

Web Enabling User Guide

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1. Overview

Serial devices fit typically into just three basic categories: input-only devices, output-only devices, and input/output devices.

Input-only devices include measurement and monitor devices such as temperature gauges, weather stations, heart monitors, etc. Output devices include displays (e.g. sign boards).

Input and output devices include controls and interactive devices such as robotics, PLCs, motor controllers, management equipment, and terminal emulators.

Typically, an operator or technician interacts with these devices from another hard-wired serial device (a computer or a controller).

With the technological advances of recent years, it is easy to interact with these devices from a remote location using a web browser over an Ethernet network. Low cost hardware exists to convert the RS-232, RS-422, or RS-485 serial port into an Ethernet interface, which is accessible by an IP-based application (i.e. a web browser) over an IP network from any place in the world. Obtaining access via an application to the serial port over a network is called *serial tunneling*. The serial data is encapsulated into TCP or UDP packets; these travel through any IP-based network. The hardware performing this function is called a *Device Server*.

Since Device Servers are inherently network-aware, the ability to add functionality (web services, e-mail, network diagnostics) is easily within reach. This paper covers the detailed requirements of adding web services to your serial device.

First, connect the serial device to the network. This requires a Device Server such as the NET232 and the Device Installer software to ease configuration. Follow the documentation to configure the network and serial parameters of the device server. Connect the serial port of the Device Server to your serial equipment using the appropriate cable and connectors, and connect the Device Server to the Ethernet network using a suitable cable.

Next, consider the desired web functionality of the serial device. Device functionality cannot be changed but you can enhance the user interface. Regardless of the device functionality, a method is needed to query or control the device over the network. To perform the required programming, use a browser-supported language like Java. To obtain a Java development kit, download one from the Sun Microsystems web site. This is required to develop the web-based application.

1.1 Background on Web Servers

The NET232 supports an internal web server used by the web programmer for storage and retrieval of documents, images, and Java applets.

Web browsers, such as Microsoft Internet Explorer or Netscape Navigator, request information from web servers by using a protocol known as Hypertext Transfer Protocol (HTTP). HTTP allows the transfer of information between two different computers: the browser computer (client) and the HTTP computer server. A client supporting HTTP 1.0, has three methods to interact with the server. These methods (GET, HEAD, and POST) are very basic. The GET method retrieves a particular document or file. The HEAD method retrieves only the “header” of the document. A client will use HEAD to check whether a cached copy of the file has been changed since the last access. POST is typically used with “forms” to send information to the server. When the server receives data from a POST method, it typically passes the data to another application for processing by a mechanism referred to as the Common Gateway Interface (CGI).

Hypertext Markup Language (HTML) documents are static in nature. Programs such as CGI and PHP typically perform functions on the server to dynamically build HTML documents (e.g. querying a database for the lowest mortgage rate).

The NET232 will be referred to as the Device Server in this paper. The NET232 supports an HTTP server. This service is used to transfer static documents or files to the requesting web browser. The typical use of the HTTP server is for unit configuration. Connecting to the Device Server brings up the unit’s configuration home page. The Device Server may be configured by this user-friendly interface.

1.2 Implementation

The Device Server's HTTP server has support for GET and HEAD methods. This support is adequate for configuration and file service of help files. It does not support the POST method, or any "server side" required processing (i.e. no CGI support).

Customers may add their own web pages to the Device Server HTTP server using a tool called *web2cob*. Customers requiring access to the serial port(s) are encouraged to use a Java applet.

The NET232 contains flash memory that supports the HTTP server. The flash memory area is divided into 64KB pages, which are available for web sites. These areas are called WEB1 – WEB6 or sector 1 – sector 6.

When a client makes a GET or HEAD request for a file, the HTTP server process first looks in WEB1 for the file. If the file is not found in WEB1, the process will look in WEB2, then WEB3 and so on. When the file is located, it is sent to the client.

The NET232 configuration web pages are loaded into the highest numbered WEB section. Since this is the last place the server will look for a file, users may add their own configuration pages in any lower numbered web area. This way, when a file is requested, users' files are searched first.

The HTTP server process must be able to determine if the WEB area contains a valid web site. The web2cob.exe program is designed to create an archive of HTML documents and other web files. Web2cob.exe also inserts a unique number into the archive. The server process will test the unique number to determine if a valid web site is loaded into that section of flash memory.

Note: A more detailed explanation and software tools are available at www.lantronix.com. Click on **Support** and select **Tech Support, Knowledge Base / FAQ**. In the **Search by Keyword** field, enter **web2cob** and click the Search button. Select **Creating custom web pages** for more information and a link to the software files.