Mobile Phone R520 White Paper

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PREFACE

Purpose Of This Document

The Ericsson R520 White Paper is designed to give the reader a deeper technical understanding of how the R520 is designed, and of how it interacts with other media. This document will make it easier to integrate the R520 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 on the Ericsson Developers' Zone. The site at http://www.ericsson.com/developerszone contains up-to-date information about technologies, products and tools.

PRODUCT DESCRIPTION

The R520 is a Triple Band phone with built-in Bluetooth^{TM} wireless technology, high speed data, GPRS and Wireless Application Protocol (WAP) support. It integrates wirelessly with personal office tools and with the Internet or Intranet corporate calendars, phone books and services, to form a unique communications tool for the organization.

R520 Always Online With The Mobile Internet
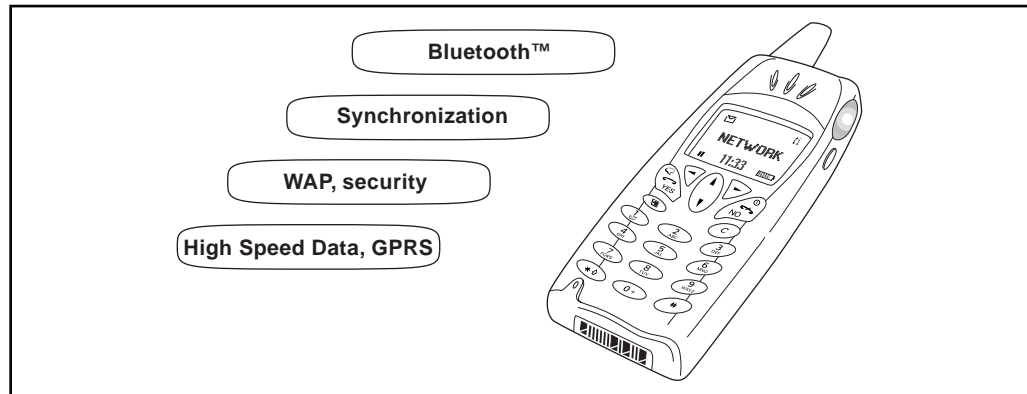
Bluetooth wireless technology

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 headsets, 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 an Internet calendar is effortless. Appointments and tasks in the phone's calendar and entries in the phone book can be synchronized via WAP/Internet, via *Bluetooth* connection, infrared, a desktop charger or a cable. The R520 features a hierarchical phone book in which you can store all the contact details for each person.

Secure WAP

Internet browsing and secure mobile e-commerce 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 R520 provides WAP over GPRS with constant connection, GSM Data or SMS.

High speed and GPRS The R520 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 R520 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. A cable can also be used if no Infrared is available on the PC or handheld.

Voice and user interface
> Built-in **speakerphone**, **voice memo recorder** and enhanced **voice control** functions. A full **graphic display** with greyscales 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. An **Options button** provides dynamic menus for quick handling in all situations.

Accessories
> A wide range of Ericsson **accessories** are available, such as *Bluetooth* wireless headsets and PC cards, to enhance productivity further.

Services on the network
> The R520 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.

Technical Specifications For The Phone

General

Product name	R520
System	GSM 900/GSM1800/GSM1900 (e-GSM supported)
SIM card	Small plug-in card, 3V or 5V type
Type number	1130101-BV

Dimensions and performance

Size	130 x 50 x 16 mm
Weight	with Ultra Slim battery approx. 105g
Talk time	up to 7 hours 35 minutes
Standby time	up to 200 hours (> 8 days)
Speech coding	HR, FR, EFR supported where available, for high speech quality

General Packet Radio Services (GPRS)

Data rates (up to)	53,600 bps for packet data communication
	with V.42bis compression up to four times higher transmission rates

Built-in *Bluetooth* wireless technology

Supported functions	Dial-up Networking Profile, Fax Profile, Generic Access Profile, Generic Object Exchange Profile, Headset Profile, Object Push Profile, Serial Port Profile, Synchronization Profile
Frequency band	2.4 GHz - the unlicensed ISM band
Data rate (up to)	108,800 bps with one time slot

