared, or cable connection
- An embedded synchronization in Microsoft Outlook, providing one-key synchronization and allowing the user to control the synchronization process with easy-to-use settings.
- Handheld devices supported include the T68i, palm-sized and handheld devices using Windows CE and PalmOS/ Casio Personal Organizers.
- All support for the full version is handled by Extended Systems Inc.

WAP services

The T68i has a WAP browser, supporting WAP 2.0 (WML 1.3). WAP 2.0 optimizes usage of higher bandwidths and packet-based connections of wireless networks.

The typical WAP client is a small, portable device connected to a wireless network. This includes mobile phones, pagers, smart phones, PDAs and other small devices. Of course, compared to desktop and laptop computers, these devices are limited by user interface, low memory and low computing power.

The WAP browser in the T68i is compliant with WAP 2.0 and includes WTLS class 3 as well as mechanisms for digital signatures. It supports WML and XHTML. The WAP browser in the T68i is also designed to access information such as timetables, share prices, exchange rates, Internet banking and other interactive services. For more details, see “WAP browser technical data” on page 58.

Using WAP in the T68i

The built-in WAP browser in the T68i gives the user portable, fast and secure access to a wide variety of services, including personalized services, with new opportunities for business, individuals and service providers:

Push services
Businesses and service providers can “push” content or service indications to work groups and/or customers. Examples of pushed content would be mail alerts, messaging, news, stock quotes, contacts, meeting requests, etc.

Support of XHTML
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, checkboxes, radio buttons, text areas, headings, horizontal rules and lists.

Support for cookies
This version of WAP has support for cookies (client based), an application used by Web sites to store site-specific information in the browser between visits to the site. Cookies give the site owner a possibility to see when a person has visited their site. They also save the user from having to enter the same information (e.g. the password or user ID) more than once. Cookies are often used by e-commerce sites (shopping carts and wish lists).

Sending bookmarks
WAP 2.0 enables the sending of bookmarks via infrared and *Bluetooth* wireless technology (in the vBookmark format) as well as via SMS.

Provide settings
Using SMS messages, configuration settings can be sent over the air, OTA, so that the user does not need to configure the WAP access settings manually. WAP settings may also be customized by the operator. For more information, see “WAP Operator technical data” on page 59.

Adapt to phone type
The User Agent Profile function allows WAP content to be automatically optimized for the T68i, ensuring the intended user experience.

Several bearer types
The T68i accesses WAP over a standard GSM Data connection as well as over a GPRS connection (network-dependent services.)

Bandwidth efficiency
Unlike traditional Internet services, WAP services are relayed to wireless devices as binary encoded data, maximizing bandwidth efficiency. A GPRS connection further increases efficiency.

Easy create for WAP
Creating a WAP service is no harder than creating an Internet/intranet service, as WML and WMLScript are based on well-known Internet languages such as HTML and JavaScript.

Using standard tools
Service creators can use standard tools such as ASP (Active Server Page) or CGI (Common Gateway Interface) to generate content dynamically. Services can be created once and then made accessible on a broad range of wireless networks.

Maintain customer base
Existing services can be adapted to WAP. The necessary binary encoding is handled by a WAP Gateway, allowing HTML-based services to be

viewed on the WAP browser of the T68i. An XHTML page can be viewed in both the WAP browser and in any standard Web browser.

Improve productivity

A business can use a WAP gateway to provide a secure connection to its corporate network, improving internal communication flow by making information available to mobile as well as office users.

The WAP profiles

A WAP profile holds network settings and user identification, allowing the user to switch easily between corporate services and WAP services on the Internet, simply by switching WAP profile.

The T68i has dynamic WAP profile handling, which means that the user can add, edit and delete WAP profiles. The T68i has a maximum of 5 WAP profiles.

During WAP browsing, the options button on the T68i gives the user immediate access to a dynamic option menu for WAP services, similar to a mouse right-click in PC programs.

Bearer type characteristics

The T68i accesses WAP services over IP. IP can be provided either over GSM Data or GPRS, depending on network services.

Typical differences which distinguish the bearer types are listed below.

GPRS access

- The connection is maintained “constantly”, with data transmitted in packets, and transmission capacity being used by the application in use on an as-needed basis.
- Higher transmission speed than with GSM Data or SMS access.
- Pricing of GPRS can be dependent on the actual use of bandwidth, which means the user is charged for the volume of data transmitted, rather than the duration of the connection.
- When transmitting large amounts of data, bandwidth can be increased automatically to allow faster transmission speed.
- Ideal for complex pull services, browsing, data transfer, provisioning, pager services, messaging services, info services, push initiations.

GSM data access

- Circuit connection of data calls, which means that the phone is connected during the entire WAP session.
- Higher transmission speed than with SMS access.
- Pricing is comparable to that of data calls in the network.
- Suitable for complex pull services, browsing and data transfer.
- Not suitable for provisioning, pager services.

Gateway characteristics

A WAP Gateway provides Internet/intranet as well as WAP services to the mobile browser. A Gateway is identified by an IP number, depending on access type.

End-to-end gateway navigation

The WAP 2.0 supports E2E (End-toEnd) Gateway navigation, making it possible for example for a bank to redirect its clients from the Internet gateway to its own gateway.

Security using WAP

For certain WAP services, such as banking services, a secure connection between the phone and WAP gateway is necessary. An icon in the display of the T68i indicates when a secure connection is in use.

The T68i is based on the WAP 2.0 (WML 1.3) specification suite, in which security functionality is specified by a technology called Wireless Transport Layer Security (WTLS). The WAP protocols for handling connection, transport and security are structured in layers, with security handled by the WTLS layer, operating above the transport protocol layer. WTLS classes define the levels of security for a WTLS connection:

- WTLS class 1 – encryption with no authentication.
- WTLS class 2 – encryption with server authentication.
- WTLS class 3 – encryption with both server and client authentication.

Server authentication requires a server certificate stored at the server side and a trusted certificate stored at the client side.

Client authentication requires a client certificate

stored at the client side and a trusted certificate stored at the server side.

A Wireless Identity Module (WIM) can contain both trusted and client certificates, private keys and algorithms needed for WTLS handshaking, encryption/decryption and signature generation. The WIM module can be placed on a SIM card and is then referred to as a SWIM card.

Certificates

To use secure connections, the user needs to have certificates stored in the phone. There are two types of certificates:

- Trusted certificate
  A certificate that guarantees that a WAP site is genuine. If the phone has a stored certificate of a certain type, it means that the user can trust all WAP gateways that use the certificate. Trusted certificates can be pre-installed in the phone, in the SWIM or they can be downloaded from the trusted supplier's WAP page.
- Client certificate
  A personal certificate that verifies the user's identity. A bank that the user has a contract with may issue this kind of certificate. Client certificates can be pre-installed in the SWIM card.

WIM locks (PIN codes)

There are two types of WAP security locks (PIN codes) for a SWIM, which protect the subscription from unauthorized use. The PIN codes should typically be provided by the supplier of the SWIM.

- Access lock
  An access lock protects the data in the WIM. The user is asked to enter the PIN code the first time the SWIM card is accessed when establishing a connection.
- Signature lock
  A signature lock is used for confirming transactions, much like a digital signature.

In the T68i, the user can check which transactions have been made with the phone when browsing. Each time the user confirms a transaction with a signature lock code, a contract is stored in the phone. The contract contains details about the transaction.

Configuration of WAP settings

An easy way to perform WAP configuration in the T68i is to use the step-by-step WAP configurator available on http://www.SonyEricssonMobile.com. The configurator utilizes OTA provisioning.

Manual configuration is done using the menu system in the phone. This is described in the User's Guide.

Over-the-air provisioning of WAP settings

To simplify the configuration of WAP settings in the T68i, all settings can be sent to the phone as an SMS message. This makes it easy for an operator, a service provider or a company to distribute settings for Internet/intranet, and WAP, without the user having to configure the phone manually. This also makes it easy to upgrade services, as no manual configuration is required.

