



Mobile Phone T39 White Paper

Ericsson is the leading provider in the new telecoms world, with communications solutions that combine telecom and datacom technologies with freedom of mobility for the user. With more than 100,000 employees in 140 countries, Ericsson simplifies communications for its customers - network operators, service providers, enterprises and consumers - the world over.

First edition (June 2001)

Publication number: EN/LZT 108 4786 R1A

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PREFACE

Purpose Of This Document

The Ericsson T39 White Paper is designed to give the reader a deeper technical understanding of how the T39 is designed, and of how it interacts with other media. This document will make it easier to integrate the T39 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

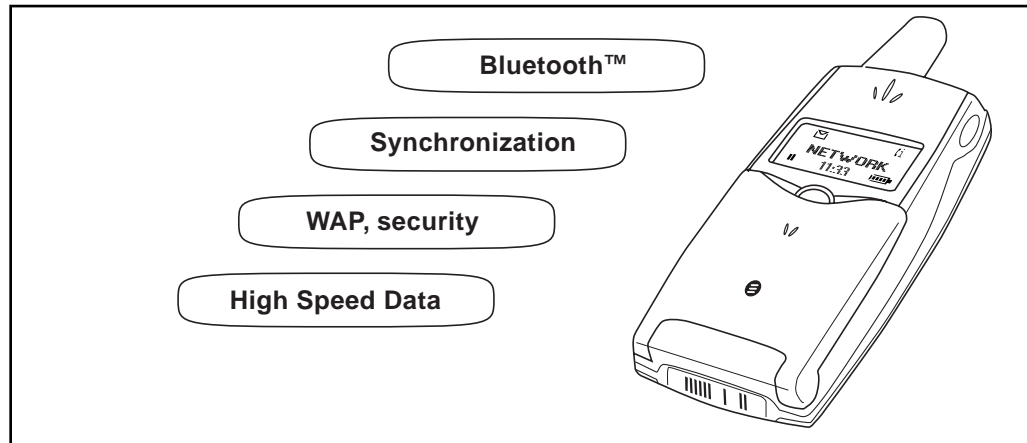
The best place to find all the extras you need to support your phone and daily life is at the Ericsson Mobile Internet, <http://mobileinternet.ericsson.com>. Here you will find downloadable ring tones, games, news, information, and a host of exciting links to other sites.

More information, useful for product, service and application developers, is published on the Ericsson Mobility World. The site at <http://www.ericsson.com/mobilityworld> contains up-to-date information about technologies, products and tools.

PRODUCT OVERVIEW

The T39 is a Triple Band phone with built-in Bluetooth™ wireless technology, high speed data, GPRS and Wireless Application Protocol (WAP) support. It integrates wirelessly with personal office tools and corporate calendars, phone books and services, to form a unique communications tool for the organization.

T39 Powerfully Attractive And Always Online



Bluetooth wireless technology

Using a high speed radio link, *Bluetooth* wireless technology eliminates the need for cables for connecting the phone to handheld devices, accessories and laptops. It provides secure short-range communication without cables – even without line of sight between the devices.

Bluetooth wireless technology can be used for synchronization with laptops and PDAs, for wireless headset, for turning the phone into a wireless modem, for exchanging calendar events and business cards with other phones, and more.

Synchronization

Synchronization with PCs, a Personal Digital Assistant (PDA) or calendar is effortless. Appointments and tasks in the phone's calendar and entries in the phone book can be synchronized via *Bluetooth* connection, infrared or a cable, and also via WAP using SyncML. The T39 features a hierarchical phone book in which you can store contact details.

Secure WAP

Internet browsing and secure mobile services are supported over Wireless Application Protocol, WAP. The built-in browser supports WAP June2000 (WAP 1.2.1) with push services and secure transaction methods, such as digital signatures. Depending on network services, the T39 provides WAP over GPRS with constant connection, GSM Data or SMS.

High speed and GPRS

The T39 enables high speed data communication and WAP browsing with a constant connection, as required by the application. In GSM Data connections, High Speed Data supports a high transmission rate, and a fast download speed. Furthermore, by supporting General Packet Radio Services (GPRS) networks, the T39 is designed to remain "always-online" with a cost efficient IP connection which enables rapid data transmission.

Functions And Features For Productivity

Triple Band support

Triple Band support means that you can use the phone on GSM 900/1800/1900 networks almost all over the world.

Messaging

E-mail client (POP3/SMTP) and support for linked **SMS** messages (long messages). **Data connections** feature makes it easy to manage all connection settings in one place, for internet etc.

Connectivity

Infrared link to be used as a complement to a *Bluetooth* connection, for synchronization, for turning the phone into a wireless modem, and more. An optional cable can also be used if no infrared is available on the PC or handheld.

Voice and user interface

Built-in **voice memo recorder** and enhanced **voice control** functions. A full **graphic display** with grey scales and an easy to navigate, user interface software. **Predictive text** input, T9[®] Text Input, makes typing quicker and easier.

Profiles feature

Groups of settings preset to suit certain environment **Profiles**, such as “In Car”, “Meeting”, “Home”. Numbered **shortcuts** make it possible to prepare settings into a favourite menu which the user accesses quickly and easily.

Accessories

A wide range of Ericsson **accessories** are available, such as *Bluetooth* wireless headset, to enhance productivity further.

Services on the network

The T39 supports the **SIM Application Toolkit (online services)**, which makes it possible for operators to provide new services to existing users over the air, including new menus and functions in the phone. Support for **mobile positioning** enables the design and implementation of new productivity and commercial solutions.

BLUETOOTH™ WIRELESS TECHNOLOGY

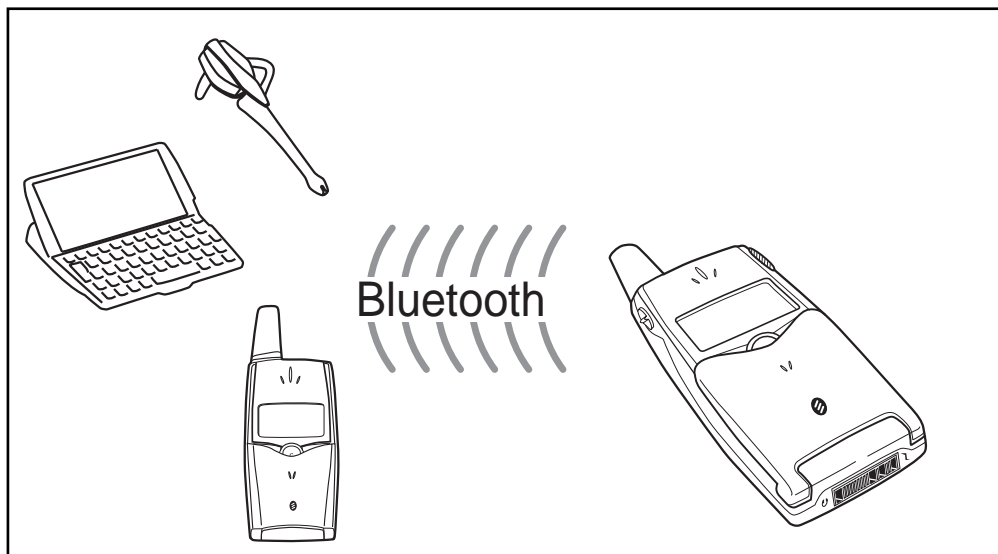
The T39 has built-in *Bluetooth* wireless technology. Short-range radio links operate in a globally available 2.4 GHz radio frequency band, and ensures fast and secure communications up to a range of 10 metres (typically) between devices. Please note that in countries where the use of *Bluetooth* wireless technology is not allowed, you must ensure that the *Bluetooth* function is set to off. Contact the 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 even in very noisy radio frequency environments and it provides a high transmission rate. All data transfer is protected by advanced error-correction methods that ensure a high level of data security.

Bluetooth wireless technology facilitates instant connections which are maintained even when the devices are not within line of sight. *Bluetooth* wireless technology facilitates high-quality voice transmissions, even under severe conditions. For example, you can connect your headset to your mobile phone to keep your hands free for more important tasks.

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:

- Headset 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 T39

The built-in *Bluetooth* wireless technology allows a very fast data transfer speed, when one or more *Bluetooth* devices is within a range of 10 metres. For example, the services available via infrared communication are replaced by *Bluetooth* wireless technology communication, and with a better performance. Key benefits of using *Bluetooth* wireless technology in the T39 are:

Replace cable and infrared

Bluetooth wireless technology gives a true wireless connection to headset, computers, networks, printers and other devices.

Several devices

The T39 identifies and maintains several devices in a pairing list.

