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Introduction

This document describes the Ethernet control interface for the AP20. TCP/IP socket communications may be used through the Ethernet to command the AP20 or to retrieve status.

This document is for system integrators who need to control the AP20 through a network connection. It assumes that the reader is familiar with some standard network TCP/IP concepts.

Ethernet connection to AP20

The RJ45 connector labeled Ethernet on the back of the AP20 must be connected to the network router and network parameters properly set. The IP address for the AP20 can be found in the Network screen in the Current IP Address box.

The client initiates the communication session with the AP20 IP address at port 14500. Once connected the client may send commands as described in this document to set or read the AP20 configuration. The configuration changes happen as soon as they are received. For example, you should see the Fader volume change immediately after receiving a command to set the fader.

For test purposes you may connect to the AP20 using Windows HyperTerminal. Telnet may also be used for Windows Command Prompt or with Linux.

Using HyperTerminal
In HyperTerminal, select “Connect Using: TCP/IP (WinSock). Then enter the AP20 IP address under “Host address:”, and 14500 for “Port number: ”.

Using Telnet
To use Telnet, enter the IP address and port number in the command line, for example:

```
# telnet 10.1.1.78 14500
```

Password Protection
The AP20 may be protected from unauthorized access by a Setup Password, which is set under the Systems screen. The Setup Password is used on both local access to the AP20 through the touch screen, and remote access through Ethernet commands.

The AUTH command with the correct password must be sent to the AP20 before sending a password protected command. If this is not done, then the command results in no action and the AP20 returns the string “SECERR”. Sending the password enables all network commands for as long as the network connection is maintained.

Not all network commands require a password. Inquiry commands such as SYSTEM and IDENTIFY will operate without a password.

Application Programming
Custom programs can be written to communicate with the AP20 using standard TCP/IP communications. An example C language interface is included at the end of this document for reference.
Command Format

The general command format for all configuration commands is listed below:

@COMMAND [ARG1] [ARG2] <CR>

Each COMMAND and its arguments are defined in this document. Whether or not [ARG1] and/or [ARG2] are used depends on the command.

The command is terminated by a <CR>. The response returns ASCII text and is also terminated by <CR> character at the end.

Some commands are characterized as “Read” and are used only to read status or information from the AP20. Commands that are “Read/Write” can be used to set the specific configuration item, or just read it.

For “Read/Write” commands the last argument is the value to write to the configuration. Omit the final argument in order to read the configuration item without changing it.

General Commands

1. System Information

Returns system versions and MAC address

<table>
<thead>
<tr>
<th>Command:</th>
<th>SYSTEM &lt;\0&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response:</td>
<td>VER&lt;space&gt;[Version]&lt;LF&gt;</td>
</tr>
<tr>
<td></td>
<td>VERDATE&lt;space&gt;[Date]&lt;LF&gt;</td>
</tr>
<tr>
<td></td>
<td>MAC&lt;space&gt;[Mac Address]&lt;CR&gt;&lt;\0&gt;</td>
</tr>
<tr>
<td>Operation:</td>
<td>Read</td>
</tr>
</tbody>
</table>

Parameters

- **Version**: Software version number
- **Date**: Software date/time
- **Mac Address**: AP20 MAC address
2. Identify

Get system identify information. Mostly used in discovery protocol.

<table>
<thead>
<tr>
<th>Command:</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>@IDENTIFY&lt;cr&gt;</td>
<td>Read</td>
</tr>
</tbody>
</table>

**Response:**

- **AP20**<space>
- **[IP]**<space>
- **[Circuit]**<space>
- **[Theater]**<space>
- **[Screen]**<cr><\0>

**Parameters**

- **AP20**: Confirms AP20 is connected at this address
- **[IP]**: IP address (useful after broadcast command)
- **[Circuit]**: Circuit information (future use)
- **[Theater]**: Theater information (future use)
- **[Screen]**: Screen information (future use)

3. Health

Enquiry for system health data.

