Nokia 9210 Communicator WWW Browser Style Guide

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2. Introduction

This document is a style guide for creating World Wide Web services for the Nokia 9210 Communicator device. Nokia 9210 Communicator is an advanced communications device with a feature-rich web browser. However, the screen size and the wireless communication link should be taken into account when designing services that are both fast and easy to use, and offer the user maximum enjoyability.

In addition to Nokia 9210 Communicator-specific issues, many of the instructions in this document can be used to maximize interoperability and ease of use on various other browsers.

Note to the reader: the URLs (web addresses) in this document are current as of November 2000.

3. Additional Reading[1]

This document tries to explain the basic principles which make your web site more enjoyable for the users of Nokia 9210 Communicator. If you need further information or guidelines for simple and effective design, we recommend the following books and publications. In addition to the Nokia 9210 Communicator, these guidelines will help you to create web sites for other small-screen and portable browsers, including the Nokia 9110 Communicator, and many other wireless devices.

- *Designing Web Usability: The Practice of Simplicity* by Jakob Nielsen, New Riders Publishing, ISBN 1-56205-810-X. Most of the guidelines in this book will offer considerable benefits for mobile users.

- *Web Content Accessibility Guidelines* from the World Wide Web Consortium, May 1999, http://www.w3.org/TR/WAI-WEBCONTENT/. Even if most of this document is targeted to help creating web pages for people with disabilities, many of the principles can be directly applied to users of small, wireless information devices; particularly guidelines 2, 6, 8, 9, and 11.

4. Web Browser Features

4.1 Features in a Nutshell

Nokia 9210 Communicator Web Browser supports[2]:

- Hypertext Transfer Protocol version 1.1 (HTTP/1.1), as specified in RFC 2068. ftp://ftp.isi.edu/in-notes/rfc2068.txt

- Hypertext Markup Language version 3.2 (HTML 3.2), as specified in http://www.w3.org/TR/REC-html32.html, except some features listed below.

- HTML Frames, as specified in HTML 4.0 document http://www.w3.org/TR/REC-html40/, except for the IFRAME element.

- HTTP over Secure Sockets Layer protocol version 3 (SSLv3), also known as the https: URL scheme. For details on how to configure your server to provide secure web access, please refer to your server documentation. Transport Layer Security protocol version 1 (TLSv1) (ftp://ftp.isi.edu/in-notes/rfc2246.txt) is also supported by Nokia 9210 Communicator in the e-mail client. Please see the *Nokia 9210 Communicator Security white paper* for more information on product security issues.

[1] These references do not imply an affiliation between Nokia and the authors or the publishers of these publications. The references are provided only for informational purposes, with the target to help the content creators to maximise their usability.
[2] Please note that all non-mandatory features might not be supported.

- Support for JPEG and GIF images, including progressive JPEG and interlaced GIF, plus several other image formats such as PNG (Portable Network Graphics), WBMP (WAP bitmap), BMP (Windows Bitmap), EPOC's native MBM bitmap and TIFF/F (Fax image file).

- Java applets are not supported. It is, however, possible to download Java applications and run them separately of the web browser. Please see the *Nokia 9210 Communicator Java white paper* for more information on Nokia 9210 Communicator's Java support.

- JavaScript is not supported.

- Plug-in interface for 3rd party plug-ins written for EPOC. Plug-in interface specifications are available from Forum Nokia at http://www.forum.nokia.com/. If you need a specific plug-in for Nokia 9210 Communicator, please contact the vendor of your plug-in.

- Native support for mailto: URL (ftp://ftp.isi.edu/in-notes/rfc2368.txt), sms:, and fax: URLs (ftp://ftp.isi.edu/in-notes/rfc2806.txt), if the accompanying software has been installed. Possibility to add 3rd party URL handlers with add-on software.

- Possibility to launch other programs based on the incoming MIME type of data, and a way to store downloaded data into a local file. Other programs can register themselves to handle these MIME types.

