Using the DAVID® UpLink Server

Version 3.0

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Chapter 1: Overview

This chapter provides and overview of the DAVID UpLink Server. It includes the following sections:

- **Introduction**
- **Installation**

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Introduction

This is the DAVID UpLink Server for Windows NT. This product replaces the DAVID UpLink Server for OS-9.

The DAVID UpLink Server processes command and control requests from client applications using the UpLink API.

A demo program named `moplay` that uses the UpLink API is located in `$MWOS/SRC/DAVID/DEMOS/MOPLAY`. It is included with the DAVID Application Development Pak and the DAVID Installation Pak.

The DAVID UpLink Server also includes a 1.544Mb/s MPEG-2 sample stream to test your installation. The stream is located in `$MWOS/SRC/ASSETS/STREAMS/MPEG_2/davidpr.mp2`. The PIDs for this stream are shown in **Table 1-1**.

Table 1-1 Sample Stream PIDs

PID Type	Value
Video and PCR data	`0x1062`
Audio	`0x1063`

This version of the UpLink server works with either the Stellar T1 / RS-422 PC Card, or an ethernet TCP/IP socket.

RadiSys Microware Communications Software Division, Inc. has written a driver and a configuration utility for the Stellar T1 / RS-422 PC Card under Windows NT 4.

For More Information

Installation and configuration information for the Stellar T1 / RS-422 PC Card is described in the *Stellar T1 PC Card RS-422 Driver/Utility Users Guide*.

Installation

The installer for the DAVID UpLink Server for Windows NT will overlay an MWOS structure of the user's choice. The documentation and executables will be accessible through the `Start -> Programs -> DAVID UpLink Server for NT` menu.

Chapter 2: Configuring the DAVID UpLink Server

This chapter describes configuring the DAVID UpLink Server. It includes the following sections:

- **Configuring the DAVID UpLink Client**
- **DAVID UpLink Server Global Settings**

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Configuring the DAVID UpLink Client

There are four pieces of information used in the client environment to be able to communicate with the DAVID UpLink Server: The first two are the Control Channel and Data Channel which are always required. The second two are the UpLink Server and UpLink Service, which are only required if using a socket as the control channel.

UpLink Control and Data Channels

The Control Channel is the name of the device that is used to send requestes and receive acknowledgements from the UpLink Server.

The Data Channel is the name of the device that is used to retrieve data and streams from the UpLink server in an MPEG-2 transport stream.

These two pieces of information should be stored in the CDB module. The Control Channel should be listed as `CDB_TYPE_CTRLCHAN` (113). The Data Channel should be listed as `CDB_TYPE_DATACHAN` (114).

UpLink Server and Services

The UpLink Server and Services are stored as entries in the inetdb module(s) in the client system.

The UpLink Server entry is the IP address of the Windows NT machine running the DAVID UpLink Server software. The entry in the inetdb module is named `uplink_server`.

The UpLink Control Channel Service is the port number at which the DAVID UpLink Server will listen for socket connections from clients to be used as the control channel.The entry in the inetdb module is named `uplink_service_cc`. This service entry is only needed when a socket is to be used as the control channel.

The UpLink Data Channel Service is the port number at which the DAVID UpLink Server will listen for socket connections from clients to be used as the data channel.The entry in the inetdb module is named `uplink_service_dc`. This service entry is only needed when a socket is to be used as the data channel.

When using the UpLink API, applications will generally call the function `david_demo_uplink_init()` to connect to the server. Doing so saves the effort of writing code to retrieve the information described above. `david_demo_uplink_init()` is included with the DAVID Application Development Pak and the DAVID Installation Pak. It is located in the library `$MWOS/OS9000/PPC/LIB/david_demo.l`. The source code for this library is located in `$MWOS/SRC/DAVID/DEMOS/LIBSRC/DAVID_DEMO`.

UpLink API

The UpLink static library is located in `$MWOS/OS9000/PPC/LIB/uplinklib.l`.

