TAMARACK
CONSULTING

NettedAutomation GmbH
Information & Communication Systems

New

MMS*d* plus Web Technologies

Web-based technologies have reached a very high level of user acceptance and familiarity. These technologies can provide very low-cost support for user interfaces and configuration tools. **Tamarack now offers significantly increased value by including simple to use Web server software with its MMS*d* Server Package.** The Tamarack Web implementation includes everything you need to provide access to real-time data and configuration parameters directly from any of the common Web browser tools. In addition, both the object model description and its real-time data values are available to web-based applications using common data representation techniques. All of this additional functionality is provided using the same MMS*d* internal interface (mapping) to local data and the same socket interface to TCP/IP.

No additional user software and/or integration is required beyond that needed to support MMS/UCA/IEC 61850.

Standards Used

The Tamarack web software supports three important standards: HyperText Markup Language (HTML), eXtensible Markup Language (XML), and HyperText Transfer Protocol (HTTP). These three standards work together to provide simple, yet extremely flexible user interface support to the embedded system.

HTML This is the standard markup language (a restricted form of Standard Generalized Markup Language, or SGML) is used to define web pages for browsers and other HyperText document handling systems. HTML primarily defines how data should look on the screen. A wide range of tools is available for developing HTML source code for custom pages. These pages can be stored in ROM or Flash memory on the embedded device, along with logos and other graphics as space permits.

XML This standard (another, more rich restricted form of SGML) is a general-purpose data representation language. It supports a diverse set of data types, and allows for the description and exchange of arbitrarily complex data. XML is quickly becoming a widespread method for creating, controlling, and managing data on the web.

HTTP The Hypertext Transfer Protocol is an application level protocol for distributed, collaborative, hypermedia systems. It is the standard protocol used to access web pages and other information over the Internet. HTTP operates over TCP/IP in a connection-oriented, transaction-based manner.

In summary, HTTP transfers (among other things) HTML documents and XML documents. HTML documents describe the formatting and contents of web pages. XML can be used to transfer data and data descriptions for either web page scripts or other applications. The web standards provide a simple, yet powerful interface to embedded systems. They do, however, have limitations in terms of reliability and performance. Tamarack believes the combination of web-based user interfaces with MMS, UCA, and IEC 61850 real-time protocols brings the best of both worlds to embedded devices.

XML Support

Tamarack is now providing a simple approach to provide standard web browser access and XML distributed application support on their embedded MMS/UCA/IEC 61850 servers. We believe this support will enable low-cost configuration tools and user interfaces with a high degree of customer acceptance. This support is offered as an additional value with all of our MMSd Server Package licenses. The Tamarack web server is designed to operate in the embedded environment. This software uses no dynamic memory allocation, and operates in either single-threaded or multi-threaded environments.

Value added services – e.g. enhanced web design and programming – are provided by Netted-Automation GmbH.

How It Works

The Tamarack MMSd Server Package implements objects in a dictionary associating object names with threaded lists of read, write, and get type 'methods', which are pointers to retrieval functions and data. The MMS server software uses the dictionary to satisfy Read, Write, GetNameList, and GetAttribute service requests of MMS. This same dictionary is used to provide XML and HTML support on the device. Requests for documents of type XML that can be resolved against the dictionary cause the software to generate an XML encoding of the sub-tree below the object in the dictionary. Requests for the root XML document cause the entire object tree to be encoded. Filtering can be performed during the generation process to deny object access for security reasons. The generated XML documents contain current values obtained by invoking the same 'methods' used by the MMS services on the device, along with type and structure information from the dictionary.

Dynamic HTML

Requests for documents of type HTML that can be resolved against the dictionary cause the software to transfer a script which, when executed by a browser, requests the XML document for the object and generates a page display for the object. A special root script is transferred as the base web page, which retrieves the root XML document. The Tamarack software may also be used to transfer any other files (such as help pages, user documentation, etc.) which may be stored on the device.

Writing Values

The HTML language allows for the construction of forms for entering values. When values in a form are entered, a POST request is transmitted to the server instructing it to store the value into the named resource. POST requests received by the Tamarack software are also resolved against the dictionary. If the requested resource matches an object on the dictionary, its write method is invoked with the data from the request.

No Additional Interface Requirements

The software implements a simple server running directly over the standard Berkley sockets interface to TCP/IP. This same interface is used by the Tamarack MMSd Server Package when operating over TCP/IP. The server is self-contained, and requires no additional software. The interface to all object data is through the MMSd object dictionary, so that one single integration effort provides both MMS, UCA, IEC 61850 support and XML/HTML access.

Future Plans

Tamarack will continue to develop this technology base to meet the needs of the industry and our valued customers. Additional protocols such as Simple Object Access Protocol (SOAP) are currently under discussion.

Please contact Tamarack Consulting, Inc. or NettedAutomation GmbH for further information.

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An introduction to MMS, UCA, and IEC 61850 can be found under:
www.nettedautomation.com/standardization/IEEE_SCC36_UCA/index.html

Glossary:

IEC 61850	Draft International Standard "Communication networks and systems in substations" incorporating UCA™
HTML	HyperText Markup Language
HTTP	HyperText Transfer Protocol
MMS	Manufacturing Message Specification (ISO/IEC 9506)
UCA™	Utility Communication Architecture (IEEE TR 1550); Trademark of EPRI, Palo Alto
XML	Extended Markup Language