Built-in infrared transceiver

Standards	IrDA DATA with secondary implementation of IrLAP 1.0 and IrDA-Ultra, IRMC 1.1 AT commands industry standard, ETSI 07.05 and 07.07 and 07.10
Data rates (up to)	115,200 bps between phone and IrDA device (e.g. PC, another phone)

Built-in GSM Data modem

Data rates (up to)	28,800 bps for GSM Data communication, no compression with V.42bis compression up to four times higher transmission rates
AT modem	V.25ter command set supported

Ambient temperatures

Max	+55°C
Min	-10°C

Display

Display size	101 pixels wide, 67 pixels high
Graphic display	4 grey scales
Text size	3 sizes (depending on software version)
Text rows	up to 8 rows of text, depending on text size

Supported Characters, depending on software in the phone.

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)
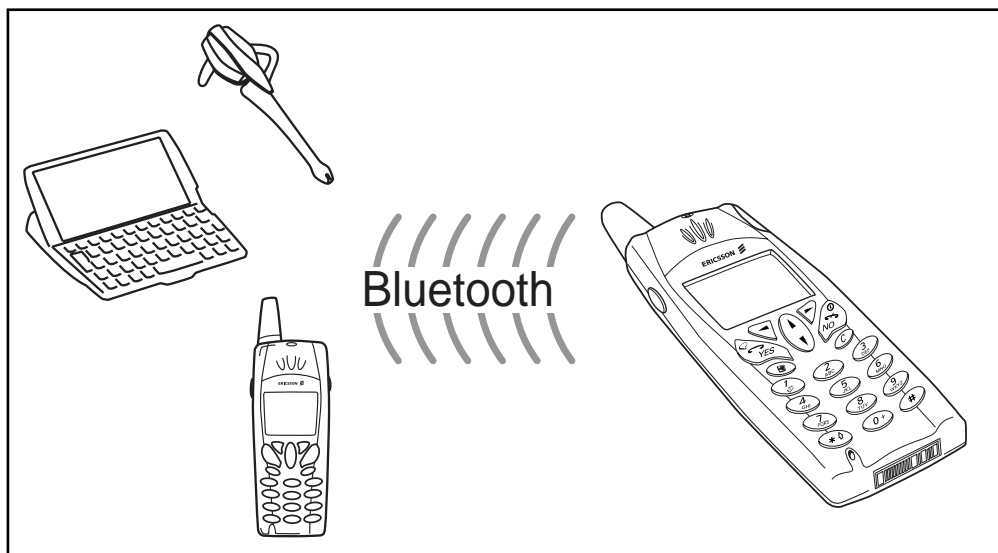
BLUETOOTH^{TM} WIRELESS TECHNOLOGY

The R520 has built-in *Bluetooth* wireless technology, which operates in a globally available 2.4 GHz radio frequency band, and ensures fast and secure communications up to a range of 10 metres 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.

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:

• 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 R520

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 R520 are:

True wireless	Cable replacement for connecting to headsets, computers, networks, printers and other devices.
Several devices	The R520 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, PDA and quick exchange of business cards, calendar events and melodies with other phones and devices.
Low power	Low power consumption.
Phone management	Manage the phone book and the phone settings from a *Bluetooth* PC.

Technical Specifications For Bluetooth Wireless Technology

Feature	Support in the R520
Dial-up Networking Profile	Yes
Fax Profile	Yes
Generic Access Profile	Yes
Generic Object Exchange Profile	Yes
Headset Profile	Yes
Object Push Profile	Yes
Serial Port Profile	Yes
Synchronization Profile	Yes

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 (3 months*) Voice mode: 8-30 mA (75 hours*) Data mode average: 5 mA [0.3-30 mA, 20 kbps, 25%] (120 hours*) *) at minimum, with Ultra Slim battery
Data transmission rate	up to 108,800 bps with one time slot