The UpLink subroutine library is located in `$MWOS/OS9000/PPC/LIB/uplink.l`. This version of the library requires that the trap module `$MWOS/OS9000/PPC/CMDS/DAVID/uplink` be in the module directory in the client.

`uplinklib.l`, `uplink.l`, `uplink`, and a reference manual for the UpLink API entitled ***UpLink Programming Reference*** are included with the DAVID Application Dev Pak and the DAVID Installation Pak.

DAVID UpLink Server Global Settings

The global settings dialog affects both the UpLink Server and the Data Pump utility.

To configure the global settings for the application, click on the Global Settings… button in the main dialog as shown in **Figure 2-3**.

Figure 2-1 DAVID UpLink Server Main Dialog
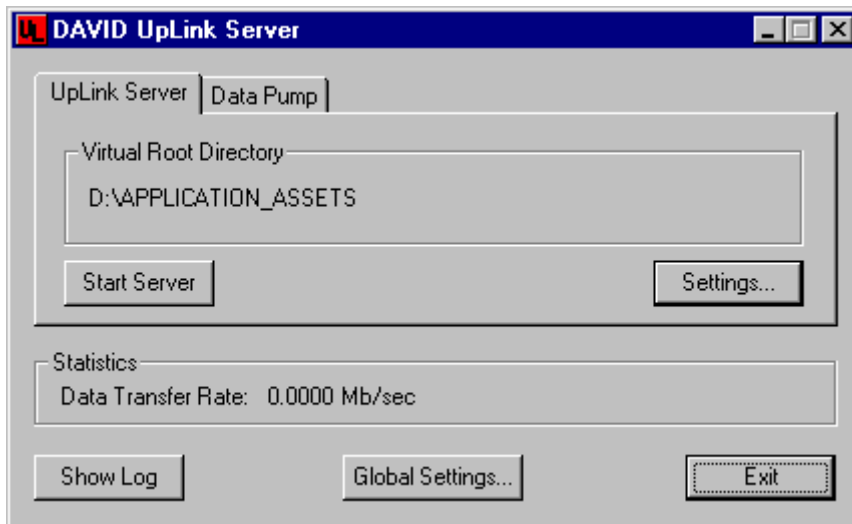
This will result in the display of the Global Settings dialog as shown in **Figure 2-4**.

Figure 2-2 Global Settings Dialog
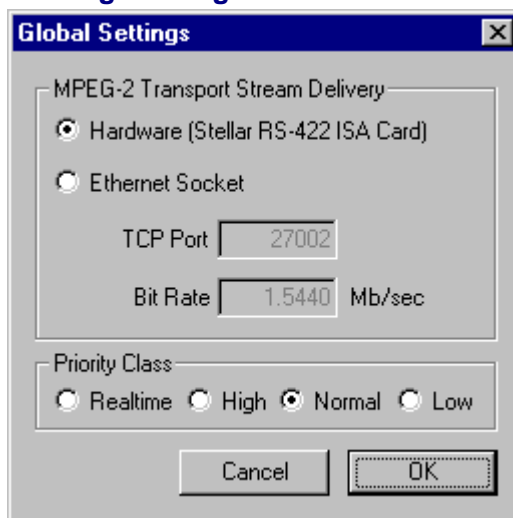
MPEG-2 Transport Stream Delivery

This section of the dialog is for configuring how MPEG-2 Transport streams are to be delivered to the client application.

Hardware

If you select the Hardware radio button, the server software will send data to the client using the Stellar RS-422 ISA card.

Ethernet Socket

If you select the Ethernet Socket radio button, the server software will send data to the client using a socket.

The TCP Port field indicates what port number the server software will listen for the client to make a socket connection. The port number must match the client UpLink Data Channel Service entry in the `inetdb` modules on the client.

The Bit Rate field indicates the rate at which data should be transmitted to the client. The value is expressed in megabits per second.

Priority Class

This section of the dialog is used to choose one of the four Windows priority classes for the server software.

Choosing a setting above Normal may be necessary when using a socket as the data channel.