4.2 Features Not Supported in HTML 3.2

4.2.1 ISINDEX Element

The Nokia 9210 Communicator's web browser does not support the ISINDEX element, which is used to create very simple search pages. This feature is very rarely used, and HTML forms should be used instead. HTML forms offer a better usability and possibilities to tailor the query page to your needs.

4.2.2 BACKGROUND Attribute of the BODY Element

Background images are not supported. Background images, especially when shown on a small screen, easily distract the user and make the page harder to read. Background colours are supported.

5. Guidelines for Design

5.1 Validate Your HTML

There are several HTML validators available that validate your documents against HTML Document Type Definition. It is recommended that authors validate their web pages, because valid HTML is always less prone for incompatibilities and errors than pages which contain erroneous HTML. This holds true for any browser.

At the time of this writing, the World Wide Web Consortium operates a HTML validator at http://validator.w3.org/.

5.2 Web Site Organization

5.2.1 Avoid 'doormat' pages

The user is accessing your web site over a GSM data call, and pays per second. It is not recommended to start your site using a 'doormat' or an 'intro' page, which has no functionality other than perhaps to greet the visitor and to display a logo. It is better to go to your service directly.

5.2.2 Automatically Detect the Browser

Users do not generally want to select which browser they are using. Especially they don't want to be told that their browser is not supported, and that they should upgrade. If you are using a modern web site hosting environment, it is usually possible to detect the browser and supply correct content transparently, without user interaction. This depends on the capabilities of your web-hosting environment – refer to your server documentation.

Nokia 9210 Communicator web browser identifies itself as "EPOC32-WTL/2.2 Crystal/6.0 STNC-WTL/6.0(build)" in HTTP user agent header, where "build" is a number. This string will be available in an environment variable in most web publishing environments. The important parts are "EPOC32", which identifies the operating system, and "Crystal", which tells that the browser is operating on a half-VGA screen[3], and "STNC-WTL", which indicates the features and requirements for the browser below the user interface level. Depending on for what purpose you are using this information, you should try to match to the correct substring of this header.

5.2.3 Optimize for Size

The size of the content is critical. If you have large documents (listings, large tables, etc.), consider splitting them in multiple parts for faster download. Large comment sections within HTML should be avoided. Especially the use of scripting languages within a page may cause the page to be littered with very long comment blocks, which may slow down the download over a wireless connection.

As for the total download time, some studies place an upper limit for acceptable delay to 10 to 15 seconds, including all images, on a PC-based browser. Even if the users are accustomed to the somewhat slower transmission speeds of GSM data, this could be used as a rough guideline when judging the usability of a web page.

The following table shows the transmission speeds that can be expected over HTTP in optimal conditions and good cellular coverage. The values given include the HTTP request and should be taken as approximations, and depend on the GSM network, Internet service provider configuration and equipment, other Internet Protocol traffic, server and client load, compression, encryption, and other factors. Note that the High-Speed transfer modes are generally more expensive than normal GSM data, and are perhaps used only when downloading large amounts of data in a continuous stream.

For more information on data transfer and the supported High-Speed data calls, please refer to *Setting Up Dial-In Service* documentation, available from Forum Nokia.

	10 kB HTML document	10 kB JPEG image[4]	100 kB JPEG image
Normal GSM data, 9600 bps, analog modem pool	12 seconds	14 seconds	98 seconds
Two High-Speed slots, 14400 bps each, ISDN connection	6 seconds	8 seconds	39 seconds
Three High-Speed slots, 14400 bps each, ISDN connection	5 seconds	7 seconds	27 seconds

5.2.4 Use Frames Sparingly

As the screen is relatively small, frames quickly eat up the screen estate. Frames also make it more difficult for the user to navigate on or bookmark the page. Users may also opt not to view frames the way they are usually viewed as the Nokia 9210 Communicator supports three different frame styles. The web site designer cannot know how the

[3] Crystal is a Symbian device family reference design that has a half-VGA resolution screen.
[4] The difference between 10 kB HTML and JPEG files is the result of compression. JPEG files and encrypted content cannot be compressed at lower protocol layers, resulting a slightly longer transmission time.

frames are shown, so it is unwise to use them for page layout. Avoid frames if possible, and note that the IFRAME element is not supported.