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 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.
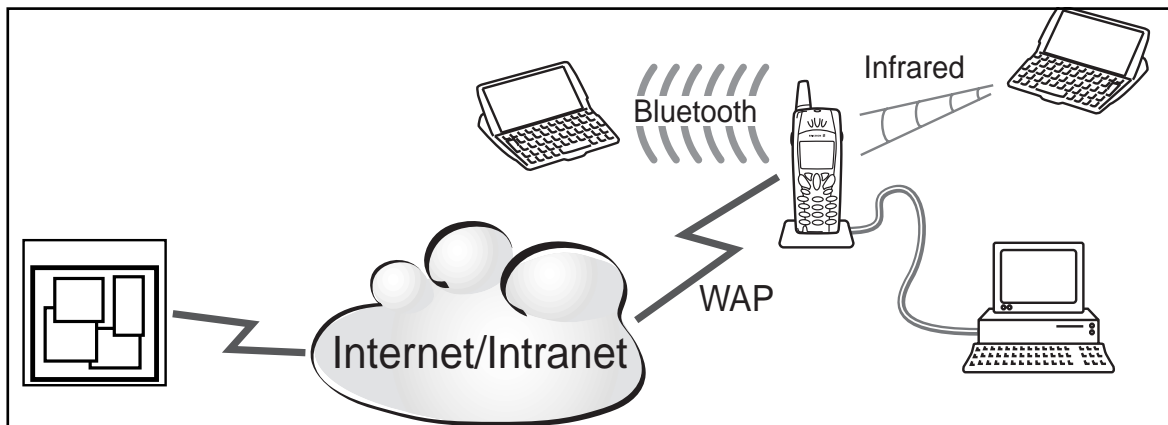
The calendar in the R520 has up to 200 tasks and entries that can be kept up to date with the user's other calendars and agenda programs, whether on a PC or remotely over a network, such as the Internet. The hierarchical phone book is also easily updated in the same way.

Synchronize With Local Calendar And Phone Book

Open standard
Communication with almost any groupware, office program and remote calendar is possible, 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
vNote for note book information
vMsg for electronic mails
ObEx (Object Exchange) for data exchange

Bluetooth wireless technology or infrared
The R520 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 synch
When infrared or *Bluetooth* 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 Wide Area Network And Internet

Remote calendar   The R520 supports Wide Area Network (WAN) remote synchronization to give users the same service without them having to be at the office or at home. Features include synchronizing the phone with calendar information on the web or on the corporate network, and sharing and updating information in a work group.

Synch over WAP   The synchronization in the R520 with a remote Internet calendar takes place over WAP according to IrMC 1.1, just like a local synchronization. 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 R520 features a hierarchical phone book. For every contact, you can store name, home, work and mobile numbers, pager number, e-mail address and other information. The hiearchical phone book in the R520 is compatible with most groupware and agenda programs, such as Microsoft Outlook. This enables a smooth synchronization of contact names, numbers and addresses in the phone and contacts on the user's PC.

Synchronization Software And The R520

A very efficient enterprise solution is to use the R520 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

- For both groups, AirCalendar is suitable for keeping the calendars updated in the mobile phone and on the web

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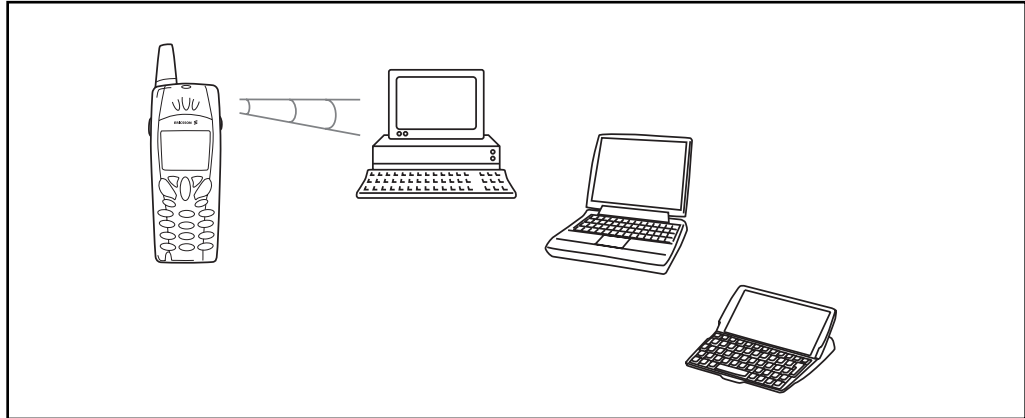
One phone can synchronize with an unlimited number of Pcs/PDAs.

