Application Note

(The implementation HTTP by using ezTCP)

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Chapter 1

Overview

To control a device with web browser, both TCP/IP and HTTP should be implemented in the device side. HTTP is a protocol that operates over TCP layer. The HTTP is implemented in web server such like Apache and web browsers such like Internet Explorer.

It is implemented in ezTCP, but not HTTP. So user have to implement HTTP as followed.

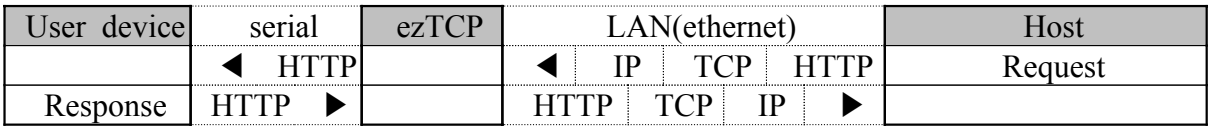
This document describes the method to implement HTTP simply.

User device	serial	ezTCP	LAN(ethernet)	Host
HTTP				HTTP (web browser)
		TCP		TCP (OS)
		IP		IP (OS)

Chapter 2

Structure of HTTP

HTTP messages can be divided to Request message and Response message. The basic operation of HTTP is that when a web browser sends request to a HTTP server(web server), then the web server responses to the web browser.



The forms of Request message and Response message are followed:

Request Message	Response Message
Request Line	Status Line
Headers	Headers
Empty Line	Empty Line
Message Body	Message Body

2.1 Request Message

▪ Request Line

The form of Request Line is followed:

Method	SPACE	Request URI	SPACE	HTTP-version	CRLF

(예) GET /test_dir/test.html HTTP/1.1

GET http://www.eztcp.com/test_dir/test.html HTTP/1.1

- Method

There are GET, HEAD, POST, PUT, DELETE, TRACE, CONNECT, and OPTION Methods.

Among the Methods, GET and HEAD have to be implemented.

This document explains GET only.

- Request URI(Uniform Resource Identifier)

Request URI is a web page that the web browser requests. Request URI is path or URI of the web page.

- HTTP-version

HTTP-version indicates the HTTP version. The expression form is followed:

(Expression) "HTTP" "/" 1*DIGIT "." 1*DIGIT

If the version is 1.1, then it will be HTTP/1.1.

(Example) HTTP/1.1

▪ Headers

There are general-header, request-header, response-header, entity-header for Headers

The expression form of Header is followed:

(Expression) header-name ":" header-value

- General Headers

header	function/example
Connection	Indicates connection option
	Connection: Keep-Alive
Date	Indicates the time when the message is made.
	Date: Tue, 15 Nov 1994 08:12:31 GMT

- Request Headers

header	function/example
Accept	Indicates data type for response.
	Accept: */*
Accept-Language	Indicates language type for response.
	Accept-Language: ko
Accept-Encoding	Indicates encoding type for response.
	Accept-Encoding: gzip, deflate
Host	Indicates host and port that has data.
	Host: eztcp.com
User-Agent	Indicates web browser's information.
	User-Agent: Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1)

▪ Empty Line

- Empty Line is CRLF(0x0d, 0x0a).

2.2 Response Message

▪ Status Line

The form of Status Line is followed:

HTTP-version	SPACE	Status-Code	SPACE	Reason-Phrase	CRLF

- HTTP-version

HTTP-version indicates the HTTP version. The expression form is followed:
(Expression) "HTTP" "/" 1*DIGIT "." 1*DIGIT
If the version is 1.1, then it will be HTTP/1.1.
(Example) HTTP/1.1

- Status-Code / Reason-Phrase

Status-Code is a 3-digits result code, and Reason-Phrase is that describes result code.

The Following table describes the first digit of Status-Code.

1xx	Informational	Request received, continuing process
2xx	Success	The action was successfully received, understood, and accepted
3xx	Redirection	Further action must be taken in order to complete the request
4xx	Clinet Error	The request contains bad syntax or cannot be fulfilled
5xx	Server Error	The server failed to fulfill an apparently valid request

The followings are frequently-used Status-Code.

100	Continue	When the web server didn't ge full request message from the web browser. It indicates that to the web browser. The web browser have to send remains.

200	OK	When the web server gets request successfully from the web browser.

400	Bad Request	When the web server gets a bad request in grammar.
403	Forbidden	When the web server reject the request.
404	Not Found	When there's no URI in the web server.
405	Method Not Allowed	When the requested data is not permitted. The web server have to inform the available methods. (Example) Allow: GET, HEAD

▪ Headers

There are general-header, request-header, response-header, entity-header for Headers. The expression form of Header is followed:

(Expression) header-name ":" header-value

- General Headers

header	function/example
Connection	Indicates connection option
	Connection: close
Date	Indicates the time when the message is made.
	Date: Tue, 15 Nov 1994 08:12:31 GMT

- Response Headers

header	function/example
Server	Indicates informationof the web server.
	Server: ezTCP WEB server V1.0

- Entity Header

header	function/example
Last-Modified	Indicates last modified date.
	Last-Modified: Fri, 04 Apr 2003 12:30:57 GMT
Content-Length	Indicates the size of the entity body.
	Content-Length: 901
Content-Type	Indicates the media type of the entity body.
	Content-Type: text/html

▪ Empty Line

- Empty Line is CRLF(0x0d, 0x0a).

▪ Message Body

- The HTML code that the web browser requested is in Message Body.