However, if you choose to use frames, please do give descriptive names for them and do not use them solely for the purposes of page layout. If possible, provide a way to access the page without frames. If you are linking to another page, avoid the situation where a new set of frames is loaded inside a frame as then the usability quickly deteriorates on a small display.

When using frames, a black background colour is not recommended, as it is easier for the user to resize frames when using a light-coloured background.

5.2.5 Choose Descriptive Page Titles And Document Names

Page titles have much more visual impact on Nokia 9210 Communicator than what they usually have on a PC-based browser. It is very useful to give a descriptive name for the page. It might be a good idea to start the title with your service's name and keep the total length of the title short.

It also pays to use meaningful URLs since the user sees the URL of the currently selected link on the screen and can use it as a navigational help, especially when images have not been loaded.

Figure 1: The URL of the currently selected link flashes on the screen

5.2.6 Pay Attention to the First Screenful

Nokia 9210 Communicator's screen size depends on user settings as follows:

	Horizontal viewable area	Vertical viewable area
Default	478 pixels[5]	170 pixels
No title bar	478 pixels	195 pixels
Full screen mode	635 pixels	170 pixels
Full screen mode and no title bar	635 pixels	195 pixels
Full screen mode, no title bar and scroll bars disabled	640 pixels	200 pixels

[5] This value may change between 478 and 528 pixels, depending on the length of command names in the command button area. The size of the command button area depends on the device language.

Some of the available area is also taken by rendering margins.

The number of text lines depends on a user-selectable zoom factor. The user can select the font size between 8 and 12 points.

	Zoom factor 1	Zoom factor 2 (default)	Zoom factor 3
Font size 10 (default)	12 lines of normal text	10 lines of normal text	7 lines of normal text

Because of Nokia 9210 Communicator's default rendering area is 478 x 170 pixels, the first (topmost) screenful of any page is the most important one. All of the often-used navigational links, search fields, login screens, and bulk of the information should reside there if at all possible (the topmost ten lines or 170 pixels of the page). The user is then able to navigate forward before the rest of the page has been loaded, and the user does not have to scroll the page.

Avoid wasting the top of the page for banner advertisements or non-informative graphics. It is better to place the advertisements at the right edge than on the top. When using tables, the left edge should be reserved for the most important links, as the user will be able to navigate there quickly with the tabulator key.

5.2.7 Avoid Large Tables

Rendering a HTML table requires the whole table to be downloaded before it can be viewed on screen, as the browser needs to know the dimensions of the table. If the whole page is inside a table, all of the HTML code has to be downloaded before the page can be viewed. On a large page, this may cause a considerable pause before the user can read the page. If possible, split the page into several, smaller tables.

5.2.8 Take Tabbing Order into Consideration

The user usually "tabs" through the page using the tab and shift+tab keys. This will highlight each image and link, one at a time, in the order that they appear in the HTML source.

Try to group all of the most important links so that they are the first ones in the HTML source, so that the user does not have to "tab" through the whole page.

5.2.9 Support the Use of a Pointer

Nokia 9210 Communicator has a pointer, which looks like a mouse pointer but which can be moved with the cursor keys (in eight directions). It is a very good practice to test all of the clickable content on your page to make sure that they are large enough to facilitate easy navigation with the pointer.

5.2.10 Do Not Use Absolute Values for the Screen Size

When using tables or frames, the use of absolute values (in pixels) is not recommended. Sizes should be specified as percentages from the total width or height.

More specifically, do not expect that the user have a 640-pixel (or any other) horizontal resolution.

5.3 Interactive and Dynamic Content

5.3.1 A Note on Pointing Devices

Applets and content that depends on a pointing device (a mouse or a pen) can be used on the Nokia 9210 Communicator, as the user can invoke a pointer that can be moved around with cursor keys.