- The OTA configuration message is distributed via SMS point-to-point.
- The setup information is a binary encoded XML message (WBXML). To receive information about OTA specifications, please contact your local Sony Ericsson representative for consumer products. A configurator that utilizes OTA provisioning can be tested on www.SonyEricssonMobile.com.
- The user is alerted about new settings when the ongoing browsing session ends. Settings are not changed during an ongoing browsing session.
- User interaction is limited to receiving and accepting/rejecting the configuration message, and selecting which WAP profile to allocate the settings to.
- Security can be handled using a keyword identifier displayed on the screen as a shared secret between the SMS sender and recipient. It is important that the user can verify that the configuration message is authentic.

Push services

Examples of WAP services that can be pushed include:

- Notification of new e-mail, voice mail, etc.
- News, sports results, weather forecasts,

financial information (stock quotes etc.).
- Personal Information Manager (PIM) - delivery of contacts, meeting requests etc.
- Smart card e-cash.
- Interactive games.

In the T68i, the user selects whether to allow push messages or not. There are two different forms of Push services:

Service Indication (SI)

An SI service sends to the browser a text message with a URL of a WAP page. If the user decides to load the URL, normal WAP browsing commences. When an SI is received by the T68i, the user can load it immediately, postpone it or delete it. Received SIs are stored in the Push Inbox and can be viewed and loaded at a later time. The Push Inbox displays a list containing the first part of each received message. The list is sorted by action attribute (high/medium/low) or reception time of the message.

Service Loading (SL)

An SL service sends and displays a WAP page if accepted by the user. If the SL is not accepted, it is loaded and stored in the cache for later use. The user can start the browser and load the page from the cache manually.

Mobile Internet

The mobile Internet offers much more than mobile access to the Internet. It opens up a whole new range of situation-based services that give the user access to personalized communications, information and entertainment, anytime, anywhere.

Data connections

In order to browse via WAP or use an Internet connection, the user must have a data communication connection configured in the phone. This connection contains specific settings and parameters to connect to an appropriate server. Several data connections can be saved in the T68i. To make it easier for the user, data connections can be provided by the operator via OTA provisioning.

Advantages of data connections include:

- Once the data connections are defined and named, the user does not have to enter the settings for the connection again.
- Data connections can be re-used at any time.
- Individual data settings for working with WAP, e-mail or the Internet can be stored and activated as needed.
- Data connections can be used for both GSM Data and GPRS connection settings.
- Bearer type for WAP and corresponding bearer-specific parameters may be selected.
- Data connections contain all the necessary settings for the Internet access point, including modem pool phone number or IP address, user ID and password.

Mobile positioning

The geographic location of mobile subscribers can be used to provide them with related information and a variety of services. Sony Ericsson's Mobile Positioning System (MPS) gives operators a fast and cost-effective way to establish and roll out location-based services.

For users of the T68i, the integration of mobile positioning with WAP services means that a complete range of service and information tools is available.

More information regarding possibilities with and technologies for mobile positioning is available at http://www.SonyEricssonMobile.com/mps.

General Packet Radio Services

The introduction of GPRS (General Packet Radio Services) is one of the key steps in the evolution of today's GSM networks for enhancing the capabilities of data communication. Data traffic is increasing enormously (over both wired and wireless networks), with the growth in demand for Internet access and services paralleling that for mobile communications. Users want access to the Internet while they are away from their offices and homes, and surveys have found that the vast majority of business professionals want the ability to send and receive e-mail, browse the Web and transmit text and graphics on a portable device. That is why the main applications driving Mobile Internet development are e-mail clients and Web browsers.

The demand for high-speed Internet access will be the key driver for coming generations of wireless services, and GPRS can deliver the necessary speed. GPRS allows innovative services to be created, enabling new and previously inaccessible market segments to be addressed and increasing customer loyalty.

GPRS applications can be developed as both horizontal and vertical. Vertical applications are specific, including those for operations such as reaching police and emergency, taxi, delivery or automated services (vending machines, supervision, vehicle tracking). Horizontal applications are more generic and include those for Internet access, e-mail, messaging, e-commerce and entertainment.

GPRS is able to take advantage of the global coverage of existing GSM networks. Applications developed for GPRS can be deployed on a large scale and can reap the associated benefits. GPRS also provides a secure medium for connections to private networks, banking and financial services.

With GPRS, the T68i sends data in "packets" at a very high speed. The T68i remains connected to the network at all times, using transmission capacity only when data are sent or received. For details, see "GPRS technical data" on page 63.

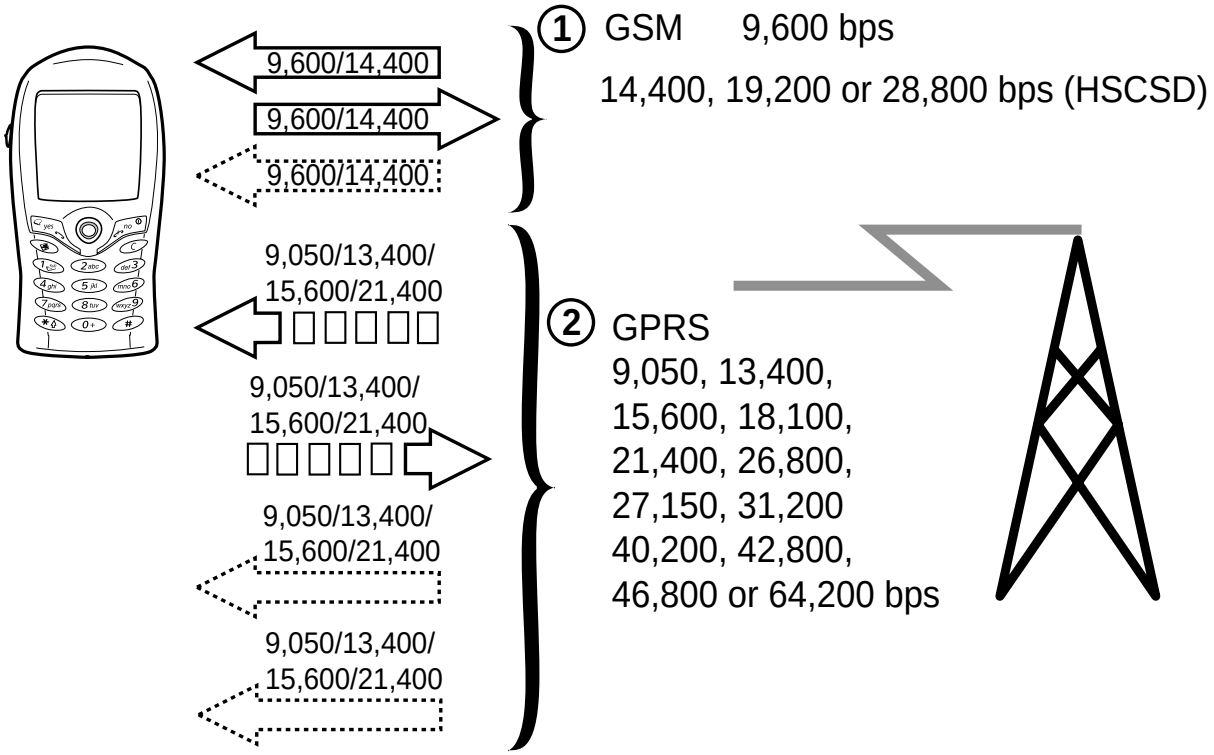


Figure 5 A comparison between GSM and GPRS

1. A normal GSM call uses only one of eight repeating time slots in the GSM channel, giving a data speed of 9,600 bps. The T68i supports a more efficient coding scheme, giving data speeds of up to 14,400 bps (with necessary network support). Furthermore, High Speed Circuit Switched Data (HSCSD) adds the possibility of using two time slots for receiving data, increasing the data speed to as much as 28,800 bps (network dependent).

2. In GPRS, data is sent in packets, with up to three time slots being combined to provide the necessary bandwidth. The T68i is prepared to support 3+1 time slots, giving speeds of up to 64,200 bps for receiving data, depending on coding scheme.