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DAVID UpLink Server Settings

To configure the Server settings for the DAVID UpLink Server application, click on the Settings… button in the UpLink Server tab in the main dialog as shown in **Figure 2-3**.

Figure 2-3 DAVID UpLink Server Main Dialog
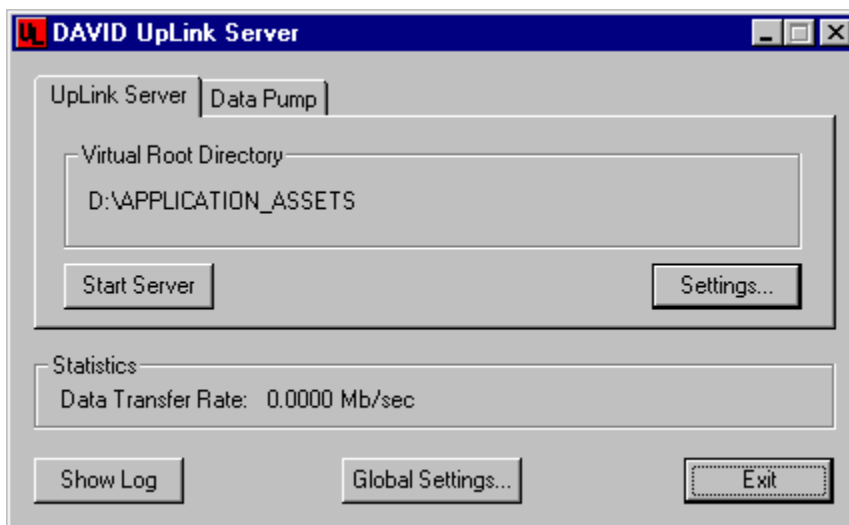
This will result in the display of the Settings dialog as shown in **Figure 2-4**.

Figure 2-4 Server Settings Dialog
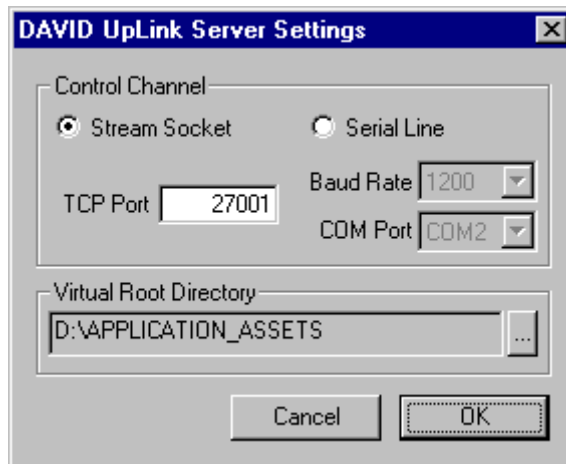
Control Channel

The control channel is used by the UpLink API to send command and control requests to the DAVID UpLink Server software.

The Control Channel section of the configuration dialog allows the user to select the use of either a socket or a serial port to be used as the control channel.

Stream Socket

If you select the Stream Socket radio button, the server software will wait for a socket connection from a client when you begin a server session.

The TCP Port field indicates what port number the server software will expect the socket connection to be on. The port number must match the client UpLink Control Channel Service entry in the inetdb modules.

Serial Line

If you select the Serial Line radio button, the server software will wait for data to arrive on the specified COM port from the client when you begin a server session.

The Baud Rate field allows you to select the bit rate that the client will be sending and receiving data.

It is important to note that serial data transmissions will be sent in a RAW mode. This allows UpLink API and Server software to send/receive binary packet data. Flow control is handled using CTS/RTS.

The COM Port field is used to specify which COM port is being connected to the set-top device.

Virtual Root Directory

A virtual root is a way of creating a restricted environment, which limits the files and directories which can be accessed by the client on the machine running the server software. It is simply an artificial root for a directory structure.

For example, the actual root of the directory `C:\ASSETS` is `C:`. This means that you can access directories and files that are parallel to the `ASSETS` directory because the root is above `ASSETS` in the directory structure. If `C:\ASSETS` became the virtual root, then only files in and below `C:\ASSETS` could be accessed.

