

# RomPlug™ Basic - Advanced - Control

## Embedded UPnP™ Technology Toolkits



Allegro Software offers three UPnP technology toolkits as part of the extensive family of RomPager® embedded Internet and Web technology, RomPlug Basic, RomPlug Advanced and RomPlug Control.

### **RomPlug Basic**

Intended for simple devices, the RomPlug Basic toolkit enables discovery of a device by Control Points such as Windows Millennium and Windows XP. On Windows systems with UPnP architecture Control capabilities, a device icon will automatically appear in "My Network Places". When the user clicks on the icon, the browser is launched to view the embedded Web server HTML pages.

The RomPlug Basic toolkit provides embedded devices the ability to interoperate with UPnP architecture Control Points, by implementing the Discovery and Description components of the UPnP architecture. The toolkit is a small-memory ANSI-C implementation that works with any OS and TCP stack. It adds less than 10 Kbytes to the RomPager Web Server that is used for Presentation services. RomPlug Basic includes fully compliant support of the UPnP Working Committee definition of the Basic Device.

### **RomPlug Advanced**

The RomPlug Advanced toolkit provides source code and tools to accelerate the development of UPnP certified devices. The toolkit includes all the capabilities of the RomPlug Basic toolkit and adds the Control and Eventing capabilities of the UPnP architecture. It includes XML parsing and framing support, SOAP protocol support and support for the GENA protocol. It builds onto the capabilities of other products in the RomPager family and includes fully licensed versions of RomPager Advanced Web Server, RomWebClient and RomXML. The RomPlug Advanced toolkit includes a series of sample templates and HTML control pages including support for the UPnP Basic Device. With the samples and the PlugBuilder template compiler, the RomPlug Advanced toolkit can save months of development time in the process of building a UPnP certified device.

### **RomPlug Control**

The RomPlug Control toolkit provides a full implementation of all the capabilities necessary to build a fully interoperable UPnP architecture Control Point that works with any OS and TCP stack. It includes XML parsing and framing support, SOAP protocol support and support for the GENA protocol. It builds onto the capabilities of other products in the RomPager family and includes fully licensed versions of RomPager Advanced Web Server, RomWebClient and RomXML. The RomPlug Control toolkit provides implementations of the Discovery, Description, Control and Eventing layers of the UPnP architecture. The RomPlug Control toolkit provides a comprehensive solution for products that need to discover and control UPnP devices in any embedded target environment.

### **PlugBuilder Compiler**

All RomPlug toolkits include the PlugBuilder compiler, which speeds product development by simplifying the SOAP parsing and framing process. PlugBuilder processes the device and service templates defined by a UPnP Forum Working Group to create application stub functions as well as SOAP parsing and framing control data. At run-time, RomPlug automatically parses incoming SOAP messages, delivering data structures to the application functions. This tool allows the application developers to focus their development time on their device-specific functions rather than the details of SOAP message parsing and framing.

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## Application Toolkits

Allegro also offers four UPnP application toolkits, RomPlug IGD, RomPlug MediaRender, RomPlug MediaServe and RomPlug MediaControl. These toolkits provide specific implementations of the UPnP services for Internet Gateway Device (IGD), MediaRenderer and MediaServer as specified by the UPnP Forum Device Control Protocol (DCP) specifications. By providing specific implementation APIs and examples, along with the underlying RomPlug core UPnP support, the RomPlug application toolkits can enable device vendors to deliver products to market months sooner.

## Simple Development Model

The RomPlug toolkits provide a simple development model for the engineer. The RomPlug runtime routines are driven by compact data tables created by the PlugBuilder compiler. Although full source is provided, the SSDP, GENA, HTTP, SOAP and XML functions operate in a layer below the application calling routines, so that the developer can concentrate on building the application specific functions rather than worrying about SOAP syntax or GENA subscriber lists. The application programming interface (API) calls to control the RomPlug toolkits provide a simple way to build powerful UPnP architecture devices and control points without getting involved with the complexities of the UPnP technology internal protocols. Sophisticated compiler option flags allow maximum code-sharing to provide the smallest possible code footprint. Since Allegro is a UPnP Forum member and participates in the UPnP Plug Fests to insure interoperability with other UPnP architecture devices and control points, vendors can focus their energies on the unique capabilities of their device, and rely on the field-proven Allegro implementations of the UPnP technology.

## Highly Portable

Allegro's RomPlug toolkits are delivered in ANSI-C source code format and are implemented using the field-proven Allegro Software Abstraction Layer, which allows the toolkits to work with any RTOS and TCP stack. The RomPager product family shares a single task/thread in the device OS environment using a common light-weight scheduler to support multiple simultaneous HTTP and other protocol requests. In fact, the RomPager products can run in devices without an OS, by running off the idle loop. The Software Abstraction Layer provides connections with any RTOS, TCP/IP and file system environment. The RomPager product family has been ported to all major processor/OS platforms and is delivered with interface files for the leading RTOS and personal computers environments.

## Full Web Technology

The RomPlug Advanced and RomPlug Control toolkits include full versions of the RomPager Advanced Web Server, RomWebClient and RomXML toolkits, which may be used to provide other device functions as well as UPnP technology support.

**RomPager Advanced** is an HTTP 1.0/1.1 compliant Web server that supports full management of a device using a Web browser. It has full support for HTML (2.0, 3.2, and 4.0), multiple Web object sources, object compression, and advanced security. RomPager Advanced includes a Web Application Toolkit and the PageBuilder compiler, which is used to prepare objects to be served by the RomPager Web Server. The PageBuilder compiler takes input from Web pages (prepared with any Web page layout program), images, Java Applets, etc. and generates a highly compressed Web object library that is compiled and linked with the Web Server Engine. RomPager Advanced also provides CGI-style user exit support and optional file system support..

**RomWebClient** is an HTTP 1.0/1.1 client that provides embedded devices the ability to send and retrieve objects to/from a Web server using the HTTP protocol. Objects can be in any format and can be used with a memory buffer or with the optional file system. RomWebClient works with any standard Web server or with other embedded devices that have embedded Web servers.

**RomXML** is a small XML parsing and framing tool for embedded devices that converts internal data between C language structures and XML documents. Designed with a programming model specifically for limited resource devices, RomXML provides a unique approach for XML designed for embedded devices. RomXML provides the basis for full SOAP support as well as simple XML documents. In conjunction with the RomPager Web Server or RomWebClient toolkits, RomXML provides support for SOAP, XML-RPC or other HTTP-based request-response protocols.