Using GPRS in the T68i

Instead of occupying an entire voice channel for the duration of a data session, the T68i sends/receives data in small packets, as needed, much like IP on the Internet. Because of this, the T68i maintains a constant online connection, its data transmission abilities summoned by the application in use on an as-needed basis.

The GPRS specification includes four coding schemes – CS1, CS2, CS3 and CS4 – that allow data speeds of 9,050 bps, 13,400 bps, 15,600 bps and 21,400 bps respectively. The T68i works with all four coding schemes, but data speed will naturally vary according to network configuration. At the moment, CS-3 and CS-4 are not supported in any live network, i.e present speed is limited to 40,200 bps.

The GSM system limits the ability to use all eight time slots, so the T68i uses up to three time slots for receiving data, and one slot for transmitting. This means the speed for receiving data is up to 64,200 bps and up to 21,400 bps for sending data.

Information about the identity of the phone and the 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 with the T68i has several advantages, for example:

- Constant connection
  Keep an open connection to an e-mail system or the company network, staying online to receive and send messages at all times. All connection settings can be managed by using the data connections feature.
- High speed
  Gain access automatically to increased bandwidth when downloading large files, images etc.
- Cost efficient
  Use transmission capacity only when needed, thus reducing costs.
- WAP over GPRS
  Access the Internet via WAP at high speed and with a constant connection.
- E-mail over GPRS
  Remain connected to an e-mail system while reading and preparing messages, (which are sent at a high speed).
- Data communication
  Transfer data and access the Internet or an intranet with a PC, PDA or handheld device connected via *Bluetooth* wireless technology, infrared or cable.
- Data and voice
  Maintain a data connection, for example, a constant connection to an e-mail system when conducting a voice call.
- Provide settings
  Receive GPRS configuration settings from the provider over the air, OTA, 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.

Modem and AT commands

The T68i contains a complete GSM/GPRS modem. This provides data and e-mail communication, as well as Internet/intranet access, for a connected PC, PDA or handheld device. Once the PC/PDA is connected to the phone using a cable, *Bluetooth* wireless technology or infrared, and the appropriate software is installed, the modem in the phone works in a similar way to a PC Card modem, or an external modem.

In the T68i, AT commands are used for:

- controlling the data communication between the PC and the remote service
- configuring and requesting settings and behaviours in the phone, from a connected PC or PDA

GSM data communication

The built-in data capability turns the phone into a modem when connected to a PC/PDA. The T68i offers the user data connection anytime, anywhere, unmatched by fixed telephone networks. Each GSM channel is divided into eight repeating time slots. A normal GSM voice or data call is circuit switched, and only one time slot is used for each call. The data speed is therefore limited to 9,600 bps. For more information, see “Built-in GSM data modem technical data” on page 65.

High Speed Data gives a faster speed

High Speed Data (HSCSD) increases speeds for circuit switched data by allowing the phone to use a coding scheme with a high capacity, and to use two time slots for receiving data. The download speed is increased to up to 28,800 bps. The speed for sending data is limited to 14,400 bps. The data rate can be increased several times by the use of rate adaption, interworking with ISDN. This also provides additional features, such as quick call set-up capability.

GPRS enables constant connection and high speed

With GPRS, the connection is maintained “constantly”, and data is transmitted in packets. Pricing of GPRS can be dependent on the actual use of bandwidth, which means very low cost when no data is sent or received, while the phone remains connected. When transmitting large amounts of data, bandwidth can be increased automatically to allow faster transmission speed, up to 64,200 bps download speed.

AT commands support

This section outlines the AT commands supported by the T68i. The information here can be of use for advanced users, to indicate the possibilities they have to:

- develop new communications software
- add the T68i to an application’s list of compatible modems
- adjust the settings of their mobile telephone and modem

The modem in the T68i supports the V.25ter command set, which is the standard communication set used by modems.

The T68i is compatible with industry de facto extensions, ETSI 07.05, 07.07 and 07.10.

Overview of AT command functions

AT commands are used to configure the mobile telephone, to request information about the current configuration or operational status of the mobile phone, and to test availability and request the range of valid parameters, when applicable, for an AT command.

The built-in modem can be set to any one of three modes of operation. These are:

Off-line command mode

The command mode for entry of AT commands, when the device is first turned on.

On-line data mode

Allows “normal” operation of the built-in modem, for exchanging data or facsimiles with a remote modem.

On-line command mode

For sending AT commands to the built-in modem while remaining connected to a remote modem.

The AT commands in the T68i are grouped as follows:

- Control and Identification
- Call Control
- Interface Commands
- Data Compression
- Mode Management
- Audio Control
- Accessory Menus
- Accessory Authentication
- Voice Call Control
- Accessory Identification
- GSM DTE-DCE Interface Commands
- GSM Call Control
- GSM Data
- GSM High Speed Circuit Switched Data
- GSM Network Services
- GSM USSD
- GSM Facility Lock
- GSM Mobile Equipment, Control and Status
- GSM Mobile Equipment Error Control
- GSM SMS and PDU Mode
- GSM GPRS
- GSM Phonebook
- GSM Clock, Date and Alarm Handling
- GSM Subscriber Identification
- Ericsson Specific AT Commands for GSM
- MMI Settings
- Voice Control
- OBEX
- WAP Browser

Infrared transceiver

Infrared communication creates a data link between two communications devices through an infrared beam of light. On the T68i, this link is used to connect with desktop computers, PDAs, Sony Ericsson handheld computers, laptop PCs, other phones (for example, the T39), and other hardware supporting the standard. The Infrared Data Association (IrDA) has set the hardware and software standards that form the infrared communication links. The T68i complies with the IrMC 1.1 specification, which defines how mobile telephony and communication devices can exchange information. In the T68i, the IrMC 1.1 specification is also used for communication via a cable.

Key benefits of using the T68i 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 or intranet/LAN from the connected PC/PDA
- Ability to manage the phone book from a PC
- Exchange of business cards and calendar events with vCard/vCalendar compatible devices
- Exchange of ring signals between compatible phones
- Ability to attach a photo from a digital camera in outgoing e-mail

Connection via infrared

IrDA 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 exchange data. For optimal performance, place the T68i within a metre and at an angle of 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, sunlight and electromagnetic fields – making it suitable for the modern office environment.

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 DRS-11 cable provides the same connectivity between the phone and another unit.

The DRS-11 cable supports a subset of the signals in the RS-232 standard, as detailed in “Infrared transceiver technical data” on page 69.

In-phone functions and features

**Subscription and/or network-dependent*

A	Antenna connector, external for HF kits	No
B	Background light	Yes
	Background pictures, pre-defined	Yes
	Background pictures, downloadable	Yes, only limited by memory
	Bluetooth wireless technology support	Yes, built-in
	Bookmarks (URL memory)	Yes, (25)
	Built-in antenna	Yes
	Business card exchange	Yes
C	Call functions	
	Call counter	Yes, outgoing and total (not incoming)
	Call barring*	Yes
	Call divert*	Yes
	Call hold*	Yes
	Call list (last dialled, answered and missed calls)	Yes, 30 entries
	Call screening*	Yes
	Call time/call cost (a.k.a Advice of Charge, Information/Charging)*	Yes
	Call transfer*	Yes
	Calling card service	Yes
	Calling Line Identification (CLI)	Yes. Either as the number of the caller, or as a picture, icon or personal ring signal assigned to the number of the caller.
	Conference calls*	Yes
	Camera application	Yes. The application supports the Communicam MCA-20. The user can browse, view, send and store pictures. It is also possible to set different picture sizes.
	Chat application	Yes, SMS as radio bearer, developped in-house.
	Clock	Yes, with automatic Time Zone*
	Closed User Groups (CUG)*	Yes