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 R520, 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.
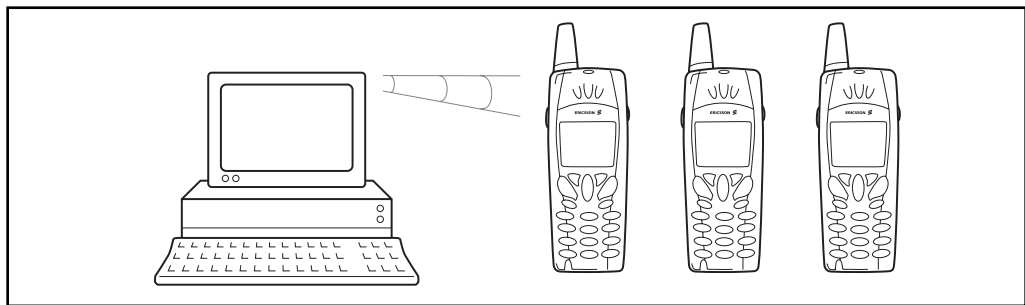
With the full version XTNDConnect PC, any number of phones can be synchronized with the same PC.

XTNDConnect PC For Ericsson

This synchronization software is bundled with the R520 and provides a powerful set of functions.

- Phone book and calendar synchronization for the R520

- 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 R520 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 R520

- 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 R520, 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 R520 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.

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 R520 is compliant with WAP June2000 (WAP 1.2.1) and 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 R520

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 R520 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.
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 R520 to allow the contents to be automatically optimized for the phone.
Security	They 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 R520. The WIM is used to store security related information.
Synchronize remotely	The R520 can update the calendar and phone book with a remote calendar on the Internet, over WAP. In this way, users can keep their calendars up to date with corporate meeting planning wherever they are.
Several bearer types	The R520 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.)
Options button	During WAP browsing, the options button on the R520 gives the user immediate access to a dynamic option menu when using WAP services, similar to a mouse right-click in PC programs.
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 R520" on page 24.

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 R520 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.

Technical Specifications Of The WAP Browser

Feature	Support in the R520 WAP browser
Back to previous page	Yes
Bearer type GPRS (IP)	Yes
Bearer type GSMData (IP)	Yes, ISDN and analog
Bearer type SMS	Yes (point-to-point)
Bookmarks	Yes, up to 50 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)
Digital signatures (security)	Yes, WML Script Crypto API - Sign Text
Home page	Yes, up to 5 different, one for each WAP profile
Hyperlinks in Text	Yes, highlighted by inverse video

Feature	Support in the R520 WAP browser
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)
WAP profiles	5 WAP profiles, each with its own settings
WIM on SIM (security)	Yes, Storage of Private keys and Client Certificates, execution of security algorithm
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, Client Certificates needed in phone

*) 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.

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

The R520 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).

When using certain WAP services, the user may want more security than normal, for example when using banking services. The user establishes a secure connection between the phone and the WAP gateway. To use such connections, certificates have to be saved in the phone. The certificates are made available so that the users can download them from certain WAP sites.

There are two types of WAP security locks (PIN codes) in the phone. The locks protect the subscription from unauthorized use when browsing. The locks should typically be supplied from the operator.

Access lock   An access lock is needed when accessing certain WAP sites or when reviewing the certificates. The user is asked to enter it before a secure WAP connection is established.

Signature lock   A signature lock is used for confirming transactions - like a digital signature.

In the R520, 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, or receipt, is saved in the phone. The contract contains details about the transaction.

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
*   News, sport results, weather forecasts, etc.
*   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 R520, the user selects if push messages are allowed to be received or not. There are two different forms of Push services:

Service Indication (SI)   This is basically a text message to the user containing a link to a URL carried by the SI. If the user decides to load the suggested URL, normal WAP browsing commences.