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 data connection

A *Bluetooth* wireless technology PC/laptop can connect to the phone, turning it into a modem for accessing the internet and for data transfer, via GSM Data or via General Packet Radio Services (GPRS).

Synchronization

Fast synchronization, even without line of sight, of calendar and phone book with PC/laptop, PDA and quick exchange of business cards, calendar events and melodies with other phones and devices.

Phone management

Manage the phone book and the phone settings from a *Bluetooth* PC.

Print from the phone

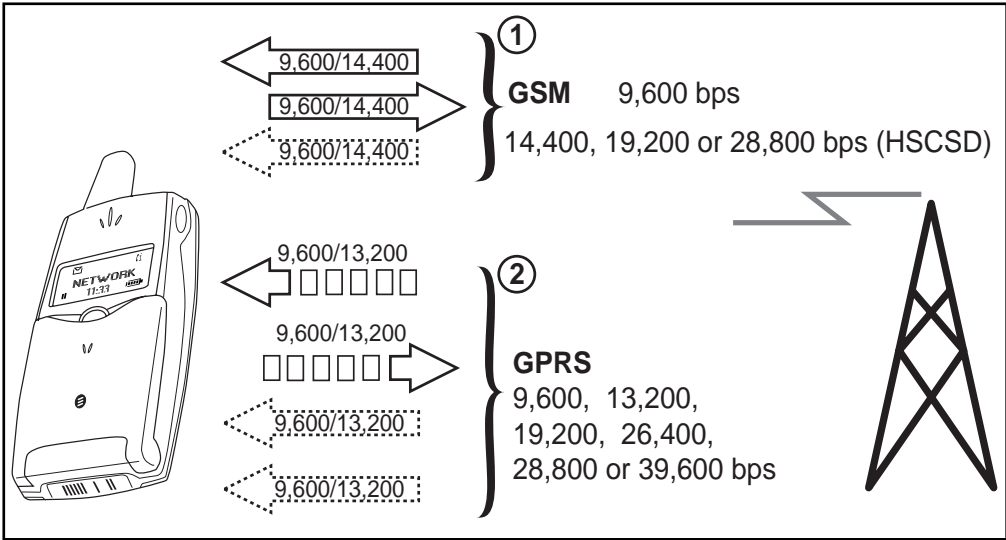
When connected to a printer via *Bluetooth* wireless technology, the user can print items directly from the phone. Items that can be printed include overviews in the calendar, appointments and tasks, contacts, business cards and text messages.

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 to enhance the capabilities for data communication. Data traffic is increasing enormously over both wired and wireless networks. This growth in demand for internet access and services has paralleled the explosion in demand for mobile communications. Users want access to the internet while they are away from their offices and homes. The main applications driving the wireless internet development are e-mail access, web browsing and pull content, also known as web clipping. User surveys have found that a vast majority of executives and business professionals want wireless internet access to both send and receive e-mail on a portable device, as well as web browsing with both text and graphic capabilities! The demand for high-speed internet access will be the key driver for coming generations of wireless services equal to, or faster than wired, and GPRS can deliver this mobile internet functionality. GPRS will allow innovative services to be created, enabling new and previously inaccessible market segments to be addressed, increasing customer loyalty and reducing churn. Machine-to-machine and person-to-machine communications will become possible.

GPRS applications can be developed both as horizontal and vertical applications. Vertical applications can for example be operations like police and emergency, taxi, delivery or automated services such as vending machines, supervision, vehicle tracking. Horizontal applications are generic, such as internet access, e-mail, messaging, e-commerce and entertainment. One of the advantages with GPRS is that it will profit from the global coverage of existing GSM networks. Therefore applications developed for GPRS can be deployed on a large scale and will gain economies of scale. GPRS also provides an ideal secure medium for connections to private networks, banking and financial services.

The T39 supports GPRS, which means that the data is sent in packages at a very high speed. The phone remains connected to the network all the time without using any transmission capacity, until data needs to be sent or received. This illustration gives a comparison.



- 1. A normal GSM call only uses one of eight repeating time slots in the GSM channel, giving a data speed of 9,600 bps. The T39 supports a more efficient coding scheme, giving data speeds of up to 14,400 bps (providing the network supports this). Furthermore, High Speed Circuit Switched Data (HSCSD) gives the possibility to use two time slots for receiving data. This can increase the data speed up to 28,800 bps (network-dependent)
- 2. In GPRS, data is sent in packets, and up to three time slots can be combined to provide the necessary bandwidth, up to 39,600 bps for receiving data, depending on coding scheme

Using GPRS In The T39

Instead of occupying a whole voice channel for the duration of the call, data is sent in small packets as needed, just like IP on the internet. Capacity is used only when data is being sent or received, which means that it is possible to be “constantly” connected, as required by the application in use. If the user wants to send e-mail, it may be sufficient to share a channel with several other users. On the other hand, the phone has access to several time slots if a higher capacity is needed.

The GPRS specification includes four coding schemes with different data speeds. The T39 works with the first two coding schemes, but the data speed will naturally vary according to network configuration.

The GSM system's design limits the ability to use all eight time slots. Instead, the T39 uses up to three time slots for receiving data, and one slot for transmitting. This means the speed for receiving data is up to 39,600 bps and for sending data up to 13,200 bps.

Information about the identity of phone and the characteristics of the connection are described in the PDP context (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. In T39, multiple PDP context settings can be set via the menu system, or by OTA provisioning.

Using GPRS with the T39 gives several advantages, for example:

Constant connection	Keep an open connection to the 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	GPRS being an IP-based connection means that a high transmission capacity is only used when needed. This makes it possible to stay connected via GPRS, whereas keeping a constant circuit switched connection would be more expensive.
WAP over GPRS	Access the internet via WAP at high speed and with a constant connection. The user can run the WAP functions such as browsing.
E-mail over GPRS	This means that the user can be connected to the e-mail system while reading and preparing messages, and that the messages are sent at a high speed.
Data communication	Using GPRS, this provides data and internet/Intranet access, for a PC, PDA or handheld device connected via <i>Bluetooth</i> wireless technology, infrared or cable.
Data and voice	The T39 can maintain a data connection when conducting a voice call. For example, the user can conduct voice calls while maintaining an uninterrupted connection to an e-mail system.
Provide settings	The GPRS configuration settings can be sent from the provider over the air, OTA. This way, the user can use GPRS without making any settings in the phone.
User controlled settings	Full user control is enabled in the T39. In the Data connections menu, the user can set up multiple descriptions and access advanced settings for GPRS, for example Data compression and Quality of Service.

WAP SERVICES

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

The WAP browser in the T39 is compliant with WAP June2000 (WAP 1.2.1) includes WTLS class 3 and mechanisms for digital signatures. It is designed for WML and cannot read ordinary HTML pages, but it is suitable for interaction with customer services, e.g. ticket reservation. It is also handy when you want to access text-based information, such as timetables, share prices and exchange rates and internet banking and other interactive services.

Using WAP In The T39

The built-in WAP browser gives the user portable, fast and secure access to a wide variety of services, with the possibility of personalized services. WAP in the T39 offers new opportunities to companies and service providers:

Push service	A useful feature for companies and service providers to push contents or service indications to work groups or customers. This is used for notifications, mail alerts, messaging, news, stock quotes, contacts, meeting requests, games etc.
Provide settings	Using SMS message, 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.
Adapt to phone type	When creating a WAP service, you want to make sure that the user experience is what you intended, regardless of client device type. The function User Agent Profile is supported by the T39 to allow the contents to be automatically optimized for the phone.
Security	Service providers can offer commercial and business critical services with high security to mobile users, compliant with Wireless Transport Layer Security (WTLS) class 1, 2 and 3. Digital signatures and Wireless Identification Module (WIM) are supported in the T39. The WIM is used to store security related information.
Several bearer types	The T39 accesses WAP over a standard GSM Data connection as well as over a GPRS connection. SMS is available as bearer type also. (Network-dependent services.)
Bandwidth efficiency	One of the key advantages WAP has over text-based HTML pages on mobile devices, is the bandwidth efficiency for communication. This is due partly to the fact that the WAP application is communicated to the wireless devices in the form of binary encoded data. Over a GPRS connection, bandwidth is used even more efficiently. See "Using GPRS In The T39" on page 11.