The Virtual Root Directory section of the configuration dialog allows the user to select a virtual root directory, which the DAVID UpLink Server software will enforce.

To select a Virtual Root, click on the browse button to the right of the currently displayed virtual root directory in the configuration dialog shown in **Figure 2-4**.

This will result in the display of an open file dialog as shown in **Figure 2-5**.

Figure 2-5 Virtual Root Dialog
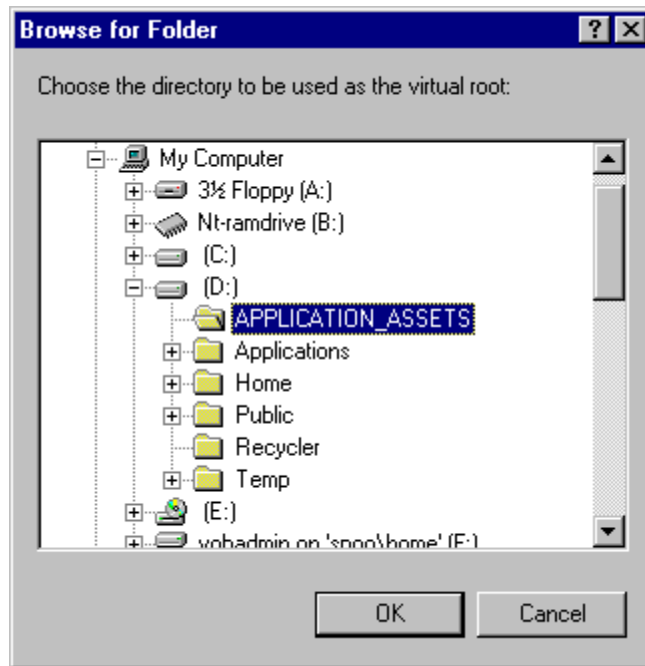
Select a drive and directory for the new virtual root and click on OK. It is not recommended that a network drive be selected if isochronous data is going to be used since network delays may cause delays in data transmission.

Virtual Root Enforcement

The virtual root is enforced by the DAVID UpLink Server software by preventing access to any file that is not in or below the virtual root. If an UpLink API call is made attempting to violate the virtual root, the OS-9 error code `E_FNA` will be returned.

Windows shortcut files within the virtual root will not be resolved. The single exception to this is the `ul_avc_play()` UpLink API call. The DAVID UpLink Server software will resolve shortcuts for this call because MPEG-2 streams tend to be quite large and not all streams used by a client application may fit on a single storage device.

Chapter 3: Using the DAVID UpLink Server

This chapter describes using the DAVID Uplink Server. It includes the following sections:

- **Using the DAVID UpLink Server**
- **Command Line Options**
- **Differences Between the OS-9 and Windows NT Version**
- **Known Issues**

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Using the DAVID UpLink Server

The DAVID UpLink Server is launched by either double clicking on the `ulserver.exe` icon (in `$MWOS/DOS/BIN`), or selecting it from the `Start->Programs->DAVID UpLink Server for NT` menu.

There are three groups of controls in the main dialog window. The controls in the UpLink Server tab are used to start, stop, and change the settings used by the server. The controls in the Data Pump tab are used to start and stop the Data Pump. Lastly, there are the global controls outside of the tab control which apply to both of the server and the data pump utility.

UpLink Server Tab

Figure 3-1 shows the application with the UpLink Server tab selected.