Chapter 3

Examples

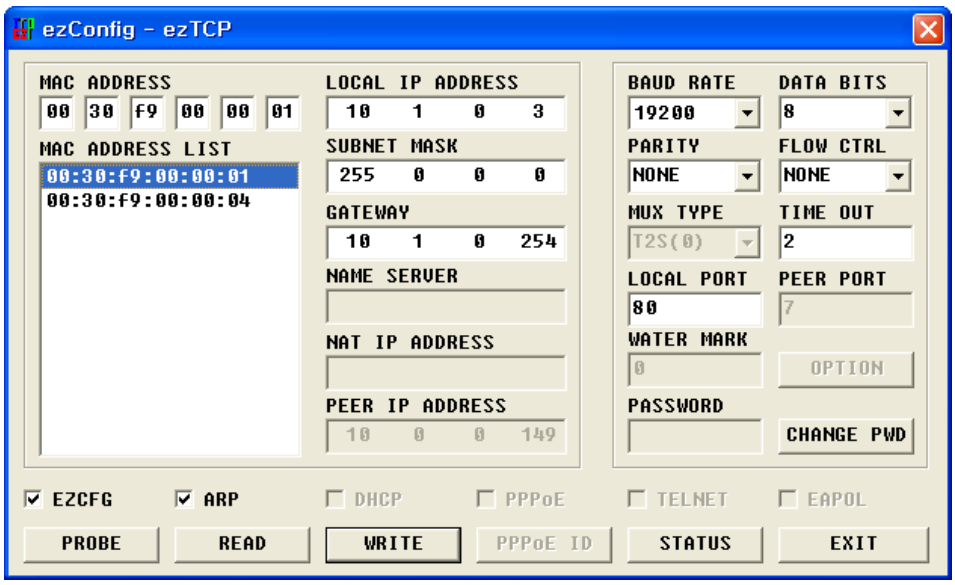
3.1 Configuring ezTCP

To implement ezTCP as HTTP server, ezTCP have to operates as server mode. The server mode operates in T2S or ATC. This example is based on T2S mode.

To operate ezTCp as server mode, the ezTCP have to be in T2S mode.

The default port number of HTTP is 80. Therfore 80 has to be configured in LOCAL PORT.

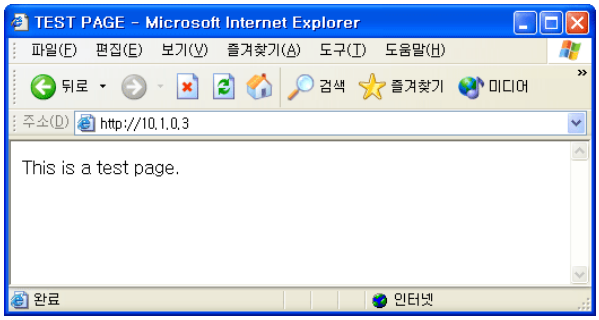
And the server should disconnect the TCP connection, 2 would be fine for TIMEOUT.



3.2 GET Request and 200 OK Response

User device	serial	ezTCP	LAN(ethernet)	Host
	◀ HTTP		◀ IP TCP HTTP	Request
Response	HTTP ▶		HTTP TCP IP ▶	

HTTP/1.1 200 OK Connection: close Content-Type: text/html <html> <head> <title>TEST PAGE</title> </head> <body> This is a test page. </body> </html>	GET / HTTP/1.1 Accept: */* Accept-Language: ko Accept-Encoding: gzip, deflate User-Agent: Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1) Host: 10.1.0.3 Connection: Keep-Alive



This is an example that the web browser requests a web page and the server response(200 OK).

When user inputs "http://10.1.0.3" in the Address field, the web browser tries to connect the web server with port number 80.

After connection, the web browser request "GET... " message, then ezTCP sends it to its serial port.

The device that received the request, it analyzes the message and sends the response data to the ezTCP via serial line. Then the ezTCP sends data to the web browser, then the HTML code appears in the window of the web browser.

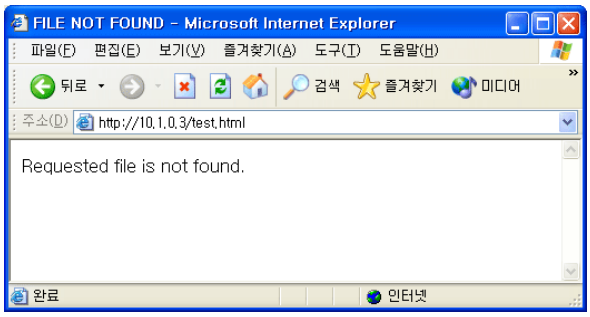
3.3 GET Request and 404 Not Found Response

User device	serial	ezTCP	LAN(ethernet)	Host
	◀ HTTP		◀ IP TCP HTTP	Request
Response	HTTP ▶		HTTP TCP IP ▶	

```
HTTP/1.1 404 Not Found
Connection: close
Content-Type: text/html

<html>
<head>
<title>FILE NOT FOUND</title>
</head>
<body>
Requested file is not found.
</body>
</html>
```

```
GET /test.html HTTP/1.1
Accept: */*
Accept-Language: ko
Accept-Encoding: gzip, deflate
User-Agent: Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1)
Host: 10.1.0.3
Connection: Keep-Alive
```



This example is that the web browser request the test.html page, but the server doesn't have the page.

Chapter 4

Cautions

- This document is based on RFC2616 and simplified to help who they want to implement HTTP with ezTCP.
- We did our best to make this document. But we don't guarantee its contents.
- For more information, please refer to the enclosed RFC2616.