Easy create for WAP	Creating a WAP service is no harder than creating an Intranet/internet service today since WML and WMLScript are based on well-known internet technology. New market segments can be addressed by launching innovative mobile Value Added Services.
Using standard tools	It is possible for the service creator to use standard tools like ASP or CGI to generate content dynamically. You can utilize existing investments in databases etc. that are the basis of existing internet services. Create a service once and make it accessible on a broad range of wireless networks.
Maintain customer base	You can adapt existing internet services to WAP. The actual binary encoding can be handled by the WAP Gateway which makes it possible to create WAP applications using the text-based language WML and other tools. In fact, existing HTML-based applications on the internet can be viewed in the WAP browser, if an automatic conversion is performed in the WAP Gateway.
Improve productivity	Improve and simplify the communication flow within an organization by making information available to mobile users. A company or organization can use a WAP gateway to provide a secure connection to the company network for their users.
The WAP profiles	The T39 holds five WAP profiles, each with a group of network settings and a home page. If you provide a corporate WAP service on your Intranet, it is useful to enter an Intranet WAP profile in user phones. The WAP profile holds network settings and user identification. The users switch easily between the corporate services and WAP services on the internet, simply by switching WAP profile.

Bearer Type Characteristics

The phone accesses WAP services over SMS or IP, where 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”, as required by the application, and data is transmitted in packets. This means that the phone is connected almost all the time without using network capacity.
- Higher transmission speed than with GSM Data and SMS access.
- 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 to the WAP service.
- When transmitting large amounts of data, bandwidth can be increased automatically to allow faster transmission speed.
- GPRS is ideal for Complex Pull services, Browsing, Data transfer, Provisioning, Pager service, Messaging services, Info services, Push initiations.

GSM Data Access

- Circuit connection of data call which means that the phone is connected during the entire WAP session.
- Comparably higher transmission speed than with SMS access.
- Pricing of GSM Data access can be compared to pricing of data calls in the network.
- GSM Data is suitable for Complex Pull services, Browsing and Data transfer.
- GSM Data is not suitable for Provisioning, Pager service.

SMS Access

- SMS point-to-point is used and not SMS Cell Broadcast.
- The connection is maintained by the automatic exchange of “messages” between the phone and the SMS Service Center.
- Comparably lower transmission speed than with GSM Data access.
- Pricing of SMS access can be compared to pricing of the normal SMS service in the network.
- SMS is suitable for Messaging services, Info services, Push initiations, Provisioning.
- SMS is not suitable for Browsing, Data transfer.

Gateway Characteristics

The WAP Gateway provides services in the company’s Intranet, a banking or stock trading service on the internet, or access to other WAP applications on web addresses anywhere on the internet. A Gateway is identified by an IP number or by a phone number, depending on access type.

Security Using WAP

When using certain WAP services the user may want a secure connection between the phone and the WAP gateway, for example when using banking services. An icon in the display indicates when a secure connection is used. The T39 is based on the WAP June2000 (WAP 1.2.1) specifications where security functionality is specified with a technology called Wireless Transport Layer Security (WTLS).

The WAP protocols that handle the connection, its transport and its security are structured in protocol layers. The security is handled by the WTLS layer operating above the transport protocol layer. There are WTLS classes that define the levels of security for a WTLS connection:

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

Server authentication Requires a server certificate stored at the server side and a root 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 will then be referred to as a SWIM card.

Certificates

To use secure connections, the user needs to have certificates saved 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 the user can trust all WAP gateways that use the certificate. Trusted certificates can be pre-installed in the phone, pre-installed in the SWIM, or 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 the WIM on SIM. The locks protect the subscription from unauthorized use when browsing. The locks should typically be supplied from 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 - like a digital signature.

In the T39, 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 saved in the phone. The contract contains details about the transaction.

Over-The-Air Provisioning Of WAP Settings

To simplify configuring WAP settings in a number of phones, all settings can be sent as an SMS message to each phone. This makes it easy for an operator, a service provider or a company to distribute settings for internet/Intranet, and WAP, without having to configure each phone manually. This also makes it easy to upgrade the services provided to the users, without the need for users to perform any manual configuration.

- The OTA configuration message is distributed via SMS point-to-point
- The setup information is a binary encoded XML message, according to WBXML. To receive information about OTA specifications, please contact your local Ericsson representative for consumer products. A configurator that utilizes OTA provisioning can be tested on the Ericsson Mobile Internet
- The user is not alerted about new settings until the ongoing browsing session ends. Furthermore, settings are not changed during an ongoing browsing session
- The necessary 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 the receiver. It is important that the user has a way to verify that the configuration message is authentic

Configuration Of WAP Settings

An easy way to perform the WAP configuration of a single phone is by using the step-by-step WAP configurator provided on the Ericsson Mobile Internet. The configurator utilizes OTA provisioning, and it is available on <http://mobileinternet.ericsson.com>, no login required.

Another way to perform the WAP configuration of a single phone is by using the Ericsson Phone Settings program which is available on the CD supplied with the phone. There, you can find all configuration settings needed for the phone to access the WAP services.

A manual configuration is made using the menu system in the phone. This is described in the User's Guide.

Push Services

These are useful for sending updated WAP site contents or WAP links to mobile users. Examples of services that can be implemented using push services:

- Notifications about new e-mails, voice mails, etc. Instant messaging and chat
- News, sport results, weather forecasts, financial information (stock quotes etc.)
- Personal Information Manager (PIM) - delivery of contacts, meeting requests etc.
- Fill up a smart card with e-cash
- Interactive games, e.g. play poker with a friend

In the T39, the user can select if push messages are allowed to be received or not. There are two different forms of Push services, Service Indication and Service Loading.

Service Indication (SI)

This is basically a text message to the user, that informs of a WAP page. It contains a link to a URL. If the user decides to load the suggested URL, normal WAP browsing commences.

When a service indication is received in the T39, the user can decide to load it, to postpone it or

to delete it. Service indications that are received are stored in the Push Inbox, and can be viewed and loaded at a later time.

The push inbox has a list that shows the first part of each received message, which is sorted by:

- 1) Action attribute, high/medium/low (highest first), and
- 2) Reception time for messages of each attribute level

Service Loading (SL)

This is a WAP page with the updated information, that is displayed if the user accepts it. If it 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.

POWERFUL MESSAGING

The T39 is capable of sending and receiving SMS messages, linked messages and it supports Enhanced Messaging Services (EMS). Please note that EMS is only valid for T39m versions.

- With the Short Message Service, a user can send text messages containing up to 160 characters to and from GSM mobile stations (up to 70 characters using Chinese text)
- Status report is supported, which means that the user can see if a sent message has been delivered or not (network-dependent service).
- With the linked SMS, the user can link several SMS messages together to create a longer message (network-dependent service)
- With EMS, the T39 lets the user insert sounds, pictures and melodies, or ring tones in outgoing messages. Also, the phone will display pictures and play melodies, sounds and animations included in incoming messages (network-dependent service, and only valid for T39m versions)

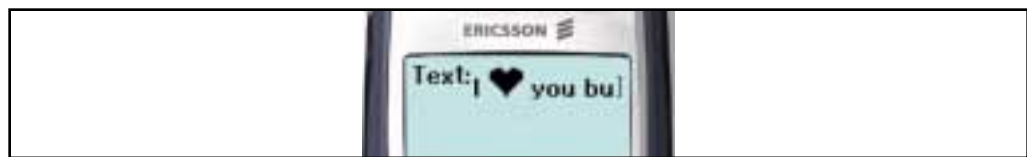
The T39 also lets you save often-used text messages as templates. You can save up to ten templates consisting of up to twenty-five characters each in the phone's memory. The T39 also features an SMS counter allowing you to keep track of SMS messages that you have sent.

Enhanced Messaging Service (EMS)

Enhanced Messaging Service (EMS) is a powerful enhancement of the SMS standard specified by the 3rd Generation Partnership Project (3GPP). It is supported by the major network operators and mobile phone manufacturers. With it, mobile phone users can add life to SMS text messaging in the form of pictures, melodies, sounds, animations and formatted text. This gives the users new ways to express feelings, moods and personality in SMS messages.



Add life to messages to and from the T39 by inserting melodies.



Users can express feelings and personality by inserting pictures in messages.

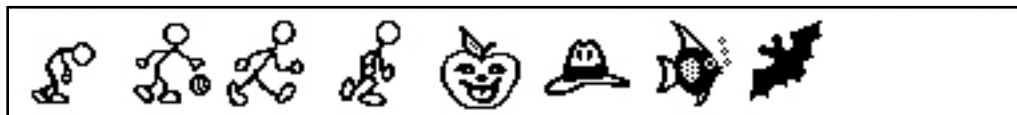
As well as messaging, users will enjoy collecting and swapping pictures and ring signals and other melodies, downloading them from the internet or editing them directly on the phone. See related documents listed under “Documents” on page 25. EMS is a network-dependent service.