Figure 3-1 UpLink Server Tab
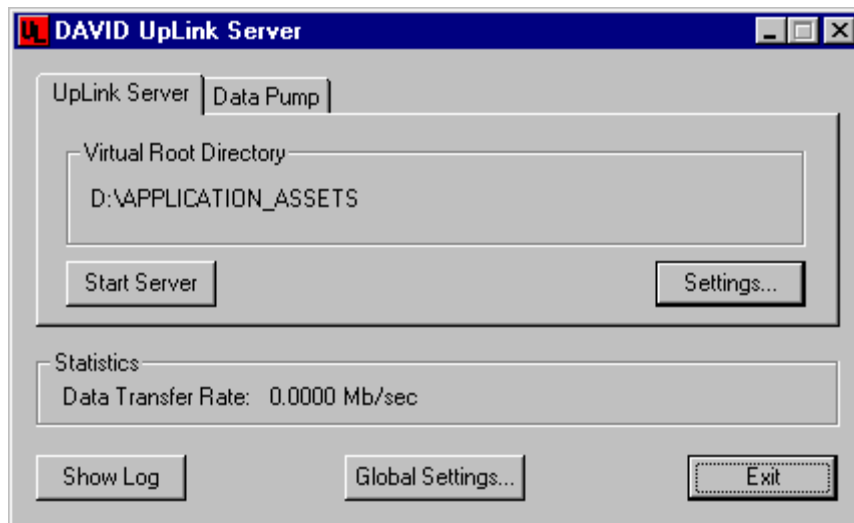
Virtual Root Directory

The Virtual Root Directory section displays the current virtual root setting. The virtual root can be changed in the server settings dialog which is accessed through the Settings... button.

Start Server

Clicking on the Start Server button starts the actual server thread. Once the server thread is started, it waits for a connection from the client.

While the server thread is executing the Start Server button's label will be changed to Stop Server. Pressing the Stop Server button will terminate the server thread.

If the server is configured to use a serial port for the control channel, the server thread simply starts waiting for UpLink API commands to come over the serial port.

If the server is configured to use a socket for the control channel, the server thread will start listening for a connection from the client on the port specified in the Server Settings dialog. Once the socket connection is established, the server thread starts waiting for UpLink API commands to come over the socket.

While the server thread is executing, there is also a writer thread running. The writer thread constantly transmits MPEG-2 transport NULL packets unless there is requested data to transmit.

If the MPEG-2 Transport Stream Delivery in the Global Settings dialog is configured for Hardware, the server thread opens the Stellar RS-422 card, launches the writer thread which then begins continuous transmission through the stellar card.

If the MPEG-2 Transport Stream Delivery in the Global Settings dialog is configured for Ethernet Socket, the server thread will start listening for a connection from the client on the port specified in the Global Settings dialog. Once the socket connection is established, the server thread launches the writer thread which then begins continuous transmission through the socket.

Note

The server thread will establish the control channel first. Then it will establish the data channel.

Settings…

The Settings… button will bring up the settings dialog.

For More Information

See **Chapter 2** for more information.

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Data Pump Tab

The DAVID UpLink Server software also supports a built-in data pump utility. Clicking on the Data Pump tab accesses this utility.

The data pump utility is used to send MPEG-2 transport streams to the client. The data pump utility is not restricted to streams within the virtual root since it is operated exclusively from the server host machine. The UpLink API calls are not used with the data pump utility.
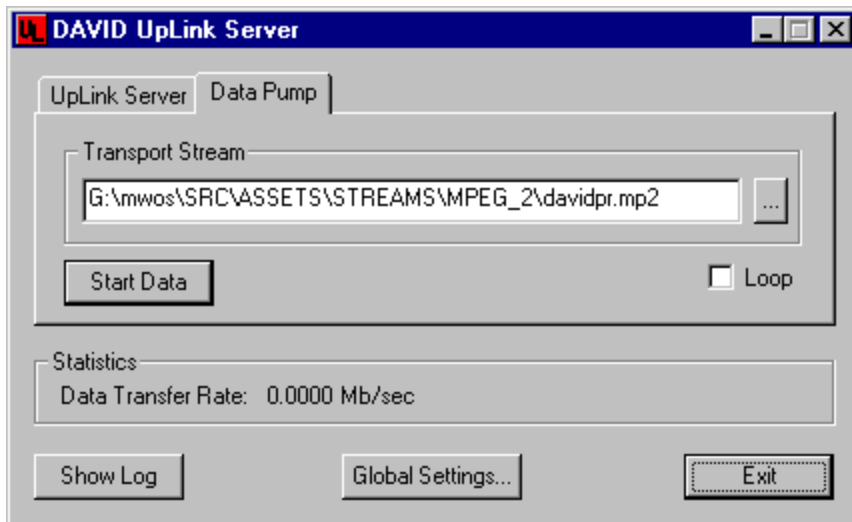
Note
The data pump utility and an UpLink server thread cannot be used simultaneously.