	Colour display	Yes, 256 colour, 101x80 pixels
	Connected Line Identity Presentation (COLP)	Yes
	Contacts	Yes
	Converter	No
	Copyright protection	Yes, possible with copyright protection via EMS and MMS.
	CSD, Circuit Switched Data*	Yes
D	Date	Yes
	Display light	Yes
E	EDGE (enhanced Data rates for Global Evolution)*	No
	E-mail address storage	Yes
	E-mail client	Yes, supporting IMAP4, POP3, SMTP.
	EMS (Enhanced Messaging Service)*	Yes, with 30 pre-defined pictures, 15 pre-defined animations and 4 melodies.
	External antenna connector	No
F	File system	Yes. At the purchase of the T68i phone, there is 1.0 Mb of memory space for own objects such as pictures, sounds and themes.
	Fixed Dialling Numbers (FDN)*	Yes
G	Games	Yes
	GPRS (General Packet Radio Services)*	Yes, up to 64,2 kbps (multislot class 4, 3+1 time slots)
H	High Speed Data (HSCSD)*	Yes, multislot class 2
I	Image browser	Yes. Gives access to pictures stored in the phone.
	Imaging support	Yes
	Infrared port	Yes
	Input methods	T9 Text Input, multitap alphabetic (GSM standard), eZi Text Input, Bopomofo, Pinyin and Stroke
J	Joystick	Yes, five-way
K	Keypad lock	Yes
L	Languages	40
M	Melody composer	Yes
	Memory check	Yes, dynamic memory allocation: 1.0 Mb
	MMS (Multimedia Messaging Service)	Yes

	Mobile chat	Yes
	Modem (data)	Yes, built-in (maximum data rate 108,800 bit/s.)
N	Notes	Yes, up to 10 – depending on size.
O	Option key	Yes, gives the most common options for the function currently in use. The option key also provides a help menu for certain functions.
P	Personal management	
	Calculator	Yes
	Calendar	Yes
	Alarm clock with snooze function	Yes
	Stopwatch	Yes
	Timer	Yes
	Currency converter	No
	Code memo	Yes
	Organizer	Yes
	Phone book	
	Capacity	510 numbers in phone + SIM
	Maximum number of ADN read from the SIM	255
	Maximum number of FDN read from the SIM	55
	Phone book user groups	Yes, 6
	Phone lock	Yes
	Pictures	
	Total storage capacity	Limited by the memory
	Number of pre-existing pictures	26
	Possibility to download	Yes, storage capacity limited by memory
	Possibility to create	Yes, storage capacity limited by memory
	Picture editor	Yes, stand-alone picture editor facility. Here the user can create new and edit existing pictures (WBMP).
	Picture phone book	Yes
	Pictures, exchange	Yes, via EMS, MMS, infrared and *Bluetooth* wireless technology
	Predictive text input	Yes
	Profiles	Yes, 7

R	Re-dialling, automatic	Yes
	Ring signals	
	Total storage capacity	Limited by the memory
	Number of pre-existing ring signals	14
	Possibility to download	Yes, storage capacity only limited by the memory
	Possibility to compose	Yes, storage capacity only limited by the memory
	Ring signal exchange	Yes, via EMS, MMS, infrared and *Bluetooth* wireless technology
S	Screen saver	Yes
	Shortcuts	Yes
	SIM relative features	
	SIM voltage	3V and 5V
	Number of networks that the handset can mangage on the SIM card	60
	SDN support	Yes, 15. Located in Phonebook menu/ Special numbers/ Service numbers
	SIM Application Toolkit*	Yes
	SIM card copy	Yes
	SIM card lock	Yes (support of GID 1 and GID 2)
	Sleep mode	Yes
	SMS (Short Message Service)*	Yes
	SMS, long messages (a.k.a. concatenated SMS)*	Yes, up to 10 messages of 160 characters each.
	SMS Cell Broadcast*	Yes
	SMS counter	Yes
	SMS templates	Yes, up to 10 templates of 30 characters each
	Sound browser	Yes. Gives the user access to sounds stored in the phone.
	Sound handling	Yes (iMelody and AMR)
	Speaker phone	No
	Speech coding	Enhanced, Full and Half Rate
	Speed dialling	Yes
	Start-up/Shutdown shows	Yes
	Status menu	Yes

	Swatch Internet Time	No
	Synchronization with PC	Yes, via RS232 cable, infrared and *Bluetooth* wireless technology
	SyncML	Yes
T	Themes, pre-defined	Yes, 5
	Themes, downloadable	Yes, only limited only by memory
	Themes, exchange	Yes, via MMS, infrared and *Bluetooth* wireless technology
	Two Line Service (a.k.a Alternate Line Service, ALS)	Yes
U	USB protocol support	No, but through the DCU-10 accessory (USB to System Connector cable + drivers) you can get the USB functionality, though not charging
	USB physical interface support	No, only with accessory
	Connection to a PC USB port	No, only with accessory
	Battery recharging through USB port	No
	Maximum data rate through USB port (bit/s)	46080
V	Vibrator	Yes
	Vibrator mode: vibrating only	Yes
	Vibrator mode: vibrating then ringing	No
	Vibrating mode: vibrating + ringing	Yes
	Vibrator: activation	Option key or long press on “c”.
	Voice recognition	Yes, dialling, answering and rejecting with HF, redial, switch profile, record/play memos and “magic word”. Maximum number of contacts: 34.
	Voice command	Yes, maximum number of functions: 6
	Voice coding	Yes
	Voice memo	Yes, the total time is only limited by the memory. The maximum number of voice memos is 20. Voice memos cannot be used as ring signals.
W	WAP browser	Yes, WAP 2.0 browser with support for XHTML Basic
	WTLS for added WAP security*	Yes, WTLS class 1, 2, 3 and signText

Network-dependent features

SMS and EMS messaging

The T68i is capable of sending and receiving SMS and EMS messages, and linked messages.

- With the Short Message Service, a user can send text messages containing up to 160 characters to and from GSM mobile stations
- With the linked SMS, the user can link up to 10 SMS messages together to create a longer message (network-dependent service)

A Service Centre (SC) acts as a a storage and forwarding centre. The T68i also supports using SMS as a bearer type for connecting to WAP.

SMS consists of two basic services:

- Mobile Originated SMS
- Mobile Terminated SMS

For Mobile Originated SMS, an SMS message is sent from a Mobile Station to the SMS-C where it is forwarded to its destination. This can be another Mobile Station, or a terminal in the fixed network.

A Mobile Terminated SMS is when an SMS message is forwarded from the SMS-C to a Mobile Station. When the Mobile Station receives the message, it returns a delivery report saying the transfer was successful.

Fixed dialling and Restricted calls

For a company or an organization, it can be useful to restrict phone calls. Fixed Dialling allows the user to preset a number of digits, for example area codes. This restricts the user to making calls only to numbers which use the preset digits as leading digits. Fixed Dialling makes use of the PIN2, and it requires fixed dial fields on the SIM card.

The Restrict Calls service allows the user to block outgoing or incoming calls in certain situations, for example international calls.

SIM application toolkit

The SIM Application Toolkit (SIM AT) is a smart card-centric method of deploying programs that apply only to GSM and to SMS and USSD transports. Programs must be distributed on smart cards. WAP is an Internet-centric method of deploying programs that is independent of network technology. Programs and content are kept centrally on web servers and downloaded as required. While there is some overlap, WAP is a particularly good choice when deploying programs that also have an HTML version for desktop use. Work is currently under way on building interfaces between the two technologies.

For an operator, a company or service provider, SIM AT offers a powerful way to deploy programs and services to users, without the need for new or upgraded equipment. All necessary setup and programming is distributed to users over the air, directly to their phones. In the T68i, a separate menu is available for functions residing on the SIM card. These can include submenus for controlling functions, and also functions which allow the phone to initiate calls, send data, and display information to the user.

SIM AT services supported by the T68i

Service		Mode	Support in T68i
CALL CONTROL			Yes
CELL BROADCAST DOWNLOAD			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 press Yes to confirm 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

Service		**Mode**	**Support in T68i**
GET INPUT		General: No. of hidden input characters	20
	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	No
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
SELECT ITEM			Yes
SEND DTMF			Yes

Service		**Mode**	**Support in T68i**
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 Subaddress DTMF support	No
			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	No
		'01' = Call connected	No
		'02' = Call disconnected	No
		'03' = Location status	Yes
		'04' = User activity	No
		'05' = Idle screen available	Yes
		'06' = Cad reader status	No
		'07' = Language selection	Yes
		'08' = Browser termination	No
		'09' = Data available	No
		'OA' = Channel status	No
SET UP IDLE MODE TEXT			Yes, 1 row of text is supporte d
SET UP MENU			Yes
SMS PP DOWNLOAD			Yes

User interaction with SIM AT

DISPLAY TEXT

Text of up to 240 characters (80 UCS coded) is supported.