One message may contain several EMS objects, such as a picture, an animation and a sound. The message is limited by size. If concatenation is used, up to six segments of 128 bytes each can be combined in one message.

Most phones without support for the EMS standard will simply ignore the EMS information when the message is received, and will just display the text in the message. This prevents the phone from displaying unreadable contents to the user.

Pictures And Animations

In the T39, there are 76 permanently stored pictures that express different moods and situations. The pictures are grouped by eight different themes to make them easy to find. In addition, the T39 has another 30 empty positions where the user can save pictures that have been received in incoming messages, or have been created by the user on the phone, see “Picture Editor” on page 19.



Examples of pictures that can be pre-installed in the T39

Animations makes it possible to further enhance the experience of the message. The T39 includes pre-defined animations for inserting into outgoing messages. In addition, the user can receive user defined animations in incoming messages.

Sounds And Melodies

The user can include pre-defined sounds in messages, such as “Chimes high” and “Notify”, and melodies, such as ring signals. Melodies received in incoming messages and composed by the user on the phone’s keypad can be stored in *My Melodies*. These are easily inserted in outgoing messages, see the User’s Guide. The built-in tool for editing and creating melodies on the phone’s keypad is the Melody Composer, see “Melody Composer” on page 15.

Picture Editor

The user can edit pictures and symbols directly on the phone, to create new, personal pictures for inclusion in EMS messages. The Picture Editor allows the user to view the picture in the display and to edit it with the pen tool.



The available tools include:

- Set line thickness
- Zoom in, zoom out
- Change picture width and height
- Select black or white pen

The T39 has a set of pre-defined pictures for use with EMS, which also can be edited. New pictures can be received with EMS messages and saved in the phone. See the User’s Guide for a description of this function.

MOBILE INTERNET AND E-MAIL

The Mobile Internet offers much more than mobile access to the internet - it opens up a whole new range of situation-based services. Services that give us anytime, anywhere access to personalized communications, information and entertainment. The T39 is built to facilitate the use of and access to services on the internet. The T39 also enables new technologies such as mobile positioning to create new commercial and productivity solutions.

Data Connections

In order to browse via WAP or use the e-mail program or an internet connection, the user must have a connection for data communication configured in the phone. Such a connection is called a Data connection. A Data connection contains specific settings and parameters for the connection, for example, the address to the appropriate server. Several Data connections can be saved in the T39, with different settings. To make it easier for the user, the Data connections can be provided by the operator in a message over the air, 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
- When working with WAP, e-mail or the internet, the user simply selects which Data connection they want to use for the activity
- Data connections are used for both GSM Data and GPRS connection settings
- Data connections contain choice of bearer type for WAP and corresponding bearer specific parameters
- Data connections contain all settings for the internet access point, whether a modem pool phone number or an IP address, and the user ID and password

Built-in E-mail Client

The T39 has a built-in e-mail client for sending and receiving e-mail messages. This means that users can connect to the e-mail account normally used on the corporate network, or another e-mail service as preferred. The same settings as those on the office PC can be used in the e-mail client on the user's T39. The e-mail client has several useful features:

- A true POP3/SMTP e-mail client, it supports the majority of e-mail and web-mail servers
- Copy of outgoing mail can be sent to the corporate e-mail server for future reference
- The user can attach a photo from a digital camera
- Automatic e-mail check at regular intervals selected by the user
- More than one e-mail account in the phone, for example, one for your business e-mail and one for your private e-mail
- Predictive text input (T9 Text Input) facilitates typing text in e-mail body, address and subject

Mobile Positioning

The geographic location of mobile subscribers can be used to provide them with related information and a variety of services. 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 T39, the integration of mobile positioning with WAP services means that a complete range of service and information tools are available.

More information regarding possibilities with and technologies for mobile positioning is available at <http://www.ericsson.com/mobilepositioning> and on the Ericsson Developers' Zone, at <http://www.ericsson.com/mobilityworld>.

MODEM AND AT COMMANDS

The T39 contains a complete GSM 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 *Bluetooth* wireless technology, infrared or a cable, 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.

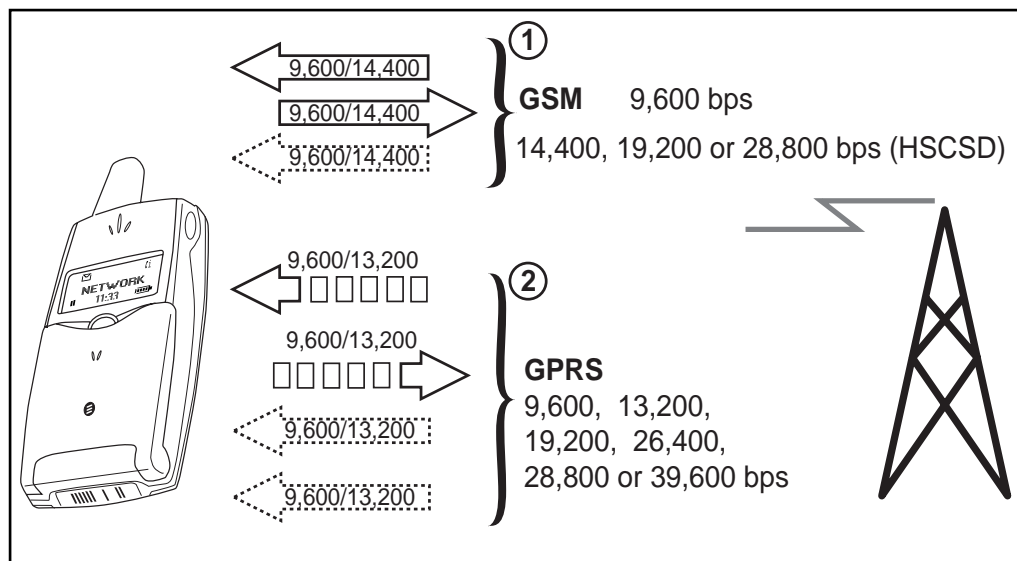
In the T39, AT commands are used both for:

- 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 T39 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 call only uses one of eight repeating time slots in the GSM channel, giving a data speed of 9,600 bps. The T39 supports a more efficient coding scheme, giving data speeds of up to 14,400 bps (providing the network supports this).



High Speed Data Gives A Faster Speed

High Speed Circuit Switched Data (HSCSD) gives the possibility to use two time slots for receiving data. In combination with a more efficient coding scheme, this can increase the receiving data speed up to 28,800 bps (network-dependent). Additionally, by using Data Compression (V.42bis) the experienced data rate can be increased up to four times.

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 39,600 bps download speed.

AT Commands Support

This section outlines the AT commands supported by the T39. The information here can be of use for advanced users, to indicate the possibilities they have to:

- develop new communications software
- add the T39 to an application's list of compatible modems
- adjust the settings of their mobile telephone and modem

The modem in the T39 supports the V.25ter command set, which is the standard communication set used by modems.

The T39 is compatible with industry de facto extensions, ETSI 07.05, 07.07 and 07.10.

Overview Of AT Command Functions

You use AT commands to configure your mobile telephone, to request information about the current configuration or operational status of your 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 in any one of three modes of operation. These are:

Off-line Command

Mode

The built-in modem is placed in off-line command mode when first powered up and is ready for entry of AT commands.

On-line Data Mode

Allows "normal" operation of the built-in modem, exchanging data or facsimile with the remote modem.

On-line Command

Mode

You can switch to on-line command mode when you want to send AT commands to the built-in modem while still remaining connected to the remote modem.