Figure 3-2 shows the application with the Data Pump tab selected.

Figure 3-2 Data Pump Tab

Transport Stream

The Transport Stream section shows the transport stream that will be transmitted when the Start Data button is clicked.

To select a transport stream, click on the browse button to the right of the currently displayed transport stream.

This will result in the display of an open file dialog as shown in **Figure 3-3**.

Figure 3-3 Selecting a Transport Stream
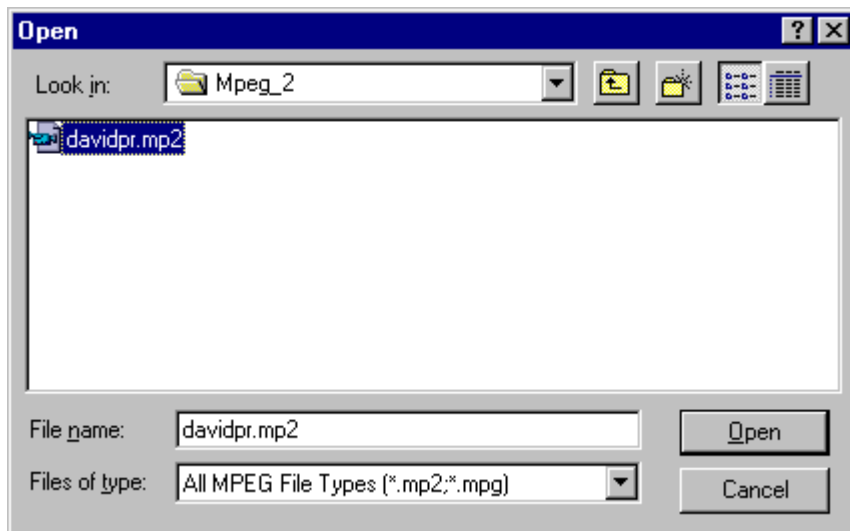
Select a transport stream. The last transport stream used is saved in the application preferences.

Start Data

Once an MPEG-2 transport stream is selected, pressing the Start Data button will cause the data pump utility to commence streaming the contents of the selected file.

Once the data begins streaming, the Start Data label will change to Stop Data. Pressing the button again will cause the data pump utility to stop streaming data to the client. Otherwise, if the Loop checkbox is not turned on, the label will change back to Start Pump when the entire transport stream has been sent.

If the MPEG-2 Transport Stream Delivery in the Global Settings dialog is configured for Hardware, pressing the Start Data button causes the data pump to open the Stellar RS-422 card and begin streaming the data.

If the MPEG-2 Transport Stream Delivery in the Global Settings dialog is configured for Ethernet Socket, pressing the Start Data button causes the data pump to begin listening for a connection from the client on the port specified in the Global Settings dialog. Once the socket connection is established, the data pump then begins streaming the data.

Loop

The Loop checkbox is used to indicate that the selected stream should continue playing until it is stopped manually by clicking on the Stop Data button.

Global Controls

Figure 3-1 and **Figure 3-2** previously showed the remaining controls.

Statistics

The Statistics section is used to display the estimated current rate of data transfer in megabits per second. When the UpLink server is running, it will be continuously be updating the statistics because the writer thread is always writing data. With the data pump utility, the statistics will are only updated when there is actual data being pumped.

Show Log

The Show Log button causes the **re-sizable** Event Log window to appear as shown in **Figure 3-4**.