5.3.2 Do Not Rely on JavaScript

JavaScript, or ECMAScript, is a scripting language often used to facilitate interactive or dynamic content. The Nokia 9210 Communicator does not support JavaScript. Pages using JavaScript should not rely on it, and should work without it.

As an example, when designing input forms, always provide a submit button and when using JavaScript for automatical browser detection, specify a timeout that will force a redirection to a non-JavaScript page if it is not supported.

5.3.3 Check the Availability of a Plug-In

The Nokia 9210 Communicator web browser has a plug-in interface that 3rd parties can use to implement their plug-ins. If you require a plug-in for your web content, please contact the vendor of your plug-in and request that it would be ported to EPOC. Specifications for the plug-in interface and the software development kit are available from Forum Nokia.

Note that plug-ins that are designed for other operating systems such as Linux, MacOS, or Microsoft Windows, do not run under EPOC.

5.3.4 Change Image File Names If You Want Them To Be Reloaded

When using an automatic page refresh after a certain period, it is necessary to change the file name of an inline image if you want it to be reloaded from the server instead of the cache (for example, web cams). This is due to internal cache organisation.

5.4 Pictures, Fonts and Colour

5.4.1 Avoid Useless Images

Downloading of images takes time, and many users may switch the loading of images off for more speed. Try to optimize the size of images. Use JPEG with a high compression ratio for photographic images, and PNG or GIF for images that require lossless compression, or use uniform fills or fewer colours. If you have large pictures on your site, consider using thumbnails for the image index. The use of interlaced or progressive images is encouraged as the user can get an overview of the image quicker.

Always give an alternative text (using the ALT attribute of the IMG element) for images that convey information. Always use a null alternative text (ALT="") for images which do not convey information, or are used for page layout or decorative purposes only.

A number of small, transparent images that are often used for page layout are discouraged because each image on the page causes a new HTTP request. If running over a 9600 bps data call, this may slow down page loading.

5.4.2 Specify Image Width/Height in HTML

Always specify the correct image width and height in IMG elements. This speeds up the layout process as the layout engine can reserve the right amount of space on the screen even before downloading the image, and avoids unnecessary screen refreshes.

5.4.3 Imagemaps

Imagemaps are not the best alternative when navigating with a keyboard. If you have to use imagemaps, try to use client-side imagemaps with descriptive names for the clickable areas via the ALT attribute. Also, provide textual links for all of the imagemap links in the case that the user does not wish to download the image.

5.4.4 Colourmap

The Nokia 9210 Communicator supports 4096 colours. The full "true colour" is specified by 24 bits, 8 bits for each colour component (red, green and blue). The Nokia 9210 Communicator is using the most significant 4 bits of each of the colour component, resulting in a colour depth of 12 bits. All other colours will either be dithered or mapped to the closest colour available, depending on the application. In other words, this means that the Nokia 9210 Communicator supports every 16th colour of the 24-bit colourmap; for example, in HTML-like notation, #100000, #200000, and #300000 are the three darkest shades of red.

When creating graphics with uniform fills, use only the colours which will not be dithered. Some image processing tools may be able to reduce the size of images if you restrict the number of colours to the exact 4096 colours supported by the Nokia 9210 Communicator.

Do not use colours which are too close to each other (differ only in the least significant four bits of each colour component). This may result in the colours being mapped to the exact same colour. For example, again in HTML-like notation, #110000 and #1F0000 map to #100000 (unless the application chooses to dither the colour).

If you are using transparent images, be sure to set the background colour in the HTML document accordingly. If the transparency relies upon a dark background image, a dark background colour should also be specified.

For added accessability, you may wish to review the images in grayscale (if compatibility with the Nokia 9110 Communicator and other grayscale PDAs is important) and take the requirements of colour-blind users into account.

5.5 Server Configuration

5.5.1 Character Sets

The web server should always supply the correct character set information in the HTTP response headers.