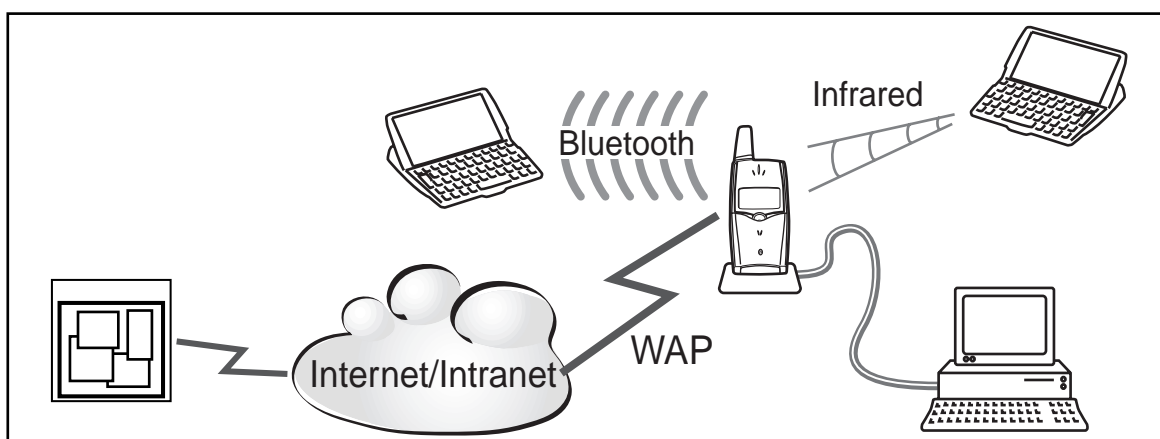
The AT commands in the T39 are grouped as follows:

- Control and Identification
- Call Control
- Interface Commands
- Data Compression
- Mode Management
- Audio Control
- Accessory Menus
- Accessory Authentication
- Voice Call Control
- GSM 07.10
- Accessory Identification
- VAD Support for External VAD
- 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 Phone book
- GSM Clock, Date and Alarm Handling
- GSM Subscriber Identification
- Ericsson Specific AT Commands for GSM
- MMI Settings
- Voice Control
- OBEX
- WAP Browser

SYNCHRONIZE CALENDAR AND PHONE BOOK

In everyday life, access to an updated calendar and details of friends and business colleagues is greatly appreciated. To be truly mobile, users must be able to carry their important information with them. Equipping mobile phones with Personal Information Manager (PIM) programs like 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. The growing use of groupware SW such as Microsoft Outlook and Lotus Notes means that more and more meetings are booked electronically in daily business life.



The user can save up to 200 appointments and tasks in the calendar, depending on the size of each item. These can be kept up to date with the user's other calendars and agenda programs on a PC or on a PDA or on the internet. The hierarchical phone book is also easily updated in the same way.

Synchronize With Local Calendar And Phone Book

Open standard	Communication with almost any groupware or office program, since the synch method complies to 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) protocol version 1.0, for data exchange
<i>Bluetooth</i> wireless technology, infrared or cable	The T39 synchronizes using the same protocol, regardless of connection type. It connects via <i>Bluetooth</i> wireless technology, infrared or cable. The cable is connected either directly to the phone or to the desktop charger.
Automatic synch	When infrared or <i>Bluetooth</i> wireless technology is switched on in the phone, the synch 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 running on the desktop computer. The synchronization engine compares, updates and resolves conflicts to make the information in the phone the same as in the computer.

Synchronize Over WAP Using SyncML

The synchronization in the T39 with a remote internet calendar takes place over WAP according to SyncML. The SyncML initiative is an open industry initiative, that has been formed to develop and promote a common protocol for synchronizing data among workstations, network application servers, and mobile information appliances, such as mobile phones, handheld computers, PDAs and other mobile devices. Ericsson is a sponsoring member to the SyncML initiative. More information is available on the official SyncML web site, see “Links” on page 44.

A synchronization engine is located on a server or on the corporate network to perform the task of synchronization. The Ericsson AirCalendar is an example of a server-based product that helps the users in an organization to update their phone books and meeting agendas over the internet.

Hierarchical Phone Book With Contacts

The T39 features a hierarchical phone book. For every contact, you can store name, home, work and mobile numbers, e-mail address and other information. The hierarchical phone book in the T39 is compatible with most groupware and agenda programs, such as Microsoft Outlook. This enables a smooth synchronization of contact names and numbers in the phone and contacts on the user's PC.

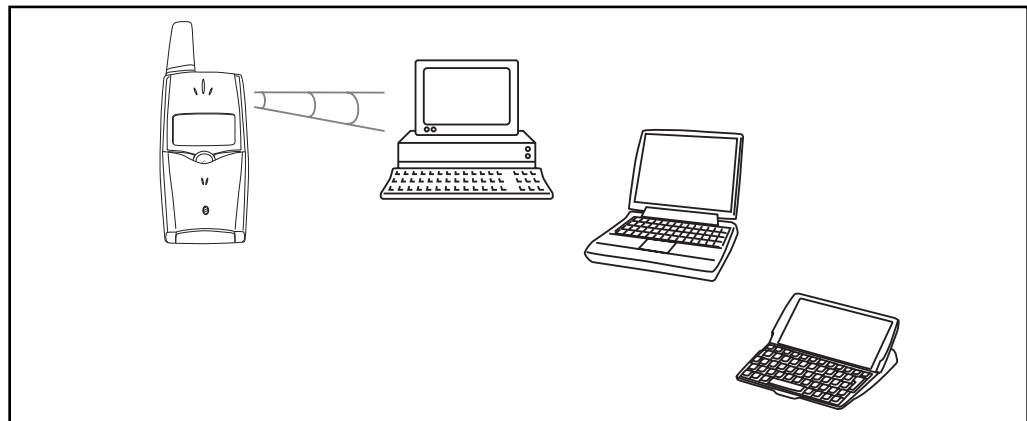
Synchronization Software And The T39

A very efficient enterprise solution is to use the T39 together with PCs equipped with XTND-Connect PC For Ericsson. It provides a fast, flexible and easy to use synchronization solution. The integration between XTNDConnect PC For Ericsson and Microsoft Outlook provides an embedded menu for one-key synchronization.

- A mobile worker typically uses SMS and Phone Book Manager
- An office worker typically uses XTNDConnect PC For Ericsson and Phone Settings

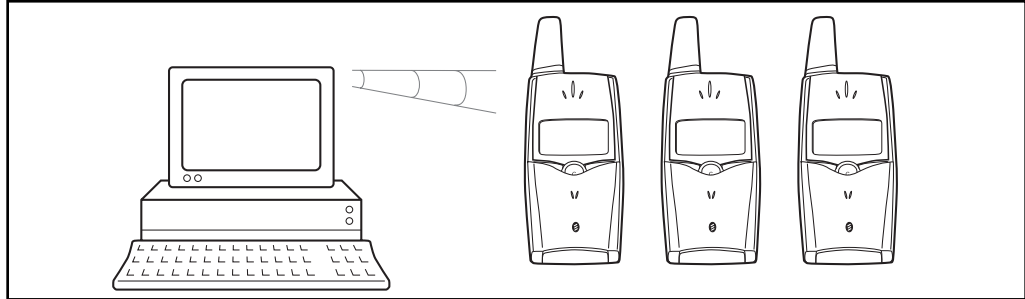
To enhance the functionality and compatibility further, the synchronization software can easily be upgraded.

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 or a PDA, it is an efficient way to synchronize data with the phone. This way, data can also be transferred between PCs to keep them in synch.



One phone can synchronize with an unlimited number of PCs/PDAs.

If the synchronization software is upgraded to 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 the T39, and needs to synchronize with one 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.



With the full version XTNDConnect PC, any number of phones can be synchronized with the same PC.

XTNDConnect PC For Ericsson

This synchronization software is bundled with the T39 and provides a powerful set of functions.

- Phone book and calendar synchronization for the T39
- A synchronization menu is embedded inside Microsoft Outlook. It provides one-key synchronization and allows the user to control the synch process by 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, 2000, Me (Millennium Edition), Windows NT 4.0
 - Pentium PC recommended (minimum 386)
 - 32 MB RAM recommended (minimum 16 MB)
 - 10 MB free hard disk space
 - Bluetooth wireless technology
 - Infrared or cable connection
- Support is handled by Ericsson

XTNDConnect PC

All users of the T39 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 T39
- XTNDConnect Phone Viewer makes phone data easy to enter. Use your computer to view, create and edit all data stored on your Ericsson phone
- 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, 2000, Me (Millennium Edition), Windows NT 4.0
 - Pentium PC recommended (minimum 386)

32 MB RAM recommended (minimum 16 MB)
10 MB free hard disk space
Bluetooth wireless technology
Infrared or cable connection

- A synchronization menu is embedded inside Microsoft Outlook. It provides one key synchronization and allows the user to control the synch process by easy to use settings
- Handheld devices supported include the T39, 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.

AirCalendar For Mobile People

The Ericsson AirCalendar is a synchronization engine and a web-based calendar with features like meeting planner, tasks, contacts and shared views. The synchronization engine can reside on the user's own desktop PC or on an enterprise server. AirCalendar gives supplementary features and benefits with its synchronized calendar.

The T39 can be synchronized with the web-based calendar over WAP. No browsing is required.

- Entering a URL, a user name and a password in the phone is all that is needed to initiate the synchronization
- The web-based calendar is maintained from any browser connected to the internet
- Members of a work group can let other members and associates view and enter appointments in the web-based calendar. The synchronization engine always compares appointments to try to resolve any conflicts
- The user can request to be automatically notified of any changes to the calendar, via e-mail or SMS

For more information about Ericsson AirCalendar, refer to <http://www.ericsson.com/aircalendar>.