Text clearing times

- 10-20 seconds. 60-second time-out limit for the user to clear the text.

'Key' responses

- 'Long NO' – Proactive session terminated by user.
- 'NO' – Backward move in proactive session.
  Any other key clears display if the command is performed successfully.

GET INKEY

Prompt for a one-character input. Pressing 'YES' without entering a character gives warning message "Minimum 1 character".

'Key' responses

- 'CLR' clears current character.
- 'Long NO' terminates the proactive session.
- 'NO' – Backward move in proactive session.
- 'YES' – Command performed successfully.

GET INPUT

Prompt for character input. Pressing 'YES' without entering a character gives warning message "Minimum 'no.' characters". The phone will refuse to accept further input when maximum response length is exceeded.

MMI Maximum Response lengths

- Digits Only – 160 characters
- SMS default alphabet characters – 160 characters
- Hidden Characters (digits only) – 40 characters

'Key' responses'

- 'CLR' clears current character/characters.
- 'Long NO' terminates the proactive session.
- 'NO' – Backward move in proactive session.
- 'YES' – Command performed successfully.

REFRESH

When a refresh command is executed by the phone, it displays the message "Please wait" and then restarts.

SELECT ITEM

Scroll to highlight item for selection. The maximum number of items supported by the phone within one Select Item command is 30.

'Key' responses

- Down arrow – Scroll down list.
- Up arrow – Scroll up list.
- Long 'NO' terminates proactive session.
- 'NO' – Backward move in proactive session.
- 'YES' – 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. Responses are "MESSAGE FAILED" or "MESSAGE SENT".

'Key' responses

- Long 'NO' or 'NO' terminates 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 the 'YES' key 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 disconnected'. If the 'YES' 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. From the standby display the right or left arrow buttons can be pressed to select the Menu Items. (Note: The SIM AT menu option is found in the 'Connect' menu.)

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 only one item provided, then this item is used as header. 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 using the 'YES' key all the items sent in the Set Up Menu command will be available for

selection, in the same way as the Select Item command. A limit of 30 menu items has been set within this command.

'Key' responses

- Down arrow – Scroll down list.
- Up arrow – Scroll up list.
- Side key: Scrolls the menu.
- 'YES' – Envelope (Menu Selection).

Security and M-commerce technical data

Feature	Support in the T68i for m-commerce
Dual-slot	No
Associated with a STK card, allowing ISO B0' bank card payments	If separate card, no
Associated with a STK card, allowing EMV bank card payments	If separate card, no
Certified by the "GIE Carte Bancaire"	If separate card, no
WIM supportance	If separate card, no
Ability to use a WIM application embedded on a SIM/USIM card	Yes
WIM application embedded on a SIM/USIM card the default WIM application	Yes
Number of smart card readers in the handset	1
Provisioning of the following SATK commands : Perform Card APDU, Power Off Card, Power On Card, Get Reader Status	No
Release of SIM Application Toolkit supported	R99 with exceptions (missing AT commands, for example "Launch browser" and "Show icon" – still under investigation)
Information to the user while in secured mode (WTLS)	Yes, via icon
Is an incoming class 2 SMS transferred to the SIM even when another application (a browser) is running?	Yes
Access to the WIM	WIM can only be accessed by native applications, e.g. the browser

Terminology and abbreviations

3GPP
3rd Generation Partnership Project.

AMR
Adaptive Multi Rate. Audio format for speech sounds.

API
Application Programming Interface.

ASP
Active Server Page. Server technology that generates web pages dynamically.

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

bFTP
binary File Transfer Protocol.

Bluetooth
Bluetooth wireless technology is a secure, fast, point-to-multipoint radio connection technology. It is a specification for a small-form factor, low-cost radio solution providing links between mobile computers, mobile phones and other portable handheld devices, and connection to the Internet. For more information, http://www.bluetooth.com.

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.

Calling Line Identification (CLI)
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.

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

CGI
Common Gateway Interface. Server technology that generates web pages dynamically.

CS
Circuit Switched.

CSD
Circuit Switched Data.

Deck
A collection of WML cards.

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

Dual band
GSM 900/1800.

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.

EDGE
Enhanced Data rates for GSM Evolution. EDGE uses a new modulation schema to enable data throughput speeds of up to 384kbit/s using existing GSM infrastructure.

EFR
Enhanced Full Rate, speech coding.

EMS
Enhanced Message 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.

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 900
The GSM system family includes GSM 900, GSM 1800 and GSM 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.

HDML
Handheld Device Markup Language.

HDTP
Handheld Device Transport Protocol.

HR
Half Rate, speech coding.

HSCSD
High Speed Circuit Switched Data.

HTML
HyperText Markup Language.

HTTP
HyperText Transfer Protocol.

Image
WBMP or GIF image contained in a Card.

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.

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.

MMI
Man-Machine Interface.

MS
Mobile Station.

MT
Mobile Termination.

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.

Phone book
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.

SC
Service Centre (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 T68i uses the small plug-in card.

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

SS
Supplementary Services.

SyncML
An open standard for synchronization of all devices and applications over any network.

TCP/IP
Transmission Control Protocol/Internet Protocol.

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.

USSD
Unstructured Supplementary Services Data.

VAD
Voice Activated Dialling.

VAS
Value Added Service.

vCalendar
vCalendar defines a transport and platform-independent format for exchanging calendar and scheduling information for use in PIMs/PDAs and group schedulers. vCalendar is specified by IETF.

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 centres, video conferences, PIMs /PDAs, pagers, fax, office equipment, and smart cards. vCard is specified by IETF.

WAE
Wireless Application Environment.

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.

WBMP
WAP Bitmap.

WBXML
Wireless Binary Extensible Markup Language.

WDP
Wireless Datagram Protocol.

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, JavaScript 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

- The T68i User's Guide
- Sony Ericsson T68i FAQ
- AT Command Reference Manual
- WAP June2000 (WAP 2.0) Specification

Software

- XTNDConnect PC For Ericsson can be downloaded from http://www.SonyEricssonMobile.com.
- XTNDConnect PC, upgraded version from Extended Systems Inc.

Links

- http://www.SonyEricssonmobile.com/
- http://wap.SonyEricssonmobile.com/
- http://www.ericsson.com/mobilityworld
- http://www.gprsworld.com/
- http://www.extendedsystems.com/
- http://www.bluetooth.com/
- http://www.imc.org/
- http://www.3gpp.org/
- http://www.irda.org/
- http://www.etsi.fr/
- http://www.wapforum.org/
- http://www.imc.org/pdi/
- http://www.syncml.org/
- http://www.w3.org/TR/xhtml-basic/

Trademarks and acknowledgements

Technical specifications

The consumer pack includes

- Mobile Phone T68i
- Standard Battery BST-14 (700 mAh)
- Travel Charger, CST-12
- Sony Ericsson PC Programs
- XTND Connect PC Synchronization software
- User's guide, including Battery Information
- Accessory leaflet
- Service and Support Leaflet

General technical data

Product name	T68i
SAR measurements: figures	0,54 SAR 1g
SAR measurements: laboratory	Electromagnetic Near Field and Radio Frequency Dosimetry, Sony Ericsson Mobile Communications
System	Tri-band. GSM phase 2 recommendations. GSM 900 (3GPP TS 51.010-1), GSM 1800 (3GPP TS 51.010-1) and GSM 1900 (NATWG 03), e-GSM supported
Speech coding	HR, FR, EFR supported where available, for high speech quality
SIM card	Small plug-in card, 3V or 5V type
Type number	1130202-BV, 1130202-CN