Service Loading (SL)   This means that the WAP site content is immediately loaded and exe-

cuted on the client, or alternatively is loaded and stored in the cache for later use. In both cases, the SL is loaded without any user intervention and is not further described here.

When a service indication is received in the R520, it is presented to the user in one of the following ways:

High	Immediately displays the message irrespective of the current activity.
Medium	Message is immediately displayed, unless the user is engaged in another activity. In this case the message is indicated to the user, who retrieves it later from the inbox.
Low	Message is not immediately displayed. Instead it is put in the Inbox, and an indication is given in the standby screen.

In the R520 push message inbox, a list shows the first part of each received message, newest first. The user decides to read or delete the message, and whether to load the suggested URL in the WAP browser.

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 and not Cell Broadcast

* The setup information is a binary encoded XML message. To receive information about OTA specifications, please contact your local Ericsson representative for consumer products

* 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 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.

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 R520 is built to facilitate the use of and access to services on the Internet. The R520 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, 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 R520, with different settings.

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 or e-mail, 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 R520 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 R520. 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 via an infrared connection

- 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

Remote Calendar

Users of the R520 can utilize WAP and GPRS by having their calendar and other organizer functions updated via the Internet and in real time while on the move. Companies and organizations can install web-based calendars and information storage. See "Synchronize Over Wide Area Network And Internet" on page 13.

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 R520, the integration of mobile positioning with WAP services means that a complete range of service and information tools are available.

More information regarding possibilites with and technologies for mobile positioning is available at http://www.ericsson.com/mobilepositioning.

GENERAL PACKET RADIO SERVICES

The R520 supports GPRS (General Packet Radio Services), 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.
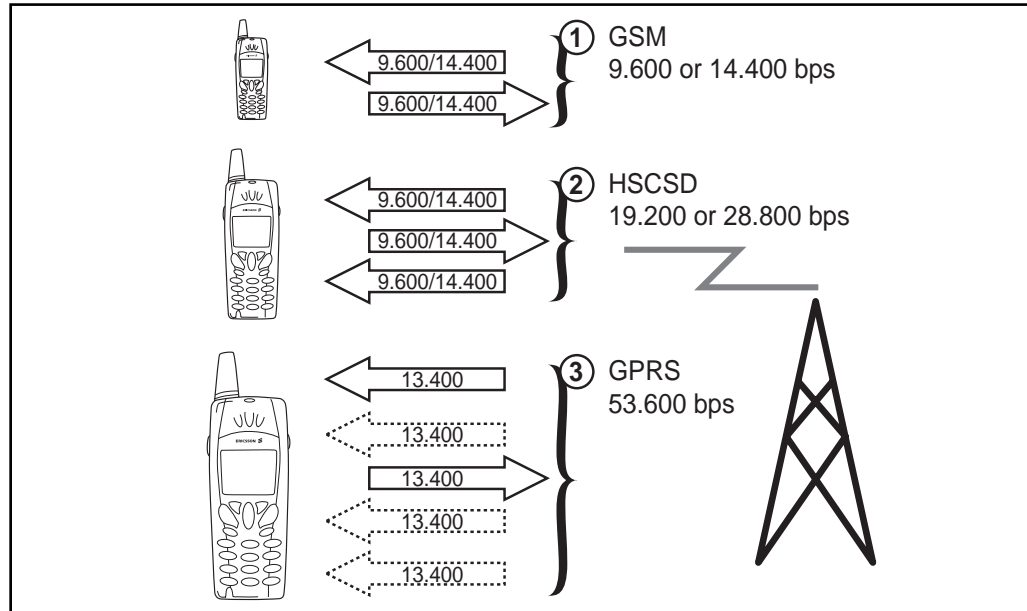
- •1. A normal GSM voice or data call only uses one of eight repeating time slots in the GSM channel. Data speeds are therefore limited to 9,600 or 14,400 bps

- •2. With HSCSD (High Speed Circuit Switched Data), the phone uses two time slots for receiving data, increasing the data speed for receiving data up to 28,800 bps

- •3. In GPRS, data is sent in packets, and one or several time slots can be combined to provide the necessary bandwidth, up to 53,400 bps for receiving data

Using GPRS In The R520

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 that allow data speeds of 9,050 bps, 13,400 bps, 15,600 bps and 21,400 bps, respectively. The R520 works with all 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 R520 uses three or four time slots for receiving data, and one slot for transmitting. This means the speed for receiving data is up to 53,400 bps and for sending data up to 13,400 bps.