Figure 3-4 Event Log Window
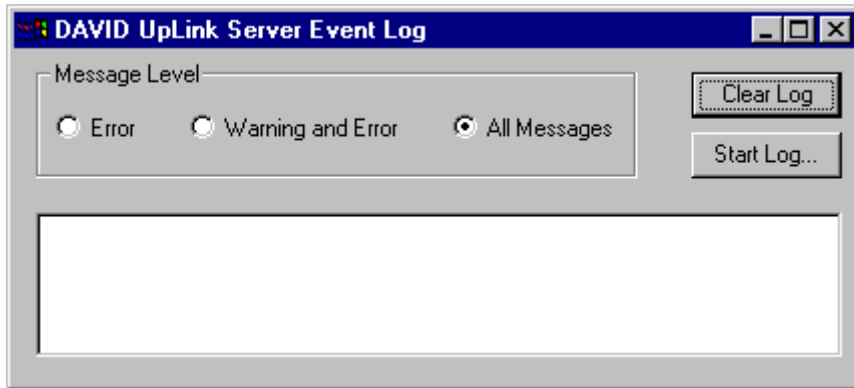
Once the Event Log dialog is visible, the Show log label will change to Hide Log. Pressing the button again will cause the Event Log window to disappear.

The Event Log contains messages for both the UpLink Server and the Data Pump. The amount of information that appears in the scrolling log is adjustable.

Message Level

The Message Level section specifies how much information should be placed in the scrolling log.

Each log entry has the following format: PREFIX[%d] MESSAGE. The PREFIX indicates the type of the message. The log entry number of the message enclosed in square brackets follows the PREFIX. The MESSAGE portion of a log entry contains the actual message being logged.

There are three settings for message level:

- Errors Only

  Only log messages indicating an error are shown in the scrolling log. Error log messages are prefixed with ERROR.

  Error messages indicate that a problem has occurred. Usually files that cannot be found or accessed cause this.

- Warnings

  Only warning and error messages are shown in the scrolling log. Warning log messages are prefixed with WARN.

  Warning messages indicate that something unexpected has happened, but that the server is coping with it.

- All Messages

  Error, warning, and informational messages are all shown in the scrolling log. Informational log messages are prefixed with INFO.

  Informational messages are used to indicate what the server software is currently doing.

Note

There is also a fourth type of message referred to as a state message. These messages cannot be turned off. You can identify these messages by the prefix STATE.
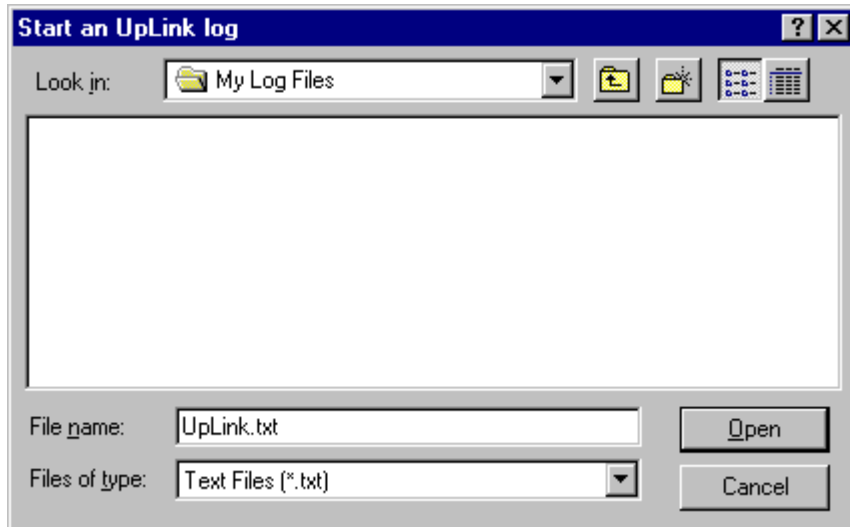
Clear Log

The Clear Log button erases all of the entries currently in the event log.

Start Log…

The Start Log… button will bring up an open file dialog to select the name and location in which to store an UpLink log file as shown in **Figure 3-5**.

Figure 3-5 Starting an UpLInk Log File

Once a log file is created, all further messages that are shown in the scrolling log will also be written to the log file.

After starting a log file, the Start Log… button's label will change to Stop Log. Clicking on the button while the label is Stop Log will cause the current log file to be closed.