INFRARED TRANSCEIVER

Infrared communication creates a data link between two communications devices through an infrared beam of light. On the T39, this link is used as a wireless connection with desktop computers, PDAs, Ericsson handheld computers, laptop PCs, digital cameras, 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 T39 complies with the specification IrMC 1.1, which defines how mobile telephony and communication devices can exchange information. In the T39, a subset of the specification IrMC 1.1 is also used when communicating via a cable.

Key benefits using the T39 with its built-in infrared transceiver:

- True wireless communication
- Low power consumption
- Secure data transmission
- Support for Medium Speed Infrared (MIR) to provide fast communication
- Support for instant detection of infrared port from a PC running Windows 2000
- Send and receive e-mail and data on the connected PC/PDA
- Connect to the internet or Intranet/LAN from the connected PC/PDA
- Support for connecting via GPRS networks (network-dependent service) also from a PC running Windows 9x/ Windows Me / Windows 2000
- Manage the phone book and the phone settings from a PC
- Attach a photo from a digital camera via an infrared connection, using IrTranP (Infrared Transfer Picture)
- Exchange business cards and calendar events with vCard/vCalendar compatible devices
- Exchange ring signals between compatible devices
- Alternatively, if no infrared eye is available, an optional RS-232 cable connection is supported

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 T39 within a metre and at a 30 degree angle from the infrared port on the PC/PDA, or other phone. One advantage of this narrow infrared gap is that the risk of transmitting data to other devices nearby is minimized. The infrared link is a serial connection, which means that the 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 IrDA–SIR standard provides a high level of noise immunity, which means that it is not sensitive to fluorescent light, sunlight and electromagnetic fields. This makes it suitable for a 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 optional DRS-10 cable provides the same connectivity between the phone and another unit.

FUNCTIONS AND FEATURES

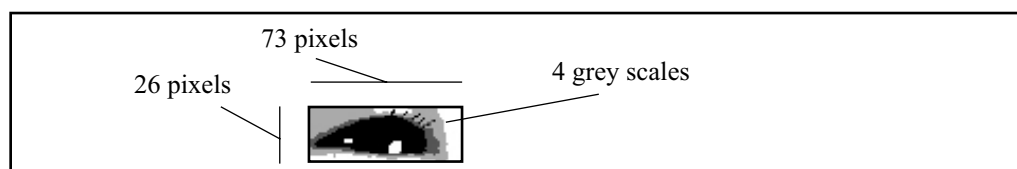
In-phone Functions And Features

Downloadable Background Pictures

The T39 makes it possible to use a favourite picture as a background in the display. The phone has a list of five pre-installed pictures, and one position for a custom picture that the user can download from another phone or from a PC or using WAP. In addition, one picture can be pre-installed by the operator, such as an operator logo.

When the user chooses to display a background picture, the menus, icons and operator name shown in the display are re-grouped to leave room in the center of the display for the background picture.

Picture format is GIF with four grey scales (no animation). The displayed picture size is 73 pixels wide and 26 pixels high, measured from the top left corner of the picture. If a picture is too wide (or too high) it will be truncated at the right (or bottom) edge.



The user can design a suitable background picture from a photo or an illustration, using editing equipment on a PC. The maximum picture file size for transferring to the phone is 600 bytes. If a picture file size is too large, it will not be recognised by the phone.

- The picture is sent to the phone from a PC or another phone using *Bluetooth* wireless technology or infrared. The user selects which transfer method to use for receiving. When the picture is received, the user accepts and saves it as a background picture.
- Using WAP, the users will be able to find downloadable pictures on WAP sites, for saving as custom picture in the phone.
- Operators can prepare logos or custom pictures for pre-installation in the T39. The phone can be set to display the operator logo as default background picture by customizing.

Profiles

The profile feature: a group of settings preset to suit a certain environment. The profiles are also related to intelligent accessories such as a desktop charger, a portable or vehicle handsfree; useful for company integration with call forwarding etc. Some phone accessories select a profile automatically. For example, when you place your phone in a car handsfree unit, the "In car" profile is chosen.

The easiest way to set up the profiles in one or several phones, is by using the Ericsson Phone Settings program.

Predictive Text Input (T9 Text Input)

The predictive text input (T9 Text Input), makes it possible for the phone to quickly recognize the most commonly used word beginning with a certain letter. This is convenient especially when writing long messages, such as text messages and e-mail, if the input language you select supports this. For example, if you press 2, 6, 3, the word "and" appears, since this is the most commonly used word with this combination of letters.

Voice Control

The T39 supports enhanced voice control, which makes it possible to interact with the phone using spoken commands. This is useful for handsfree use of the telephone. The functions include:

- Voice dial - call someone by saying the name and number type, e.g “John, home”
- Answer and reject calls with your voice when using a handsfree kit
- Change profile with your voice
- Record or listen to voice memos with voice commands
- Caller name can be presented with the recorded voice command
- Activate the voice control with a “magic word”

The Magic Word

The user can record a magic word and use it as a voice command to allow totally handsfree access to voice control. Instead of pressing and holding YES, just say the magic word and then one of the recorded voice commands. Activating the magic word consumes more power than in normal standby mode. The magic word is especially suitable when driving a car with a car handsfree kit installed, because external power is used instead of the battery power of the phone. The user can also use the magic word when the phone is connected to a portable hands-free.

Hierarchical Phone Book

In a company or an organization, you may need to deploy several phones with a common set of phone book entries. This is done in one of the following ways:

- Use the Ericsson Phone Book and SMS Manager on your PC to prepare the common phone book entries. Then send the phone book entries from the PC to each and every phone. See the User’s Guide.

or

- Prepare the phone book on one SIM card in one phone. Copy the contents from this SIM card to the phone’s memory, then put each one of all the other SIM cards into the phone and copy the contents of the phone’s memory to them. See the User’s Guide.

Voice Memo

Voice memo is accessed through the regular menu system. You can record either your own voice or the voice of the person with whom you are speaking. You can also record short memos to yourself. Total record time 92 seconds for normal quality mode, and 36 seconds for high quality mode.

Note that you may not be allowed to record the voices of other parties in conversation. Please check the appropriate regulations before using this function.

Calendar Entry Exchange

Calendar entries can be exchanged with other programs, according to the vCalendar specification. Using vCalendar, events, appointments, “ToDo” items and meeting information can be “beamed” to and from any IrDA equipped device with support for vCalendar, including PDAs, PIMs, laptops and phones.

Ring Signal Exchange

The T39 supports exchange of ring signals to and from other compatible phones.

More In-phone Functions And Features

- Active Flip answering
- Alarm Clock
- Background light blue
- *Bluetooth* built-in wireless technology
- *Bluetooth* wireless technology games
- Built-in modem
- Calendar
- Cable functionality
- Contacts
- Calculator
- Code memo
- Data transfer
- Ericsson ring signal logotype (to recognise an Ericsson phone by its ring signal)
- External antenna connector
- Full graphic display 4 grey scales and 5 rows of text
- Games including *Bluetooth* enabled
- Infrared functionality
- Last dialled numbers
- Melody composer
- Missed calls
- Power gauging
- Received calls list
- Ring signal composition
- Status lists
- Status view
- Stopwatch
- SIM Application Toolkit
- Tasks
- Timer
- Vibrating alert
- Voice answering
- Voice dialling
- WAP browser and services

Network-Dependent Features

Business Card Exchange

Business cards can be exchanged with other devices, according to the vCard specification. vCard information can include name, phone number, e-mail address, and so on. Laptops, PDAs, phones or other devices equipped with IrDA or *Bluetooth* wireless technology, and that supports vCard, can “beam” business cards.

Fixed Dialling And Restricted Calls

For a company or an organization, it can be useful to restrict phone calls. Fixed Dialling allows you 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. Check with your Operator about this feature.

Restricted calls allows you to block outgoing or incoming calls in certain situations, for example international calls.

More Network-dependent Features

- High Speed Data
- Advice of Charge Charging
- Advice of Charge Information
- Automatic time zone
- Call barring
- Call forwarding
- Call hold
- Call screening
- Call transfer
- Call wait
- Calling Line Identification CLI
- Closed User Groups
- Conference calls
- EFR Enhanced Full Rate Speech Coding
- e-GSM
- FR Full Rate Speech Coding
- GPRS (3+1 time slots)
- GSM 900/1800/1900 Triple band
- GSM phase 2+
- HR half rate speech coding
- International roaming
- Phone book on SIM
- SIM Application Toolkit
- Two line service / Alternate Line Service (ALS)
- Unified messaging

- Voice mail
- WAP 1.2.1

SIM APPLICATION TOOLKIT

The SIM Application Toolkit (SIM AT) is a smartcard-centric method of deploying programs that apply only to GSM and to SMS and USSD transports. Programs must be distributed on smartcards. 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 underway 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 the users over the air, directly to their phones. In the T39, a separate menu is available for functions residing on the SIM card. These can include sub-menus for controlling functions, and also functions which allow the phone to initiate calls, send data, and display information for the user.