Exterior description

Size	100x48x20 mm (with battery)
Weight	84 grams with battery, 60 grams without battery
Graphic display	Full graphical display 80 x 101 pixels 256 colours, 34 x 28 mm (30.3 x 24 mm used)
Display	Type: graphical Resolution: 101 pixels wide, 80 pixels high Size: 30.3 x 24 centimeters, 101 x 80 pixels Technology: LCD, 256 colours Colours displayed together: 256 colours Size (lines): 8 Refresh rate: 70 Hz Backlight colour: 1 Fonts: 4 Possibility to display the Euro symbol: yes Zooming availability: yes, 3 levels

Antenna	Built-in
Text size	A selection of text sizes
Text rows	Varies depending on text size used
Colours	2, Lunar Grey and Gold
Battery	Li-Polymer Battery BST-14 (700 mAh)
Network LED	1 colour – green
Keypad	Hard silver-painted plastic, 5-way joystick and select 16 keys + joystick + side key (four different keypads: Latin, Arabic, Hebrew, Chinese) Keypad lock: option key or long press on “c”. Use of several keys simultaneously (e.g. for games) is possible

Ambient temperatures

Operating	Max: +55°C, Min -10°C
Storage	Max: +70°C, Min -40°C
Charging	Max: +35°C, Min 0°C

Supported Man-Machine Interface (MMI) languages

Depending on software in the phone, these languages are supported:

Albanian (SQ), Arabic (AR), Brazilian Portuguese (PB), Bulgarian (BG), Canadian French (CF), Czech (CS), Chinese traditional (ZC), Chinese simplified (ZS), Croatian (HR), Danish (DA), Dutch (NL), English (EN), Estonian (ET), Farsi (FA), Finnish (FI), French (FR), German (DE), Greek (EL), Hebrew (IW), Hungarian (HU), Indonesian-Bahasar (IN), Italian (IT), Latin American Spanish (XL), Latvian (LV), Lithuanian (LT), Malay (MS), Norwegian (NO), Philippine-Tagalog (TL), Polish (PL), Portuguese (PT), Romanian (RO), Russian (RU), Serbian (SR), Slovakian (SK), Slovenian (SL), Spanish (ES), Swedish (SV), Thai (TH), Turkish (TR), US English (AE), Vietnamese (VI).

Current consumption, talk and standby times

Dimension	**Value in GSM 900**	
Transmission current	55 mA (min) 210 mA (max)	
Standby current	1.75 mA (min), (paging rate 9, 1 neighbour present) 3.55 mA (max), (paging rate 2, 16 neighbours present)	
Standard Battery (LiPolymer) BST-14 (700 mAh)	Talk time	up to 12 hours
	Standby time	up to 390 hours
	Charging time	2 hours 15 minutes

Games

Name	Type of game	Interactive	Vibration
Arizona	Card game		
Contrary	Strategic	Yes, via IR and Bluetooth.	
Erix	Level based	Yes, highscore can be sent via WAP.	Yes
Four piles	Card game		
Naval fleet	Strategic	Yes, via IR and Bluetooth.	Yes
North territory	Card game		
Q	Strategic		
Yukon struggle	Card game		
Wuziqi (Chinese market only)	Strategic	Yes, via IR and Bluetooth.	

* All games will stop and be saved in the memory if interrupted by an incoming call. You can resume the games after the call.
* All games in the T68 are owned by Sony Ericsson Mobile Communications.

Technical platform information	
AVR micro-controller	12 Mhz frequency
Video management memory	Yes, 8 Kb
API (Application Program Interface)	Yes

Speech coding

Dimension	Full rate	Enhanced full rate
Type	RPE/LPC with LTP	ACELP
Bit rate	13.0 Kbp/s	12.2 Kbp/s
Frame duration	20 ms	20 ms
Block length	260 bits	244 bits
Class 1 bits	182 bits	
Class 2 bits	78 bits	

Cell broadcast service

Feature	Support in the T68i
User notification of the reception of a CB message	Message displayed on screen
Handling of reception of several unread messages	The last message overwrites the previous one
Support of all CMBI from 0 to 65535	Yes
File support	CBMI and CBMID
Support CB SIM data download	Yes
Support of all applicable Data Coding Scheme values as defined in 3G TS 23.038 V3.3.0	Yes
Ability to display in a understandable way a message with a DCS “language unspecified” whatever language is set in the SIM card	Yes
Ability to extract a phone number or short number of a CB message to re-use it (to send an SMS or call the sender)	Yes
Support of multi-page CB-messages	Yes

Short message service

Feature	Support in the T68i
SMS Center Number	It is possible to pre-record the SMS Center Number.
Pictures	It is possible to insert a picture/an icon into the text message. EMS compliant mobile handsets will be able to see the picture correctly.
Input methods	Predictive text input
Reply to messages	It is possible to reply to received messages by SMS, phone call, ...
Message creation methods support	Predictive writing
Enhanced predictive writing method by:	
predictive keyboard which replaces the PDA keypad, alphabet keypad, keyboards for numbers, punctuation and symbols	Yes, the Chatboard accessory
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
print via IrDA	No
use predefined 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 in the inbox	Yes
get delivery time and date	Yes
print via IrDA	No
Possibilities of the previously sent message:	
delivery report of the message	Yes
forward the message	Yes
save the message in the Inbox	Yes
know the remaining capacity storage	Yes

Feature	**Support in the T68i**
print via IrDA	No
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 remining 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
via WAP call (go to the WAP address contained in the message body)	Yes
via USSD session	No
Possibility to offer the user the ability of sending an SMS to a list of recipients	Yes, using Phone Book groups
Possibility to write an e-mail address as a recipient adress	Yes, if SMS type=e-mail
SMS storage	In the SIM and in the handset.

Enhanced message service

Feature	Support in the T68i
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	10
Capacity storage	100 messages
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 pre-defined 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, animations, text formatting, 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.
Attachments	It is possible to attach pictures, animations and sounds to an EMS message.
Text formatting	• Centred, left and right aligned text. • Small, normal and large font size. • Bold, italic, underlined and strikethrough style.
Sounds	Chimes high, chimes low, ding, tada, notify, drum, claps, fanfare, chords high, chords low.
I-melody	Yes, version 1.2.
Melodies	It is possible to... • edit and create melodies by using the phone keypad. • send and receive melodies via EMS. • download melodies and commercial tunes from Web/WAP portals. • create melodies on Web/WAP portals.
WBMP	Yes
Picture sizes	16x16 mm, 32x32 mm, variable size receipts in black and white.

Feature	Support in the T68i
Pictures	It is possible to... • edit and create pictures by using the phone keypad. • send and receive pictures via EMS. • create pictures on Web/WAP portals. • download pictures from Web/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 9 defined in 23.040 v4.3.0. It is possible to... • send and receive animations. • download animations from Web/WAP portals.
TP-PID field value given by the handset before sending an EMS message	0x00

Multimedia message service

Feature	Support in the T68i/ie
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
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 specified by Ericsson and Nokia
MMS User Agent functional entity will be a separate entity from WAP browser:	Yes
MMS User Agent support	WAP WTA, WAP UAProf and WTA Public.
Supplier indication of realized interoperability tests between its MMS User Agent and MMS Relay/Server from other suppliers	Yes

Feature	**Support in the T68i/ie**
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* • MSISDN recipient address • *e-mail* recipient address • message *Cc* recipient(s) address(es) • *delivery report* request • *read-reply* report request • *message* priority
From where can the user insert multimedia elements into multimedia messages:	• terminal memory • directly from camera
Supplier indication if MMS User Agent will be able to handle a network-based address book	No
Possibility for sent messages to be memorized into a folder in handset memory	Yes
Actions that the user can perform after message notification:	• retrieve the message immediately • defer message retrieval • reject message
Actions that the user can perform after message retrieval:	• reply to the sender of the message • reply to the sender and to Cc people • forward the message • delete the message • save message into terminal
Multimedia codecs/formats supported for audio	AMR, AAC
Multimedia codecs/formats supported for video	None
Multimedia codecs/formats supported for image	Baseline JPG, GIF 89a
MMS User Agent provides:	• text formatting facilities (only textsize) • coloured text/background (Viewer/player supports coloured text and background. Not editable in composer) • predictive writing
Supported formats for message presentation:	• message body + attachments (e-mail presentation) • SMIL version as described in “Nokia/Ericsson MMS Conformance document (not WML and SMIL 2.0 Boston)
Storage capacity dedicated to multimedia messages (Kb)	~800kb available for user data (images, sounds, mms,...)
Maximum message size that can be handled by the handset for message	30 kb for sending, 50 kb for receiving

Feature	Support in the T68i/ie
Possibility to configure unconditional message modification (such as media modification in messages)	Yes
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 ResponeText (please see WAP209) • message not sent causes insufficient credit (in case of prepaid charging), if included in ResponeText (please see WAP209)

Instant messaging/ Chat

Feature	Support in the T68i/ie
Support of instant messaging	No
Chat application	Yes, SMS as the radio bearer.

