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ODU Firmware Command: IP

This document describes ODU and Protection Switch IP configuration beginning with firmware revision 78, where IP configuration was simplified under a single command: **IP**. The most-used commands are simply **IP ADDR** and **IP DHCP**.

IP ADDR is used to return or set the static IP address of the unit, and **IP DHCP** is used to return the unit to an address given by a local DHCP server. These commands are entered using an ASCII command/terminal display. Using Supervisor, a terminal display can be raised by clicking on the **Show/Hide Terminal** button that is in the menu bar of the Supervisor's main window.

Note: AnaCom, Inc.'s NMS Supervisor has an option to find and manage ODUs on a local network that do not have a DHCP server, either using an existing static address, or assigning an unused static address if the ODU does not have one. This feature can also be used to resolve an IP address conflict on a local network. This option can be found in the Options menu of Supervisor's main window, toggle the check box for **Enable IP address checking**.

Note: with firmware Rev 91+ we do not allow the IP configuration to be changed via a TCP connection, which includes the web page interface and telnet. This change was made to the firmware because the IP setup can be changed to a state where the device can be lost and not be recoverable using either a browser or telnet. The IP configuration can be changed over Ethernet using Supervisor or using a serial port connection.

Table of Contents

Commands....2
IP ADDR [Address]....2
IP DNS [IP address | RESET] (Rev 78)....2
IP ALL / IP LIST....2
IP DEFAULT [default gateway IP Addr]....3
IP CLEAR ALL....3
IP DHCP....3
IP DHCP RENEW [ON | OFF | NOW | time in secs] (Rev 91)....3
IP gARP [ON | OFF] (Rev 92)....3
IP mDNS [ON | OFF] (Rev 91)....4
IP MTU [Packet length]....4
IP NETMASK [IPv4 netmask]....4
IP NTP [ON | OFF] (Rev 91)....4
IP RTC [Domain Name | IP address | CLEAR]....4
IP RTC START....5
IP RTC UPDATE [Time in hours | ON | OFF]....5

IP TCP RESET (Rev 91).....5
IP HELP [ADDR | DHCP | DEFAULT | NETMASK | RTC | DNS | MTU | CLEAR | SHOW/LIST/ALL].....5
Appendix A: IP Address Conflict / Wrong Subnet.....6
Appendix B: Supervisor still fails to find ODU.....7
Appendix C: Ethernet Status.....7

Commands

IP ADDR [Address]

The **ADDR** argument allows a static IP address to be set for the ODU. If no address is given, then the present address will be returned. Information as to whether the ODU has a static IP address or one assigned by a DHCP server/router will also be displayed.

AnaCom, Inc. equipment is configured for DHCP when shipped, and thus will be accessible once connected to a local network that has a router running DHCP that assigns IP addresses.

Examples:

```
COMMAND> IP ADDR
IP 192.168.1.42 [DHCP]

COMMAND> IP ADDR 192.168.1.42

COMMAND> IP ADDR
IP 192.168.1.42 [Eth static [08]]
```

Note: when monitoring a device using Supervisor, (version 10.1.14,) we recommend using the Svr10 internal command **>STATIC [IP Addr]** to change the device to a specific static IP address. This is so that Svr10 will be made aware that the device is changing it's IP address, it will attempt to re-establish the connection automatically, with minimal user intervention to re-acquire the device.

IP DNS [IP address | RESET] (Rev 78)

DNS allows a domain name server to be specified. At this time, this would only be used with the **IP RTC** command to specify the name of a time server.

The ***RESET*** argument will reset the DNS address to the default value: OpenDNS1 – 208.67.222.222.

IP ALL / IP LIST

This command will display a report of most IP related parameters that can be set with the **IP** command.

Example:

```
IP LIST
IP Addr=192.168.1.42 [DHCP] MAC=0C:EF:7C:99:99:95
IP Netmask=255.255.255.0, MTU=1492
```

```
IP Default Gateway=192.168.1.1, MAC=54:75:D0:26:9F:E5
IP DNS Server=208.67.222.222 [idle]
IP RTC Server=128.138.140.44 [done [0]], auto-update disabled
SNMP trap targets:  192.168.1.3  192.168.1.16
```

IP DEFAULT [default gateway IP Addr]

This command sets/gets the IP address of the default gateway for the device. It is assumed to be a non-routable LAN address. It will be set automatically if the IP Address is assigned by a DHCP server.

Example:

```
COMMAND> IP DEFAULT
IP Default Gateway=192.168.1.1
```

IP CLEAR ALL

Assuming the device is using a static IP address, this command will return the IP configuration to the factory defaults.

IP DHCP

Assuming the device is currently using a static IP address, this command will switch the device to asking for a lease from a DHCP server.

Note: when monitoring a device using Supervisor, (version 10.1.7+,) we recommend using the Svr10 internal command **>DHCP** to command the device to switch to using a dynamically assigned IP address. This is advantageous because then Sv10 will know the IP address of the device is going to change, and it will try to re-establish the connection automatically.

IP DHCP RENEW [ON | OFF | NOW | time in secs] (Rev 91)

In firmware Rev 91, a DHCP lease can be renewed immediately, or in the specified number of seconds. DHCP lease renewal can also be enabled or disabled. Default is enabled.

IP gARP [ON | OFF] (Rev 92)

With the advent of firmware revision 92, we have begun sending gratuitous ARP broadcasts to announce our presence on a LAN, if we are using a static IP address assigned by the user. These broadcasts take the form of a request, with this device's IP address in the source and destination fields.

This broadcast is sent under specific circumstances:
1. When we boot the system, and we have a static IP address previously set.
2. We have static IP address, and the user changes it to a another static address.
3. We have been using a DHCP-assigned address, and we switch to using a static address.