SIM AT Services Supported By The T39

Service	Mode	Support in T39
CELL BROADCAST DOWNLOAD		Yes
DISPLAY TEXT	General: Support for packed and unpacked format in SMS default alphabet as well as UCS2 alphabet.	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.	No
	and 1 = character sets defined by bit 1 and bit 2 are disabled and the "Yes/No" response is requested.	No

Service	Mode	Support in T39
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
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	No
	'03' = Date, time and time zone \$(DTTinPLI)\$	No
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 SHORT MESSAGE	bit 1: 0 = packing not required	Yes
	1 = SMS packing by the ME required	Yes
SEND SS		Yes

Service	Mode	Support in T39
SEND USSD		Yes
SET UP CALL	General: Capability configuration	Yes
	Setup speech call CallParty Subaddress	No
	DTMF support	Yes
	'00' = set up call, but only if not currently busy on another call;	Yes
	'01' = set up call, but only if not currently busy on another call, with redial;	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 redial;	Yes
	'04' = set up call, disconnecting all other calls (if any);	Yes
'05' = set up call, disconnecting all other calls (if any), with redial;	Yes	
SET UP MENU		Yes
SMS PP DOWNLOAD		Yes
START MENU		Yes

User Interaction With SIM AT

DISPLAY TEXT	A text string of up to 160 characters (80 UCS coded) is supported.
Text clearing times	10-20 seconds. 60-second timeout 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) – 20 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 Reset command is executed by the phone it will prompt the user with the text 'Please wait' and then the phone will restart.
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 MESS.	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 'Extras' 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)

TERMINOLOGY AND ABBREVIATIONS

3GPP	3rd Generation Partnership Project.
API	Application Programming Interface.
Beam	Sending an item to another phone or a compatible application using the infrared link. This can include ring signals, calendar entries, business cards.
Bearer	The method for accessing WAP from the phone, for example GSM Data (CSD) and SMS.
bFTP	binary File Transfer Protocol.
Bluetooth	<i>Bluetooth</i> 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 connectivity to the internet. Available from the <i>Bluetooth</i> Special Interest Group (SIG), http://www.bluetooth.com .
Bookmark	A URL and header/title stored in the phone.
Browsing session	From the first access of content until the termination of the connection.
Calling Line Identification (CLI)	Shows the number of the person calling you in your mobile phone display. You can then make an informed choice as to whether or not to take the call. Bear in mind that not all numbers can be displayed. To use this service, it must be supported by your network.
Card	A single WML unit of navigation and user interface. May contain information to present to the user, instructions for gathering user input, etc.
CGI	Common Gateway Interface.
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.
e-GSM	Extended GSM, e-GSM, are 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, which favours both the user and the operators.
EFR	Enhanced Full Rate, speech coding.
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 traveling 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 systems 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.
IrTranP	Infrared Transfer Picture, a specification for sending pictures via infrared.
ISP	Internet Service Provider.
ITTP	Intelligent Terminal Transfer Protocol.
LAN	Local Area Network.
ME	Mobile Equipment.
Micro browser	Accesses and displays the internet contents in your mobile phone, just as an ordinary browser does in your computer. The micro browser uses small file sizes and the bandwidth of the wireless-handheld network.
MIR	Medium speed infrared
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 a message, SMS, 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 your 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. Your phone uses the small plug-in card.
SIR	Serial Infrared.
SMS	Short Message Service. Allows messages of up to 160 characters to be sent and received via the network operator's message centre to your mobile phone. Messages are stored if the phone is off or out of reach ensuring that they reach you. To use this service, it must be supported by your network.
SS	Supplementary Services.
SWIM card	A SIM card with a WIM module.
TCP/IP	Transmission Control Protocol/Internet Protocol.
TE	Terminal Equipment.
TLS	Transport Layer Security.
Triple Band GSM 900/1800/1900	Your phone is a triple band phone, which means that you can use your phone on three different kinds of networks – the GSM 900 and the GSM 1800 and GSM 1900 systems (also called PCN or DCS 1800) systems.
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 conferencing, 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.
WIM	Wireless Identity Module
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, for example.
WSP	Wireless Session Protocol.
WTLS	Wireless Transport Layer Security.
WWW	World Wide Web.
XML	Extensible Markup Language.

RELATED INFORMATION

Documents

- The T39 User's Guide
- WAP June2000 (WAP 1.2.1) Specification
- Mobile Phones R520, T20, A2628 Developers' Guidelines WAP Services
- AT Command Reference Manual

Software

- XTNDConnect PC For Ericsson, bundled with the phone.
- XTNDConnect PC, upgraded version from Extended Systems Inc.

Links

- <http://mobileinternet.ericsson.com> - a site for the mobile phone user
- <http://www.ericsson.com/wap> - a site for information on WAP
- <http://www.ericsson.com/aircalendar> - information the Ericsson AirCalendar
- <http://www.ericsson.com/mobilityworld> - information, tools, white papers and software updates on Ericsson products and technologies; check frequently!
- <http://www.3gpp.org>- home of the 3rd Generation Partnership Project
- <http://www.irda.org> - home of the Infrared Data Association
- <http://www.etsi.org> - home of the European Telecommunications Standards Institute
- <http://www.wapforum.org> - home of the WAP Forum
- <http://www.gprsworld.com>
- <http://www.extendedsystems.com>
- <http://www.bluetooth.com> - the official Bluetooth Special Interest Group web site
- <http://www.imc.org>
- <http://www.syncml.org> - the official home of the SyncML open industry initiative.

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APPENDIX: TECHNICAL SPECIFICATIONS

The consumer pack includes

- 1 Mobile Phone T39
- 1 Ultra Slim Battery BUS-11 (600 mAh)
- 1 Travel Charger CTR-10
- 1 Ericsson service and support leaflet
- 1 User documentation
- 1 Accessory leaflet
- 1 CD ROM (including Ericsson PC programs, MS Outlook and XTNDConnect PC synchronization software)

General

Product name	T39m/T39mc
System	GSM phase 2 recommendations. GSM 900 (CTR 19 and CTR 20), GSM 1800 (CTR 31 and CTR 32) 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 T39m	1130102-BV
Type number T39mc	1130102-CN

Exterior Description

Size	96 x 50 x 18 mm
Weight	with High Capacity Battery BHC-10: 120 grams with Slim Battery BSL-11: 104 grams with Ultra Slim Battery BUS-11: 86 grams
Display size	101 pixels wide, 54 pixels high
Graphic display	4 grey scales
Text size	3 sizes (depending on software version)
Text rows	up to 5 rows of text, depending on text size
Colour	White Rose, Classic Blue, Icecap Blue
Keypad	17 keys and a slider on the side
Active flip	Yes

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:

Arabic (AR), Brazilian Portuguese (PB), Bulgarian (BG), Canadian French (CF), Czech (CS), Chinese traditional (ZH), Chinese simplified (ZS), Chinese Taiwan (ZT), Croatian (HR), Danish (DA), Dutch (NL), English (EN), Estonian (ET), Farsi (FA), Finnish (FI), French (FR), German (DE), Greek (EL), Hebrew (IW), Hindi (HI), 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)

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%

Current Consumptions, Talk And Standby Times

Dimension	Value in GSM 900	
Transmission current	54.9 mA (min) 215 mA (max)	
Standby current	1.95 mA (min), (paging rate 9, 1 neighbour present) 3.75 mA (max), (paging rate 2, 16 neighbours present)	
High Capacity Battery BHC-10 (1400 mAh)	Talk time	6.5 to 25.5 hours
	Standby time	375 to 715 hours (up to 29 days)
Slim Battery BSL-11 (850 mAh)	Talk time	4 to 15.5 hours
	Standby time	225 to 435 hours (up to 18 days)
Ultra Slim Battery BUS-11 (600 mAh)	Talk time	2.5 to 11 hours
	Standby time	160 to 300 hours (up to 12 days)

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	

CPHS Compliancy

The Common PCN Handset Specification (CPHS) is an industry standard which defines terminal and SIM functionality in addition to the standard GSM specifications. Several handset manufacturers have implemented the features, but since they remain outside the core GSM/3G specifications, their use is limited.