Bluetooth technical data

Dimension	Support in the T68i
Bluetooth capability statement	This product is manufactured to meet *Bluetooth* Specification 1.0b.
Bluetooth enabled through accessory	Yes
Bluetooth functions	Dial-up Networking Profile Fax Profile Generic Access Profile Generic Object Exchange Profile Headset Profile Object Push Profile Serial Port Profile Synchronization Profile
Connectable devices	All products supporting *Bluetooth* spec. 1,0b.
Coverage area	Up to 10 metres (33 feet)
Transmission power	1mW (0dBm)
Frequency band	2.4 GHz - the unlicensed ISM band
Power consumption	Standby current: < 0.3 mA Voice mode: 8-30 mA Data mode average: 5 mA [0.3-30 mA, 20 kbps, 25%]

Data transmission rate	up to 108,800 bps with one time slot
Specific commands working with the SIM card	No
Support of multipoint connections	No

Performance and technical characteristics

Dimension	**GSM 900/E-GSM 900**	**GSM 1800**	**GSM 1900**
Frequency range	TX: 880 – 914 MHz RX: 925 – 959 MHz	TX: 1710 – 1785 RX: 1805 – 1880	TX: 1850 – 1910 RX: 1930 – 1990
Channel spacing	200 kHz	200 kHz	200 kHz
Number of channels	174 Carriers *8 (TDMA)	374 Carriers *8 (TDMA)	299 Carriers *8 (TDMA)
Modulation	GMSK	GMSK	GMSK
TX Phase Accuracy	< 5° RMS Phase error (burst)	< 5° RMS Phase error (burst)	< 5° RMS Phase error (burst)
Duplex spacing	45 MHz	95 MHz	80 MHz
Frequency stability	+/- 0.1	+/- 0.1	+/- 0.1
Voltage operation (nominal)	3.6 Volts	3.6 Volts	3.6 Volts
Transmitter RF power output	33 dBm Class 4 (2W peak)	30 dBm Class 1 (1W peak)	30 dBm Class 1 (1W peak)
Transmitter Output impedance	50 Ω	50 Ω	50 Ω
Transmitter Spurious emission	< -36 dBm up to 1 GHz < -30 dBm over 1 GHz (according to GSM spec.)	< - 30 dBm (according to GSM spec.)	< - 30 dBm (according to GSM spec.)
Receiver RF level	Better than – 102 dBm	– 102 dBm	– 102 dBm
Receiver RX Bit error rate	< 2.4%	< 2.4%	< 2.4%

WAP browser technical data

Feature	Support in the T68i WAP 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 25 named bookmarks for easy access to frequently visited pages
Bookmark Export/Import	Yes, can be sent and received as link using SMS and vBookmark format via IR and BT
Cache	Yes (size 6 kbyte)
Character sets *	UTF8 (Default), USASCII, Latin1, UCS2
Clear cache	Yes
Colour	Colour display
Home page	Yes, up to 5 different, one for each WAP profile
HTML version for WAP browser	xHTML, mobile profile
Hyperlinks in Text	Yes, highlighted by inverse video
Hyperlinks in Images	Yes, indicated by a frame
Image Animation	No
Image Formats	GIF (interlaced and non-interlaced), WBMP, no transparent layers, JPG
Network Settings	Up to 5 different settings available by selecting WAP profile (Intranet, Internet, Banking, Gateway etc.)
OTA Support	Yes
PPP Authentication	PAP, CHAP supported
Reload page	Yes
Tables	Yes
User Agent Profiles	Yes, list of client characteristics - e.g. display size
WAP/WML WAP	WAP 2.0/ WML 1.3
	*) When creating WML applications, it is recommended that you always save the page contents as UTF8, 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.

Feature	Support in the T68i WAP browser
WAP browser	WAP 1.2.1 baseline
WAP profiles	Dynamic - up to 5 WAP profiles, each with its own settings
WTLS (security)	Yes, WTLS Class 1 - Encoding WTLS Class 2 - Encoding + Server Authentication. Root Certificates needed in phone WTLS Class 3 - Encoding + Server Authentication + Client Certification. Root Certificates needed in phone + special SIM cards Sign text

WAP Operator technical data

Feature	Support in the T68i for WAP
WAP Browser	
Version	1.2.1 baseline
HTML	xHTML, mobile profile
WAP Provisioning	
Total Parameter sets	5
Parameter set list	Name Startpage IP settings: CSD phoneno., CSD Data rate, CSD dial type GPRS APN, password request, allow calls, authentication, data compression, header compression, quality of services IP address, datamode (conn.less or oriented) UserId and password Security on/off Show images on/off Response timer
Manual selection	Yes, between Analog (V32) and Digital (V110)
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
Simultaneous OTA	WAP/CSD, WAP/GPRS configuration possible
Single OTA	WAP/CSD, WAP/GPRS is not possible
Bookmarks	Not empty by default
URL format	Underlined
Security mechanism	

Feature	Support in the T68i for WAP
OTA provisioning (if empty)	Operator verification through a code, included in the OTA data. This code is shown to the user who can choose installation or not.
Interface (if empty)	An Install question is asked with the code, if available. The user has to choose if a new WAP profile shall be created or an existing profile shall be replaced.
Re-provisioning (Set 1 filled)	As above
Interface (Set 1 filled)	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. No new certificates can be stored and no old ones can be removed by the terminal.
Applicative provisioning	
Preferred bearer customization	Yes
Email customization	No
Other applications/features	Yes. MMS, SyncML
Technologies	
WAP Forum OTA provisioning	No
Openwave OTA	No
Other	Yes. The Ericsson-Nokia solution.
Provisioning bearer	SMS
Parameter sets available	5
Parameter sets for OTA modification	5

PUSH	
Content types	
Service Indication (SI)	Yes
Service Loading (SL)	Yes
Cache Operation (CO) content type	Yes
Session Initiation Application (SIA)	Yes
Man Machine Interface	
SI/content retrieval postponing	Yes

Feature	Support in the T68i for WAP
SI menu structure accessability	WAP services, Push inbox
SL reception warning	The user can make a choice if a dialog is wanted or not before loading the SL. WAP services/options/common/Push access/prompt
SIA reception warning	Yes
Cache size limitations	If the inbox is full and a new push is received, 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. WAP services/options/common/Push access/Off
Dynamic push menu changes	No. There are no changes in the menus when activating/ deactivating push
Security	
Mechanisms for push	None
Trust with PPG	Sending a SIA is the most trustful.
WSP push sessions	1
Denial of service/spoofing	
User agent profile	
UA profile content sent at beginning 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 web site.
WTAI	
WTA Make Call	Yes
WTA Send DTMF	Yes
WTA Add Phone Book	Yes
Other WTA/WTAI	No
DOWNLOAD	
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 limited to 3kB is downloaded without using SAR
Features	

Feature	Support in the T68i for WAP
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	
Ringing tones	audio/iMelody, other/eMelody, vMel.
Wallpapers	Image/WBMP, GIF, JPG.
Pictures	Image/WBMP, GIF, JPG, PNG.
Games	
JAVA applications	application/JAR not used, JAD not used
Screen savers	Image/GIF, JPG
Audio files	audio/MPEG4 not used,MP3 not used, WAV not used
Skins	Application /skin
Video	Video/MPEG4 not used

GRAPHICAL USER INTERFACE	
Man Machine Interface	
Soft keys	None
Separate/dedicated back or erase keys	No
Screen backlight on when browsing?	Yes
Predictive writing for WAP sessions?	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	4 to 7 plus Title, depending on the selected font size.
Pop-up menus	Yes. Single select list to conserve space.
Radio buttons	Yes. Single select list to conserve space.
Check boxes	Yes. Boolean selection.
Push buttons	No
Horizontal rules	Yes. Separate sections of WML card.