The Nokia 9210 Communicator encodes all form submissions as per the HTML 4.01 specification, using a language-specific character set. For Western European and Nordic language versions, the ISO 8859-1 (ISO Latin 1) character set is used. Elsewhere, the character set may change according to the characters available in that specific language version.

If the language version uses characters that are not available in the ISO 8859 standard series, the device may use Unicode character set with UTF-8 encoding. The server should not just assume that all incoming forms are in ISO 8859-1. Supporting Unicode on server side has the additional benefit of adding another layer of international compatibility to your web site.

5.5.2 MIME Types

Some web servers tend to use the generic MIME type 'application/octet-stream' for most downloaded files that are not HTML or text. The Nokia 9210 Communicator, however, uses and stores the MIME type information, so the web server should always be configured to return the correct MIME type for a given file. Please see IANA's web site for a listing of MIME types at http://www.isi.edu/in-notes/iana/assignments/media-types/. If, however, the generic MIME type is used, the Nokia 9210 Communicator tries to guess the file format from the file suffix and its contents.

The Nokia 9210 Communicator supports a number of MIME types, either in its web browser, or through a separate application. This table lists the file types that can be viewed[6] with the software that comes either factory installed or on the companion CD-ROM. For some of the MIME types, there may be more than one application that can view the file, and these applications may use different MIME types as some of the MIME types are not standard. To maximise

[6] Note: a file might not be always viewed correctly. Some file types may use features and content that cannot be viewed. Different viewers may have also differing capabilities.

interoperability, when configuring your server, use the first MIME type listed for any given file type. It also helps to use one of the listed file suffixes for the file.

Of course, you should take into account the size of the file. Especially files containing graphics may be extremely large (megabytes) and downloading them over a wireless connection may prove to be very uncomfortable, even if they are supported file types.

In most cases, the files must be saved on the Nokia 9210 Communicator before they can be viewed. Some files open directly in the web browser, such as HTML files, plain text files and most picture formats. In addition to these, WAP content types, such as WML files, can be viewed using the WAP application. For most other files, the user needs to install a viewer separately.

MIME type	**Description**	**File suffixes**
application/msexcel application/vnd.ms-excel application/x-excel application/xlc application/x-msexcel	Microsoft Excel spreadsheet	.xls, .xlc
application/msword application/vnd.msword application/vnd.ms-word	Microsoft Word document	.doc, .wri
application/rtf	Rich text format	.rtf
application/vnd.lotus-1-2-3 application/x-lotus123	Lotus 1-2-3	.wq1, .wku, .wk1, .wk3, .wk4, .wk5, .wk6, .123
application/vnd.ms-project	Microsoft Project file	.mpp
application/vnd.nokia.ringing-tone	Nokia ringing tone	.rng
application/vnd.symbian.install	EPOC installation file	.sis
application/vnd.visio	Visio drawing	.vsd
application/wordperfect5 application/wordperfect5.1 application/x-wordperfect6	Word Perfect document	.wpd
application/x-gzip application/gzip	UNIX GNU Zip (gzip)	.tgz
application/x-mspowerpoint application/mspowerpoint application/pot application/pps application/ppt application/vnd.ms-powerpoint	Microsoft PowerPoint slide show	.ppt, .pot, .pps
application/x-tar	UNIX Compress/tar	.tar, .taz
application/zip	PkZip archive	.zip, .exe
audio/basic	Sun audio file	.au
audio/x-sibo-wve	EPOC audio file	.wve
audio/x-wav	WAV audio files	.wav
image/cgm	Computer graphics metafile	.cgm
image/gif	GIF image file	.gif
image/jpeg	JPEG JFIF image file	.jpeg, .jpg, .jif
image/png	Portable Network Graphics file	.png
image/tiff	TIFF/F (Fax) image file	.tif
image/tiff	TIFF image file	.tif
image/vnd.wap.wbmp	WAP monochrome bitmap	.wbmp
image/wmf	Windows metafile	.wmf