This 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, synchronization of calendar and phone book.
SMS over GPRS	Users can send and receive messages while connected via GPRS, which means that they can be constantly available for SMS, broadcast messages, paging via SMS, e-mail notification etc.
E-mail over GPRS	The e-mail client in the R520 can operate over a GPRS connection. 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.
GSM Data over GPRS	This provides data and Internet/Intranet access, for a PC, PDA or hand-held device connected via *Bluetooth* wireless technology or Infrared.

Technical Specifications Of GPRS In The R520

|	
Data rates	Multislot class 8 supported. CS-1, CS-2, CS-3 and CS-4 supported. 9,050 bps, 13,400 bps, 15,600 bps and 21,400 bps supported (network-dependent).
Downlink data rate	Up to 53,600 bps for packet data communication, using 4 time slots. with V.42bis compression up to four times higher transmission rates.
Uplink data rate	Up to 13,400 bps for packet data communication, using 1 time slot. with V.42bis compression up to four times higher transmission rates.
Mode of operation	Class B mode 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, *Bluetooth* 1.0 and RS232. PPP is supported as L2 layer in the R reference point. Authentication algorithms PAP and 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	10 PDP context descriptions stored in mobile. PDP context description is edited via application in mobile, AT-command or via OTA. Simultaneous PDP context not supported. Network requested PDP context not supported.
SIM	GPRS aware, as well as GPRS non-aware, SIMs are supported.

MODEM AND AT COMMANDS

The R520 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 R520, 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 R520 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 speeds are therefore limited to 9,600 or 14,400 bps.
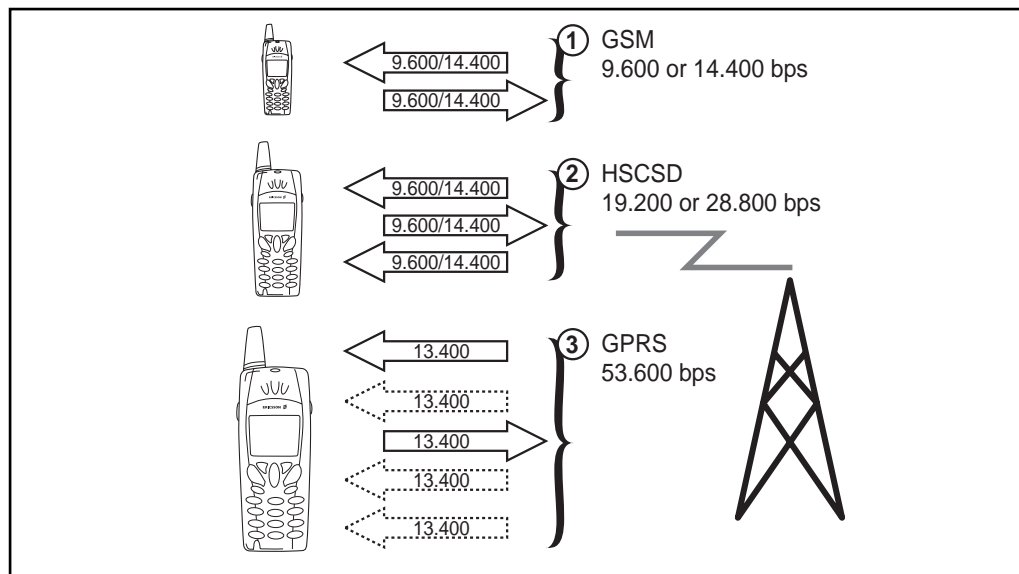
High Speed Data Gives A Fast Download Speed

High Speed Data (HSCSD) increases speeds for circuit switched data by allowing the phone 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 Contant 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 53,600 bps download speed.