GPRS technical data

Dimension	Support in the T68i
Compatible GPRS and SMG specifications	ETSI R97 SMG 31 bis
Data rates	Multislot class 4 supported (3+1) CS-1, CS-2, CS-3, CS-4 9,050 bps, 13,400 bps, 15,600 bps, 21,400 bps supported (network-dependent)
Indicator of attachment to the GPRS service	Yes, an icon in the bottom left corner, a filled triangle if attached 
Indicator of PDP context activation	Yes, an icon on the right side. Animated globe 
Data volume counter	• The Data volume counter details the volume of data exchanged in bytes for the up/down link for last call for each PDP context. • The Total data counter details the sum of all GPRS sessions (i.e. not the sum of total data received + sent during the last GPRS session. The total data counter can be reset by the user.
Medium Access Modes	Fixed and 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
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
Support of compression algorithms	Yes, V42bis and IP header compression
Support of the QoS modification procedure	Yes, when initiated by the network (not by the handset)

Dimension	**Support in the T68i**
Interfaces to external devices supported by the handset and available for a GPRS link	IrDA, RS-232, AT commands. IrDA, Datarate=SIR & MIR RS232, autobaud, max 460kbit/s Bluetooth, v1.0B+Critical errata, Certified and listed Supported Bluetooth profiles: DUN, FAX, Headset, Synch, Object push
Downlink data rate	Up to 64,200 bps for packet data communication, using 3 time slots in coding scheme CS-4
Uplink data rate	Up to 21,400 bps for packet data communication, using 1 time slot in coding scheme CS-4
Mode of operation	Class B and Class C modes of operation supported. It is possible for the user to choose if the Circuit Switched services should be favoured.
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
Application	WAP over GPRS supported (UDP/IP and GPRS-SMS) SMS over GPRS (SMS-MT, SMS-MO) supported
QoS	QoS negotiation supported. Default requested QoS sent by the handset at PDP context activation is reliability Class 3. Peak/Mean/Delay/Precedence Class: subscribed (1,2,3). • Precedence class supported (1,2,3) • Reliability class 1-5 supported • Delay classes supported (1,2,3,4) • Mean and peak throughput rate limited by multislot class 4 and CS-4
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 not supported Network requested PDP context not supported
SIM	GPRS aware, as well as non GPRS aware SIMs 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

Built-in GSM data modem technical data

Dimension	Support in the T68i	
Standards	AT commands industry standard, ETSI 07.05 and 07.07 and 07.10, V.25ter command set supported	
Data rates, Circuit Switched (CSD)	Download data rate	Up to 19,200 or 28,800 bps (depending on base rate) no compression, with V.42bis compression up to four times higher transmission rates depending on the data type
	Upload data rate	Up to 9,600 or 14,400 bps (depending on base rate) for GSM Data communication, no compression with V.42bis compression up to four times higher transmission rates depending on the data type
Data rates, GPRS	See GPRS Technical data	

E-mail client technical data

Feature	Support in the T68i e-mail client
Attachment	Yes (outgoing, images only)
Bearer type GPRS (IP)	Yes
Bearer type GSM Data (IP)	Yes, HSCSD, ISDN and analog
Character sets *	US ASCII (All variants)
	ISO8859-1 (All variants)
	ISO8859-2 (All variants except China, Taiwan & HongKong))
	ISO8859-5 (All variants except China, Taiwan & HongKong))
	ISO8859-10 (All variants except China, Taiwan & HongKong))
	KOI8-R (All variants except China, Taiwan & HongKong))
	WIN1251 (All variants except China, Taiwan & HongKong))
	WIN1252 (All variants except China, Taiwan & HongKong))
	UTF7 (All variants)
	UTF8 (All variants)
	GB2312 (Chinese Simplified, only in China variant)
	BIG5 (Chinese Traditional, only in Taiwan/HongKong variant)
	GB18030 (Chinese Simplified, only in China variant)

Feature	Support in the T68i e-mail client
OTA Support	Yes
Supported protocols	POP3, IMAP4, SMTP

USSD technical data

Feature	Support in the T68i/ie
USSD support	GSM Phase 1/ 2 (Cross-phase compatibility). GPRS behaviour according to class B
Mode support -mode	MMI-mode supported. No application mode support (not needed for any application).
MMI-mode details	• USSD messages displayed until removed by user • It is possible to scroll up and down the text in USSD messages

Image format technical data

Format	**Visible**	Max	Animation	Colours	Visible colours	Transparency support
GIF	101x80 pics	160x120 pixels	50 frames (1 frame/ 100ms)	256	256 (3:3:2=RGB; less blue colours)	
JPEG	101x80 pics	640x480 pixels	No	16.8 mil.	256	
WBMB	101x80 pics	320x320 pixels	No	Black/ White	2	

Images – downloading to phone

Feature	**File type**	Max. size	PC/ Cable	PC/ IrDA	PC/ BT	Phone-to-phone	WAP	MMS
EMS icons	WBMP	WxH<=1024 pixels	Yes	Yes	Yes	Yes	Yes	Yes
MMS	GIF, WBMP, JPG	Limited by the memory	Yes	Yes	Yes	Yes	Yes	Yes
Background	GIF, WBMP; JPG	Limited by the memory	Yes	Yes	Yes	Yes	Yes	Yes
MMS template		Send 30k, Receive 50k	No	No	No	No	No	Yes
Animations	Animated GIF	Limited by the memory	Yes	Yes	Yes	Yes	Yes, 1)	Yes
Themes	GIF (propriety, THM)	Limited by the memory	Yes	Yes	Yes	Yes	Yes	No
Screensaver	Animated GIF	Limited by the memory	Yes	Yes	Yes	Yes	Yes	Yes

Exceptions:

MMS: GIF, WBMP, JPG, 160x120 pics

EMS icons: WBMP max WidthxHeight<=1024 pixels (eg 32x32=1024)

Themes: GIF max, 160x120 pixels

WAP: Can not show animations in the WAP Browser. You can download maximum 3kb. The animation will be shown in the Image Browser if it's saved in the phone.

GIF: Animations used as background images or user greetings displays first frame only.

SyncML technical data

Feature	Support for Sync ML in the T68i
SyncML compliance	The handset is fully SyncML compliant (it passed both SyncML Conformance and Interoperability testing [SyncFest])
Basic data formats	Contacts: vCard 2.1, Calendar: vCalendar 1.0, Tasks: vTodo 1.0.
Possibility for operators to extend SyncML functionlity	No
Possibility to synchronize other handsets using SyncML	No
Transport method for SyncML messages	WSP (i.e. using a WAP connection)
Synchronization application placement	Inside the handset
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 synced (on/off), WAP Account, Sync Sound
Mechanisms used by the handset to capture changes made by the end user (i.e. how does the SyncML client in your handset know which changes ware made to the address book)	It uses a changelog where it marks the contact as updated
Ability to deal with multiple servers	No
Ability to perform conflict resolution actions	No

Infrared transceiver technical data

Signal in RS-232	Support in DRS-11
CD (Carrier Detect)	No. Set statically
CTS (Clear To Send)	Yes
DSR (Data Service Ready)	Statically connected with DTR
DTR (Data Terminal Ready)	Statically connected with DSR
GND (Signal Ground)	Yes
RI (Ring Indication)	No. Set statically
RTS (Request To Send)	Yes
Rx (Received Data)	Yes
Tx (Transmitted Data)	Yes

Index