<table>
<thead>
<tr>
<th>Command:</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>@HEALTH [SUB_CMD]&lt;cr&gt;</td>
<td>Read</td>
</tr>
</tbody>
</table>

**SUB_CMD**

**TEMPERATURE**

Returns t1, t2, t3 Celsius temperatures where:

- t1: H331 board temperature
- t2: H332 board temperature
- t3: H335 board temperature

Example response:

HEALTH TEMPERATURE 34,29,25

**H331VOLTS**

Returns voltages sensed on H331 board,

<vok>,<ref>,<5v>,<+15v>,<-15v>,<-5V>

Example response:

HEALTH H331VOLTS 1,3.18,4.99,15.0,-15.0,-5.0
<vok> is 1 if voltages are all within limits, else 0
H332VOLTS

Returns voltages sensed on H332 board, <vok>,<ref>,<5v>,<-15v>,<-5V>

Example response:
HEALTH H332VOLTS 1,3.18,4.99,15.0,-15.0,-5.0
<vok> is 1 if voltages are all within limits, else 0.
If H332 board is not present, response will be
HEALTH H332VOLTS NA

H335VOLTS

Returns voltages sensed on H335 board, <vok>,<ref>,<1.3v>

Example response:
HEALTH H335VOLTS 1,3.13,1.32
<vok> is 1 if voltages are all within limits, else 0

H336VOLTS

Returns voltages sensed on H336 board, <vok>,<ref>,<+5V>,<+15V>,<-15V>,<48V>,<vcpu>

Example response:
HEALTH H336VOLTS 1,3.39,5.10,15.0,-14.4,0.0,1
<vok> is 1 if voltages are all within limits, else 0
<48V> is mic phantom power, will be 0 if phantom power off
<vcpu> will be 1 if CPU power in limits, else 0

H338VOLTS

Returns voltages sensed on H338 board, <vok>,<ref>,<5v>,<-10V>

Example response:
HEALTH H338VOLTS 0,3.18,5.02,10.56,-10.48
<vok> is 1 if voltages are all within limits, else 0
If H338 board is not present, response will be:
HEALTH H338VOLTS NA
4. Board Information

**Command:** \@BOARDINFO<cr>  
**Response:**  
```
H331, [ID], [AD], [R], [V], [CS], [FW], [FCS],
H332, [ID], [AD], [R], [V], [CS], [FW], [FCS],
H335, [ID], [AD], [R], [V], [CS], [FW], [FCS],
H337In, [ID], [AD], [R], [V], [CS], [FW], [FCS],
H337Out, [ID], [AD], [R], [V], [CS], [FW], [FCS],
H338, [ID], [AD], [R], [V], [CS], [FW], [FCS],
HDMI, [ID], [AD], [R], [V], [CS], [FW], [FCS],
```

Read

Returns a list of boards, present and their hardware and PIC f/w versions.

**Arguments**  
None

**Board IDs:**  
- H331: H331 Board  
- H332: H332 Board  
- H335: DSP/Motherboard  
- H337in: H337In  
- H337in: H337Out  
- HDMI: HDMI Interface board

**Parameters:**  
- **[ID]**: Board ID  
- **[AD]**: Board Slot Address  
- **[R]**: Hardware revision  
- **[V]**: Loader version  
- **[CS]**: Loader Checksum  
- **[FW]**: Firmware version  
- **[FCS]**: Firmware Checksum
5. Authorization

<table>
<thead>
<tr>
<th>Command:</th>
<th>@AUTH&lt;space&gt;[Password]&lt;cr&gt;</th>
<th>Operation</th>
<th>Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response:</td>
<td>AUTH&lt;space&gt;[SETUP</td>
<td>OP</td>
<td>SECERR]&lt;cr&gt;</td>
</tr>
</tbody>
</table>

Give a password to allow usage of restricted commands. The authorization is required for many commands if access the AP20 is configured with a Password. The AUTH must be issued before issuing any password protected commands, and is valid only for the duration of the TCP/IP connection.

There are two levels of password protection in the AP20. Both levels are set in the System > Access Control screen on the AP20. The top password labeled NetCmd Password will allow access to the AP20 for Operator level type commands. The bottom password labeled Setup Password allows access to setup and configuration level commands.

The AUTH may be used for either the Operator or Setup level password.

Parameters:

<table>
<thead>
<tr>
<th>/Password</th>
<th>Operator level or Setup level password. The AP20 compares this first with setup level password and gives Setup Level authorization if it matches. Otherwise, it compares it to the Operator (NetCmd) password and authorizes operator commands if it matches.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SETUP</td>
<td>The AP20 returns this value when Setup Level authorization has been granted.</td>
</tr>
<tr>
<td>OP</td>
<td>The AP20 returns this value when Operator Level authorization has been granted.</td>
</tr>
<tr>
<td>SECERR</td>
<td>The AP20 returns this value if neither Setup nor Operator level authorization has been granted.</td>
</tr>
</tbody>
</table>

6. Serial Number

<table>
<thead>
<tr>
<th>Command:</th>
<th>SERIALNO&lt;CR&gt;</th>
<th>Operation</th>
<th>Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response:</td>
<td>SERIALNO &lt;space&gt;[SN]&lt;CR&gt;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reads the AP20 serial number.