The T39 is manufactured to comply with CPHS. However, a detailed and formal specification and compliancy declaration is not available in this document. Please refer to Ericsson for more information.

Bluetooth Wireless Technology Technical Data

Dimension	Support in the T39
<i>Bluetooth</i> capability statement	This product is manufactured to comply with the Bluetooth specification 1.1. However, since the qualification for the 1.1 specification is not yet available, this product has been formally qualified according to the Bluetooth specification 1.0b.
<i>Bluetooth</i> functions	Generic Access Profile Serial Port Profile Headset Profile Dial-up Networking Profile Fax Profile Generic Object Exchange Profile Object Push Profile Synchronization Profile
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

WAP Browser Technical Data

Feature	Support in the T39 WAP browser
Back to previous page	Yes
Bearer type GPRS (IP)	Yes
Bearer type GSM Data (IP)	Yes, ISDN and analog
Bearer type SMS	Yes (point-to-point)
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
Cache	Yes (size 8 kbyte).
Character sets *	UTF8 (Default), USAASCII, Latin1, UCS2
Clear cache	Yes
Colour	High resolution grey scale display (four grey scales)
Home page	Yes, up to 5 different, one for each WAP profile
Digital signatures (security)	Yes, WML Script Crypto API - Sign Text
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.
Network Settings	Up to 5 different settings available by selecting WAP profile (Intranet, Internet, Banking, Gateway etc.)
OTA Support	Yes
PPP Authentication	PAP, CHAP and MS-CHAP
Reload page	Yes
Tables	Yes
User Agent Profiles	Yes, list of client characteristics - e.g. display size
WAP/WML	WAP June2000 (WAP 1.2.1)

**) When creating WML applications, it is recommended always to 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 T39 WAP browser
WAP profiles	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 and Client Certificates needed in phone

GPRS Technical Data

Dimension	Support in T39
Data rates	Multislot class 8 supported. CS-1, CS-2 9,600 bps, 13,200 bps supported (network-dependent).
Downlink data rate	Up to 39,600 bps for packet data communication, using 3 time slots in coding scheme CS-2
Uplink data rate	Up to 13,200 bps for packet data communication, using 1 time slot in coding scheme CS-2
Mode of operation	Class B and Class C modes of operation supported Network Operation Modes I, II and III handled by mobile It is possible for the user to choose which of the Circuit switched and GPRS services should be favoured.
R Reference point	Physical layer: Support of IrDA, <i>Bluetooth</i> 1.0 and RS232 PPP is supported as L2 layer in the R reference point Authentication algorithms PAP, CHAP and MS-CHAP supported
IP connectivity	PDP type IP is supported IP termination in mobile or TE (laptop, PDA) supported TCP/IP header compression supported
Application	WAP over GPRS supported (UDP/IP and GPRS-SMS) SMS over GPRS (SMS-MT, SMS-MO) supported
QoS	QoS negotiation supported Reliability class 1-5 supported Mean and peak throughput rate limited by multislot class 8 and CS-4
PDP context	Up to 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 GPRS non-aware, SIMs are supported

Built-in GSM Data Modem Technical Data

Dimension	Support in the T39	
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	

Infrared Transceiver Technical Data

Dimension	Support in the T39	
Standards	IrDA DATA with secondary implementation of IrLAP 1.0 and IrDA-Ultra, IRMC 1.1 except RTCON (Real Time Control Protocol) AT commands industry standard, ETSI 07.05 and 07.07	
Coverage area	Up to 1 metre (3.3 feet)	
Power consumption	Slightly increased depending on type of communication.	
Compatibility	Computer	IrDA equipped computers using Win95/98/NT 4.0, vCard/vCalendar support to exchange business cards/calendar entries
	PDA	Ericsson MC218 and other IrDA equipped PDAs running Windows CE, EPOC32 or PalmOS, vCard/vCalendar support to exchange business cards/calendar entries
	Phone	T39 to exchange business card, calendar entries and ring signals, as well as other vCard/vCalendar compliant phones
Data transmission rate	Max speed between phone and IrDA device (e.g. PC, another phone) SIR: up to 115,200 bps MIR: up to 1,152,000 bps	

Connection Via Cable

The optional DRS-10 cable supports a subset of the signals in the RS-232 standard, as detailed below. The cable connection supports autodetect (automatic detection of baudrate, parity, data-bits and stopbits used by host device). The maximum data speed is up to 230,400 bps.

Support of HW and SW flow control
Yes

Support for AT commands industry standard, ETSI 07.10 - multi channels
Yes

Signal in RS-232	Support in DRS-10
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

Enhanced Messaging Service Technical Data

EMS Feature	Support in T39																																													
Concatenation (linked SMS)	Yes, 6 parts, each message up to 128 bytes of data																																													
iMelody format support	<table border="1"> <thead> <tr> <th></th> <th>iMelody notation</th> <th>Melody Composer notation</th> </tr> </thead> <tbody> <tr> <td>Note range: (If a note is out of range the melody will not be played)</td> <td>From *3c to *5b</td> <td>From c to ++b (From octave 3 note c to octave 5 note b)</td> </tr> <tr> <td>Durations: 150 ms</td> <td>3</td> <td>c</td> </tr> <tr> <td>225 ms</td> <td>2</td> <td>c.</td> </tr> <tr> <td>300 ms</td> <td>1</td> <td>C</td> </tr> <tr> <td>450 ms</td> <td>0</td> <td>C.</td> </tr> <tr> <td>Flat note:</td> <td>Yes, &</td> <td>(b)</td> </tr> <tr> <td>Sharp note:</td> <td>Yes, #</td> <td>#</td> </tr> <tr> <td>Rest:</td> <td>Yes, r3 (r2, r1, r0)</td> <td>p (p. , P , P.)</td> </tr> <tr> <td>Beat:</td> <td>No</td> <td></td> </tr> <tr> <td>Style</td> <td>No, (S)</td> <td></td> </tr> <tr> <td>Volume modifiers:</td> <td>No, (V+, V-)</td> <td></td> </tr> <tr> <td>Volume:</td> <td>No, (V)</td> <td></td> </tr> <tr> <td>Duration Specifier:</td> <td>No, (. : ;)</td> <td></td> </tr> <tr> <td>Led, Vibe, Backlight, Repeat</td> <td>No</td> <td></td> </tr> </tbody> </table>		iMelody notation	Melody Composer notation	Note range: (If a note is out of range the melody will not be played)	From *3c to *5b	From c to ++b (From octave 3 note c to octave 5 note b)	Durations: 150 ms	3	c	225 ms	2	c.	300 ms	1	C	450 ms	0	C.	Flat note:	Yes, &	(b)	Sharp note:	Yes, #	#	Rest:	Yes, r3 (r2, r1, r0)	p (p. , P , P.)	Beat:	No		Style	No, (S)		Volume modifiers:	No, (V+, V-)		Volume:	No, (V)		Duration Specifier:	No, (. : ;)		Led, Vibe, Backlight, Repeat	No	
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Duration Specifier:	No, (. : ;)																																													
Led, Vibe, Backlight, Repeat	No																																													
Include melody in message	Yes, according to iMelody v1.0 format																																													
Include picture in message	Yes																																													
Melody composer	Yes, up to 8 user defined melodies and ring tones in My Melodies, each melody up to 80 notes long. Four note durations available.																																													
Picture editor	Yes, edit My Pictures in display using black or white pen, line thickness, zoom in, zoom out, picture size.																																													

EMS Feature	Support in T39	
Picture, receive to phone	Fixed size (WxH in pixels):	Small: 16x16, Large: 32x32
	Variable size. Note: The total product of Width and Height must never exceed 1024 pixels.	Width in pixels: (Pictures wider than display are truncated.) In multiples of 8 pixels up to the screen width (i.e. 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96)
		Height in pixels: from 1 to 1024
Picture, edit a picture saved in <i>My Pictures</i>	Fixed and variable sizes according to “Pictures, received to phone” in this table. The picture size depends on the picture format when it was saved to <i>My Pictures</i> .	
Picture, create a new picture in <i>My Pictures</i>	User defined size	Width in pixels: 8, 16 or 32
		Height in pixels: 8, 16 or 32
Play animation on focus	Yes	
Play melody on focus	Yes	
Pre-defined animations	Yes, 6 animations: Ironic, Glad, Sceptic, Sad, WOW!, Crying	
Pre-defined pictures	Yes, 76 pre-defined pictures grouped by themes	
Pre-defined sounds	Yes, 10 sounds: Chimes high, Chimes low, Ding, TaDa, Notify, Drum, Claps, FanFare, Chord high, Chord low	
Text templates	Yes	

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