Clicking the Clear Log button will only clear the entries displayed in the Event Log window, it does not affect entries written to the log file.

Exit

Clicking on the Exit button will cause the DAVID UpLink Server application to terminate.

Command Line Options

To make the DAVID UpLink Server easier to use, the following command line options supported.

-ss

If the Start Server option is specified, when the DAVID UpLink Server is launched it immediately starts the server (just as if the Start Server button had been pressed).

-sl

If the Show Log option is specified, when the DAVID UpLink Server is launched it immediately displays the Event Log dialog (just as if the Show Log button had been pressed).

Note
Either or both of these options can be specified on the command line or added to a Windows Shortcut to $MWOS/DOS/BIN/ulserver.exe.

Differences Between the OS-9 and Windows NT Version

- A Virtual Root is now enforced to prevent access to other files on your host system.

- You may fail to delete files or directories because of Windows sharing violations.

ul_rfa_mkdir()

- The mode parameter is ignored. The created directory will inherit the permissions of the DAVID UpLink Server application.

ul_rfa_getinfo()

- The `perm_h` and `perm_l` members of the `ul_file_info` structure returned will convert the NT permissions to similar permissions for OS-9.

- Only the lower 32-bits of the Windows 64-bit file size stored in `size_h` and `size_l` are used.

- Windows does not support group/user values. The group and user members are always set to zero.

- The first entry in `modified[]` contains the year and indicates the number of years since 1900.

ul_rfa_setinfo()

- The `perm_h` and `perm_l` members of the `ul_file_info` structure are ignored.

ul_rfa_dir()

- The `perm_h` and `perm_l` members of the `ul_file_info` structures returned will reflect the NT permissions.

ul_rfa_setinfo()

- Only the two least significant bits are used to determine the permission changes.
- The first entry in `modified[]` contains the year and indicates the number of years since 1900.
- When accessing a file's size is necessary, only the low order 32-bits are used. The high order 32-bits are ignored

Known Issues

- Using the serial port as the control channel has not yet been tested.

- OS-9 uses 16-bit error codes where the error class is in the most significant byte and the error number within that class is in the least significant byte. OS-9000 uses 32-bit error codes where the error class is in the most significant word and the error number within that class is in the least significant word. Currently, the server software returns OS-9 error codes.

Chapter 4: Trouble Shooting

This chapter contains a list of common questions and answers about the DAVID UpLink Server.

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Trouble Shooting Issues

- If an error 221 or 216 is returned from `david_demo_uplink_init()`, it generally indicates that the subroutine library `uplink` is not in the module directory, or one of the devices specified in the CDB module (`CDB_TYPE_CTRLCHAN`, `CDB_TYPE_DATACHAN`) is not present.

- If you experience problems with MPEG playback, make sure your hard drive is not the bottleneck.

- If it appears that the MPEG is not streaming quickly enough (i.e., you see the stream but also see occasional pauses or macroblocks), try the following:

  - Setting the message level to "Errors Only".

  - Make the server the foreground application.

  - Set the Priority Class of the server to a setting above Normal.

  - Shut down other applications to reduce the load on the overall system.

- If you are having trouble sending requests to the server and you are using a serial line as the control channel, check to make sure you have set the baud rate of the COM port you are using to 1200bps in the configuration dialog. If a faster rate is required, modify the function `set_options()` in `$MWOS/SRC/DAVID/DEMOS/LIBSRC/DAVID_DEMO/uplink.c` to set the baud rate to the speed desired.

- The current speed setting of the Stellar RS-422 card determines the rate at which data is transmitted from the server to the client. Make sure the data rate setting of the card being used matches the overall bit rate of the MPEG-2 transport stream to be transmitted. The Statistics section of the main dialog should be a good indicator of what speed the card is set at.

Product Discrepancy Report

To: Microware Customer Support

FAX: 515-224-1352

From:_____

Company:_____

Phone:_____

Fax:_____Email:_____

Product Name:

Description of Problem:

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_____

_____

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Host Platform_____

Target Platform_____

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