image/x-win-metafile		
image/x-wmf		
image/x-amidraw	Lotus AMI Draw file	.sdw
image/x-bmp	Windows bitmap	.bmp, .rle, .ico, .cur
image/bmp		
image/x-MS-bmp		
image/x-win-bitmap		
image/x-cgm	Computer graphics metafile	.cgm
image/x-epoc-mbm	EPOC multibitmap file	.mbm
image/x-pc-paintbrush	Paintbrush image file	.pcx, .dcx
image/x-png	Portable Network Graphics file	.png
image/x-presentations	Corel/Novell Presentations	.shw
image/x-wordperfect-graphics	Word Perfect document	.wpg
None specified	Nokia OTA image file	.ota
None specified	EPOC Sheet document	None specified
None specified	EPOC Word document	None specified
text/html	HTML hypertext file	.html, .htm, .shtml, .shtm
text/plain	Text file	.txt
text/rtf	Rich text format	.rtf
text/vnd.symbian.ebookmark	EPOC web bookmark file	.ebm
text/x-vcalendar	VCalendar	.vcs
text/x-vcard	VCard	.vcf

5.6 Secure Web Connections

5.6.1 A Note on Supported Protocols

Nokia 9210 Communicator's web browser supports the SSLv3 (Secure Sockets Layer version 3) protocol. Future updates of the web browser plan to support TLSv1 (Transport Layer Security version 1) protocol. Unfortunately, some server implementations of SSL are defective and fail the protocol negotiation if TLS is proposed by the client. To guarantee interoperability with these servers, Nokia 9210 Communicator only uses SSL for web connections for the time being. There is no difference in the level of security between SSL and TLS protocols, and SSLv3 is the most widely supported security protocol for web at this time. TLS is still available to other applications that do not need to connect to web servers.

When the connection is secure, the user sees a lock icon in the title bar and can see the 'encrypted' status in the menu (Tools | Information | Status).

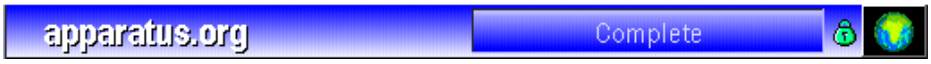

Figure 2: The lock icon is visible for pages retrieved over SSL (https://)

5.6.2 Certificates

In order to authenticate your server to the web browser, you need a certificate from a certification authority (CA). *Nokia does not endorse any specific CA.* The authenticity of your server's certificate is checked against a so-called root certificate, which is installed in the Certificate Management application (in the Control Panel of Nokia 9210 Communicator). Root certificates from the most popular commercial CAs are factory-installed in Nokia 9210 Communicator. Users can install new root certificates themselves if required.

It is important to make sure that the server's name (such as www.nokia.com) is present in the 'common name' element of the certificate. Otherwise the web browser will display a warning message about the name not matching the web site's name.

5.7 Differences to Nokia 9110 Communicator

5.7.1 Potential Incompatibilities

All pages that have been designed for Nokia 9110 Communicator should work with Nokia 9210 Communicator. The only exceptions are the pages which use Nokia proprietary SMS forms or the ISINDEX elements, which are not supported in Nokia 9210 Communicator. SMS forms can be replaced by using sms: URL scheme and ISINDEX elements can be replaced by normal HTML forms.

5.7.2 Creating Pages Suitable for Nokia 9110 Communicator

Nokia 9110 Communicator does not support colour, and it only supports GIF and JPEG images. Also, Nokia 9110 Communicator frame support is implemented through a frame list, and table support is implemented using a special table viewer. Java or JavaScript are not supported in Nokia 9110 Communicator.

Plug-ins or any other software written for Nokia 9110 Communicator does not run on Nokia 9210 Communicator, as they use different operating systems and their hardware is different.

Otherwise, pages that have been written according to the guidelines laid out in this document should be viewable with Nokia 9110 Communicator as well as most other web browsers.