Parameters

| /SN/ | This value is the serial number that has been programmed into the unit during the manufacturing process. |
7. **MAC Address**

<table>
<thead>
<tr>
<th>Command:</th>
<th>MAC&lt;CR&gt;</th>
<th>Operation:</th>
<th>READ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response:</td>
<td>MAC&lt;space&gt;[Mac adr]&lt;CR&gt;</td>
<td>Read:</td>
<td></td>
</tr>
</tbody>
</table>

Reads the AP20 network MAC address.

**Parameters**

/\[Mac adr\] This is the 12 digit AP20 network interface MAC address.

**Example**

Send: MAC
Receive: MAC 080077124578

**Format Commands**

8. **Format Selection**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Response:</td>
<td>FADER&lt;space&gt;[Format]&lt;&lt;CR&gt;</td>
<td>Read/Write</td>
<td></td>
</tr>
</tbody>
</table>

This is used to select a new format, or view the current format.

**Parameters**

/\[New Format\] This is the format name to select. The name must match exactly the format name on AP20.  
Note: Spaces may be used within the name.

/\[Format\] This is the current format name.

**Example**

Set the format to Digital Cinema
Send: FORMAT Digital Cinema
Receive: FORMAT Digital Cinema
Automation

9. Execute a AP20 Macro

<table>
<thead>
<tr>
<th>Command:</th>
<th>RUNMACRO &lt;space&gt; [Macro] &lt;CR&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response:</td>
<td>[OK</td>
</tr>
</tbody>
</table>

This is used to execute a macro defined in the AP20.

**Parameters**

- **[Macro]**
  - This is the macro name to execute. The name must match exactly the macro name on AP20.
  - Note: Spaces may be used within the name.

- **OK**
  - Response after macro is found and executed.

- **ERR no macro**
  - Response if macro does not exist on the AP20.

**Example**

Run Macro named Auto1

Send: **RUNMACRO Auto1**

Receive: OK

Level Commands

10. Master Fader Level

<table>
<thead>
<tr>
<th>Command:</th>
<th>FADER &lt;space&gt; [New Level] &lt;CR&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response:</td>
<td>FADER &lt;space&gt; [Level] &lt;CR&gt;</td>
</tr>
</tbody>
</table>

This is used to set or read the fader level.

**Parameters**

- **[New Level]**
  - Value to set the fader in tenths.
  - Omit this argument to only read the fader value.

- **[Level]**
  - Current master fader level in tenths.

**Example**

Set the master fader to 7.0

Send: **FADER 70**

Receive: **FADER 70**
11. Master Fader Mute

Command: MUTED<space>[New Value]<<CR>
Response: MUTED<space>[Value]<CR>

Mute or Unmute the AP20 output.

Parameters
[New Value] 1 to mute, 0 to unmute.
[Value] Current mute value.

Example
Mute

Send: MUTED 1
Receive: MUTED 1

12. Monitor Level

Command: MONITORLEVEL<space>[New Value]<<CR>
Response: MONITORLEVEL<space>[Value]<CR>

Set or read the AP20 monitor level.

Parameters
[New Value] 0 (minimum) to 100 (maximum).
[Value] Current monitor level value.

Example
MONITORLEVEL

Send: MONITORLEVEL 70
Receive: MONITORLEVEL 70
13. Monitor Mute

<table>
<thead>
<tr>
<th>Command:</th>
<th>MONITORMUTE&lt;space&gt;[New Value]&lt;&lt;CR&gt;</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response:</td>
<td>MONITORMUTE&lt;space&gt;[Value]&lt;&lt;CR&gt;</td>
<td>Read/Write</td>
</tr>
</tbody>
</table>

Set or read the AP20 monitor level.

**Parameters**
- **[New Value]**  0 (unmute) or 1 (mute).
- **[Value]**      Current mutevalue.

**Example**
Mute the monitor.

- **Send:** MONITORMUTE 1
- **Receive:** MONITORMUTE 1
Sample Network Control Program

/* ===================================================================== **
* Module:     Ap20NetCmd.cpp
* Project:    AP20 Ethernet Control Program
*              
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*              LOSS OF BUSINESS INFORMATION, AND THE LIKE) ARISING OUT OF THE USE, MISUSE
*              OR INABILITY TO USE THE SOFTWARE OR RELATED DOCUMENTATION.
*              
*              ===================================================================== */

/* ======================================================================== **
*   Compile Options
*              
*              #define StrAp20Ip        "10.1.1.78"
*              #define StrAp20Password  "xyz"
*              
*              ======================================================================== */