Technical Specifications For Built-in Modem

Standards	ETSI 07.05 and 07.07 and 07.10, V.25ter command set supported

Data rates, Circuit Switched
download (up to)	28,800 bps for High Speed Data communication
upload (up to)	9,600 or 14,400 bps for GSM Data communication, no compression with V.42bis compression up to four times higher transmission rates

Data rates, GPRS	See "Technical specifications of GPRS in R520" on page 25.

AT Commands Support

This section outlines the AT commands supported by the R520. The information here can be of use for advanced users, to indicate the possibilities they have to:

• develop new communications software

• add the R520 to an application's list of compatible modems

• adjust the settings of their mobile telephone and modem

The modem in the R520 supports the V.25ter command set, which is the standard communication set used by modems.

The R520 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 R520 are grouped as follows:

• Control and Identification

• Call Control

• Interface Commands

• Data Compression

• Mode Management

• Fax Class 1

• Fax Class 2

• Audio Control

• Accessory Menus

- Accessory Authentication
- Voice Call Control
- GSM 07.10
- Accessory Identification
- VAD Support for External VAD
- Customized Menu
- GSM DTE-DCE Interface Commands
- GSM Call Control
- GSM Data/Fax
- 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 Digital Binary and Ping-Pong 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 R520, this link is used as a wireless connection with desktop computers, PDAs, Ericsson handheld computers, laptop PCs, other phones (for example, the R520), 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 R520 complies with the specification IrMC 1.1, which defines how mobile telephony and communication devices can exchange information. In the R520, the specification IrMC 1.1 is also used for communication via a cable.

Key benefits using the R520 with its built-in infrared transceiver:

*   True wireless communication

*   Low power consumption

*   Secure data transmission with the IrDA DATA standard

*   Send and receive e-mail and data on the connected PC/PDA

*   Connect to the Internet or Intranet/LAN from the connected PC/PDA

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

*   Exchange business cards and calendar events with vCard/vCalendar compatible devices

*   Exchange ring signals between compatible phones

*   Attach photo from a digital camera in outgoing e-mail

*   Alternatively, if no infrared eye is available, RS-232 cable connection is supported

Technical Specifications For Infrared Transceiver

Coverage area	Up to 1 metre (3.3 feet)
Standards	IrDA DATA with secondary implementation of IrLAP 1.0 and IrDA-Ultra, IRMC 1.1.
Data rates (up to)	115,200 bps between phone and IrDA device (e.g. PC, another phone)
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, Psion5^{MX}, PalmV, PalmIII, other IrDA equipped PDAs running EPOC32 or PalmOS, vCard/vCalendar support to exchange business cards/calendar entries.
Handheld PC	IrDA equipped handheld PCs and PDAs using Windows CE, vCard/vCalendar support to exchange business cards/calendar entries.
Phone	R520 to exchange business card, calendar entries and ring signals, as well as other vCard/vCalendar compliant phones

) Software for IrDA support on NT 4.0 available on http://mobileinternet.ericsson.com.

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 R520 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 DRS-10 cable provides the same connectivity between the phone and another unit.

The DRS-10 cable supports a subset of the signals in the RS-232 standard, as detailed below.

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

FUNCTIONS AND FEATURES

In-phone Functions And Features

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.

Options Button

The options button is used to display a list of options depending on what the user is about to do. For example, the options button is a quick way to display options for the Phone Book, Call Info, Messages, Calendar, WAP Services, Call diversion, Call waiting.

Voice Control

The R520 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
- Activate the voice control with a "magic word"

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. Then copy the contents from this SIM card to the SIM cards of all the other phones. See the User's Guide.

Voice Memo

Voice memo is accessed either through the regular menu system or by pressing the button marked with a microphone. 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 HR mode. However, in FR or EFR modes, the available record time will be filled more quickly since more sound data is recorded to give a higher quality.

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.

Code Memo

If a password is lost, there is absolutely no technical possibility of retrieving the password or the hidden information from the phone's Code Memo. Therefore, it is recommended that you keep a code in more than one place (in more than one Code Memo), if the code is critical to an organization or to a work group.