6. Troubleshooting web sites

6.1 Troubleshooting a web site without the Nokia 9120 Communicator

Newer versions of the *Nokia 9210 SDK* (Software Development Kit) *for the Symbian Platform* also contain the web browser. You can run the browser in the Nokia 9210 emulator on a desktop PC. This way, you can see exactly how the page is going to look on a Nokia 9210 Communicator. However, please bear in mind, that at the time of writing, some features of the browser may still be undergoing changes. If you are using a beta version of the SDK, it also has a beta version of the web browser. The SDK is freely available from Forum Nokia (http://www.forum.nokia.com/).

Connecting to the Internet with the emulator is possible over a dedicated PPP connection or by using a modem connected to the desktop PC. You can get instructions for how to connect to the Internet from Forum Nokia. Search for *EPOC SDK Internet Connectivity FAQ*.

6.2 What can I do, when...

6.2.1 I see a HTML page that tells me that I should upgrade my browser, or have a wrong browser

This is usually caused by the web site checking for the HTTP User-Agent header and making decisions based on it. Web users have traditionally been using two major flavours of web browsers, and many sites still have a start page that filters out the users of all other browsers. This can be fixed by either removing this check altogether or adding support for the Nokia 9210 Communicator web browser.

6.2.2 Secure connections will not succeed

If you see a HTML page that tells you that secure connections are not possible, the most likely reason is that the site checks the User-Agent header and does not even start secure connection handshake because it does not recognise the Nokia 9210 Communicator web browser. The Nokia 9210 Communicator should be added to the list of accepted web browsers.

If you get an error note from the web browser which says that a secure connection could not be established, the most common reasons are:

- The site only supports SSL version 2, which is a very old version of the SSL security protocol. An upgrade to SSL version 3 capable server would be recommended.

- The site supports SSL, but is configured to do SGC (Server Gated Cryptography, also called ramp-up cryptography) negotiation. This is a way in which some U.S.-origin browsers operated in the past. If the site presented a certain type of certificate, the SSL connection was re-established with a stronger suite of cryptographic algorithms. The reason for this was to allow certain sites, such as financial institutions, to use strong cryptography, and at the same time restrict all other sites to weak cryptography. The Nokia 9210 Communicator natively supports strong cryptography, and has no need or support for SGC. The site should be upgraded to use strong algorithms in all connections.

- The site requires a client certificate. This is very rare, but may be a case on some mail servers. The Nokia 9210 Communicator does not support client certificates. The server should be configured not to require a client-side certificate.

6.2.3 Some frames are too small

Some sites use frames that are using a fixed width or height. When rendered on a small screen, these frames eat up the screen and leave only a small portion of the screen for the rest of the frames. The optimum solution is not to use frames at all, but if that is not an option, the frames should be allowed to dynamically resized. Also, for clarity, there should not be too many parallel frames or frames inside frames.

As an user, you may opt to use another frame display mode, for example a single frame with a list of frames, or you can open the currently selected frame as a new page (effectively discarding all other frames).

6.2.4 A link or a form button does not work

The most common reason for this is the use of JavaScript in the link or the button. As the Nokia 9210 Communicator web browser does not support JavaScript, these links and buttons should have normal URL targets and not JavaScript function calls.

Also, if a form has no clickable submit button, it is not possible to submit the form.

6.2.5 Characters in submitted forms display incorrectly

The Nokia 9210 Communicator uses a 16-bit Unicode character set, whereas most form submissions are made using a 8-bit character set of the ISO 8859 family. Unicode is not used in form submissions by default because of interoperability problems with most web services. This results in some of the characters not being sent correctly to the web server. As an example, the Euro sign (€) is not included in ISO 8859-1, which is used when sending forms from an English language communicator, and cannot therefore be included in a form submission.

What the service operator can do is to suggest that users use certain other characters in the place of missing ones (for example, the ¤ character instead of €). As a move towards an international web, the service should also support Unicode (most notably the UTF-8 encoding) so that future versions of web browsers can use Unicode to get rid of character set problems completely.