/* ======================================================================== **
*   Include Files
*              
*              #include <stdio.h>
*              #include <string.h>
*              #include <stdlib.h>
*              #include <unistd.h>
*              #include <arpa/inet.h>
*              
*              ======================================================================== */

/* ======================================================================== **
*   Definitions
*              
*              #define AP20_PORT_NUM    14500
*              
*              ======================================================================== */

/* ======================================================================== **
*   Data
*              
*              #define RX_BUF_SIZE 2048
*              char rxBuf[ RX_BUF_SIZE + 1 ];
*              
*              ======================================================================== */
/ * Prototypes * ----------------------------------------------- */
int AP20Command( char *strAp20_IpAddress, char *StrCmd, char *StrPassword );
int Send( int fd , char *StrCmd );
int ReadResponse( int fd , char *StrCmd );

/* Functions */

/* Function: main */
*/
/* Picks up the Command from the command line arguments. */
/* In this example the AP20 IP address and AP20 Setup password is hardcoded. */
*/

int main (int argc, char **argv)
{
char StrCmd[256];
int cnt;
if ( argc < 2 )
{
    printf ("Usage: Ap20NetCmd arg1 ... arg\n");
    exit(1);
}

// collect args
int firstarg=1;
snprintf( StrCmd, sizeof(StrCmd), "%s", argv[firstarg] );
for ( cnt = firstarg; cnt < argc; cnt++ )
{
    strcat ( StrCmd , " ");
    strcat ( StrCmd , argv[cnt]);
}
AP20Command( StrAp20Ip, StrCmd, StrAp20Password );
}
int AP20Command( char *strAp20_IpAddress, char *StrCmd, char *StrPassword )
{
    int fd;
    struct sockaddr_in MySocket; // sender main socket

    memset(&MySocket, 0, sizeof(MySocket));
    MySocket.sin_addr.s_addr = inet_addr( "127.0.0.1" );
    MySocket.sin_addr.s_addr = inet_addr( strAp20_IpAddress ); // Set the AP20 IP address here
    MySocket.sin_family = AF_INET;
    MySocket.sin_port = htons( AP20_PORT_NUM );            // Set the AP20 Port address

    // Get a file descriptor for the socket
    if脂肪((fd = socket(AF_INET, SOCK_STREAM, 0)) < 0) 邮件到 {  
        printf("socket() failed\n");
        return -1;
    }

    // Connect to the AP20
    if脂肪(::connect( fd, (struct sockaddr *)&MySocket, sizeof( MySocket ) ) != 0 ) 邮件到 {  
        printf("connect() fail\n");
        close( fd );
        fd = -1;
        return -1;
    }

    printf("Connection to %s:%d OK\n", strAp20_IpAddress, AP20_PORT_NUM );

    // Send password only if AP20 has Setup Password defined
    char StrAuth[100];
    sprintf( StrAuth, "AUTH %s", StrPassword );
    if脂肪(strlen( StrPassword ) ) 邮件到 {  
        Send( fd, StrAuth );
        ReadResponse( fd, StrAuth );
        if脂肪(!strcmp( rxBuf, "SETUP" ) ) 邮件到 {  
            printf( "Wrong Password\n" );
            return(-1 );
        } else
            printf("Password OK\n");
    }

    Send( fd, StrCmd );
    ReadResponse( fd, StrCmd );

    close( fd ); // Close connection
    fd = -1;
    return( 0 );
}
/*Function: Send*/
int Send(int fd, char *StrCmd)
{
    char strAP20Cmd[1024];
    // Command starts with '@' and ends with CR
    strcpy(strAP20Cmd, '@');
    strcat(strAP20Cmd, StrCmd);
    strcat(strAP20Cmd, '');
    printf("Sending NetCmd to AP20: %s\n", strAP20Cmd);
    int ret = write(fd, &strAP20Cmd, strlen(strAP20Cmd));
    if (ret < 0)
    {
        fprintf(stderr, "write fail\n");
        close(fd);
        fd = -1;
        return 0;
    }

    /*Function: ReadResponse*/
    int ReadResponse(int fd, char *StrCmd)
    {
        char c;
        int count = 0;
        for (int i = 0; i < RX_BUF_SIZE; i++)
        {
            // read 1-by-1.
            int ret = read(fd, &c, 1);
            if (ret < 0)
            {
                printf("Count=%d, Error\n", count);
                close(fd);
                fd = -1;
                return 0;
            }

            if (ret == 1)
            {
                // add to buffer
                rxBuf[count++] = c;
                if (c == '\r') // End of response
                {
                    rxBuf[count] = 0;
                    printf("%s\n", rxBuf);
                    break;
                }
            }
        }
        return 0;
    }
}
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