Speakerphone With Proximity Switch

You can use the phone as a speakerphone during a call, for example when you want others to participate in a conversation or when you need to have your hands free during the call.

The speakerphone is always deactivated if a call is ended. For safety reasons, the speakerphone function is automatically deactivated when the phone is approximately 10 cm from your ear, or closer.

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 R520 supports exchange of ring signals to and from other compatible phones.

More In-phone Functions And Features

• Alarm
• Background light green
• *Bluetooth* built-in wireless technology
• Built-in modem
• Calendar

- Contacts
- Calculator
- Data transfer
- E-mail
- Ericsson ring signal logotype
- External antenna connector
- Full graphic display 4 grey scales and 6 rows of text
- Games including Bluetooth enabled
- Infrared functionality
- Last dialled numbers
- Missed calls
- Power gauging
- Received calls list
- Ring signal composition
- Status lists
- Status view
- SIM Application Toolkit
- Tasks
- Timer
- Vibrating alert
- Voice answering
- Voice dialling
- WAP browser

Network-Dependent Features

SMS Messaging

The R520 is capable of sending and receiving SMS 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 several SMS messages together to create a longer message (network-dependent service)

A Service Centre (SC) acts as a a storage and forwarding centre. The R520 also supports using SMS as a bearer type for connecting to WAP.

SMS consists of two basic services:

- Mobile Originated SMS (from a mobile station to an SMS-C)
- Mobile Terminated SMS (from an SMS-C to a mobile station)

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.

Business Card Exchange

Business cards can be exchanged with other devices, according to the vCard specification. vCard information can include name, address, phone number, e-mail address, but also elements like pictures, company logos, live Web addresses, and so on. Any IrDA-equipped device that supports vCard can "beam" business cards, including PDAs, PIMs, laptops and phones.

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 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 (4+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 R520, 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 for the user.

SIM AT Services Supported By The R520

Service	Mode		Support in R520
CELL BROADCAST DOWNLOAD			Yes
DISPLAY TEXT	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
		1 = character sets defined by bit 1 and bit 2 are disabled and the "Yes/No" response is requested.	No

Service	Mode		Support in R520
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 INFOR-MATION	'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 turn off and turn on the mobile.		Yes
	'00' =SIM Initialization and Full File Change Notification;		Yes
	'01' = File Change Notification;		Yes
	'02' = SIM Initialization and File Change Noti-fication;		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 R520
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 – xx 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	A requirement to turn the phone off and then on again can be sent to the user with the text 'Operator has updated your SIM! Restart phone to update!'.
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	*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 connectivity to the Internet. Available from the *Bluetooth* 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 specifiied 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.
FIR	Fast Infrared.
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.
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.
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.
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. TBA rewrite <This increases capacity in densely populated urban areas, and consequently improves the coverage offered by your network operator. It also offers you enhanced international roaming, thanks to the additional networks now available when you are travelling. The switching between the two systems is done automatically and seamlessly, which means that you can use your phone without ever having to consider which system is best at the time. This is taken care of by the networks. However, you should note that the functions offered and the network coverage differ depending on your choice of operator and/or subscription.
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.
WAN	Wide Area Network.

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.
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, for example.
WSP	Wireless Session Protocol.
WTLS	Wireless Transaction Layer Security.
WWW	World Wide Web.
XML	Extensible Markup Language.

RELATED INFORMATION

Documents

- The R520 User's Guide
- Ericsson R520 FAQ
- AT Command Reference Manual
- WAP June2000 (WAP 1.2.1) Specification

Software

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

Links

- http://mobileinternet.ericsson.com
- http://www.ericsson.com/wap
- http://www.ericsson.com/developerszone
- http://www.ericsson.com/aircalendar
- http://www.gprsworld.com
- http://www.extendedsystems.com
- http://www.bluetooth.com
- http://www.imc.org
- http://www.3gpp.org
- http://www.irda.com
- http://www.etsi.fr
- http://www.wapforum.org
- http://www.imc.org/pdi/

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