We chose to add this feature to announce to smart devices on a LAN of the static address being used by our AnaCom device. This includes routers, and smart switches as well as possible client machines.

The default setting for this feature is ON, but it can be disabled by the user, by setting **IP gARP** to **OFF**.

For more information, see: https://wiki.wireshark.org/Gratuitous_ARP.

IP mDNS [ON | OFF] (Rev 91)

We have implemented a rudimentary implementation of the mDNS protocol, enabling properly-equipped browsers to access the web page of a device by using an address such as: **anacominc-072925.local**. The default setting for this feature is to be enabled.

Please see the Addendum for using mDNS, P/N 35111 for further information.

IP MTU [Packet length]

MTU allows the packet length of TCP/IP packets to be set. TCP/IP packets are limited in length to 1500 bytes, however, intermediate nodes in a network between the client machine running Supervisor and the monitored device may have a lower limit. The firmware does not have a means of interrogating these nodes to determine the largest packet size that can be transferred over the desired path, but this value can be set explicitly by the user with the **MTU** command.

The default value is 1492 bytes. Maximum value is 1,500 bytes; minimum value is 600 bytes.

IP NETMASK [IPv4 netmask]

This command set/gets the IPv4 netmask that combined with the device's IP address, defines the LAN subnet. It will be set automatically if the IP Address is assigned by a DHCP server.

Example:

```
COMMAND> IP NETMASK
IP Netmask=255.255.255.0
```

Note: the netmask cannot be specified as part of the IP address, eg. 192.168.1.5/24.

IP NTP [ON | OFF] (Rev 91)

Often, a device will be denied access to the Internet. This can result in a substantial delay during the bootup process. Additionally, we do not currently use the NTP / RTC functionality for any important function in the firmware. Therefore, by default we have disabled the use of the NTP protocol. It can be re-enabled if desired.

IP RTC [Domain Name | IP address | CLEAR]

RTC sets the name of a time server that will be used by the real-time clock for time synchronization.

The argument ***CLEAR*** will reset the server address being used as a time server for RTC synchronization to 0.0.0.0.

For some available time servers, see: http://tf.nist.gov/tf-cgi/servers.cgi.

IP RTC START

RTC *START* Updates Real-Time Clock synchronization immediately.

Note, the following message is printed upon starting:

```
IP RTC update started...
```

IP RTC UPDATE [Time in hours | ON | OFF]

The RTC function can resynchronize it's time with a time server periodically given in hours. This update feature can be turned off by giving a time of 0 or using the OFF argument. The ON argument will set the auto-update time to 24 hours.

Note: once this command is used, updates will begin as scheduled, and the command **IP RTC *START*** is not required.

IP TCP RESET (Rev 91)

We found that the finite state machine that implements the TCP layer in the firmware's Ethernet stack can hang if there are too many connections that are not properly terminated. This can cause the web page service to refuse any new connections. This issue has been fixed in firmware Rev 91, but regardless, we have implemented this command to restart the TCP layer state machine manually.

IP HELP [ADDR | DHCP | DEFAULT | NETMASK | RTC | DNS | MTU | CLEAR | SHOW/LIST/ALL]

HELP displays information available for the various network configuration settings that can be set with the **IP** command.

Examples:

```
IP
IP [HELP] [ADDR DHCP DEFAULT gARP mDNS NETMASK RTC DNS MTU CLEAR
SHOW/LIST/ALL]

IP HELP
IP [HELP] [ADDR DHCP DEFAULT NETMASK RTC DNS MTU CLEAR SHOW/LIST/ALL]
```

IP HELP RTC - shows help for the 'IP RTC' command

```
IP HELP ADDR
IP ADDR - get current ODU IP interface configuration
IP ADDR [IP Address] - set ODU to static IP address
IP DEFAULT [IP Address] - set IP address of default gateway
```

IP NETMASK [netmask in DOT notation] - set netmask for network

IP HELP DHCP
IP DHCP - command ODU to use DHCP; this sets the saved IP address to 0.

IP HELP RTC
IP RTC - read IP address of RTC server
IP RTC [IP Address or URL] - set IP address of RTC server.
If URL is specified, ODU will use DNS to find IP address.
IP RTC CLEAR - set IP address of RTC server to 0.0.0.0
IP RTC START - refresh the RTC setting
IP RTC UPDATE nnn - set auto-update time to nnn hours
IP RTC UPDATE ON - set auto-update time to 24 hours
IP RTC UPDATE OFF - disable auto-update

IP HELP DNS
IP DNS - read IP address of DNS server
IP DNS [IP Address] - set IP address of DNS server
IP DNS RESET - set IP address of DNS server to default (OpenDNS1)

IP HELP MTU
IP MTU - read current MTU value
IP MTU [mtu_value] - set MTU to specified value

IP HELP CLEAR
IP CLEAR - reset all parameters to stored defaults
IP CLEAR ALL - reset all parameters to factory defaults

Appendix A: IP Address Conflict / Wrong Subnet

When two units on a local network have the same IP address, (usually because at least one of them had been previously assigned their address as static, it will likely be difficult or impossible to communicate with one or both devices. If a unit is attached to a network and is not reachable and this cause is suspected, Supervisor can be used to find it, and change its address to an unused static address.

A device can also be unreachable if although it is physically on the same LAN, it is on a different subnet than the monitoring device or computer running Supervisor.

Solution:
Bring up Supervisor's terminal window by clicking on the **Show/Hide Terminal** button, located at the top of the Summary window. Using Supervisor's Terminal command field, enter the command:

>SNRESET *SERIAL#*

where ***SERIAL#*** is the serial number of the unit that is the target of this address change operation.

Appendix B: Supervisor still fails to find ODU

Supervisor uses the BootP protocol to find AnaCom, Inc. devices via their serial numbers. It does this by sending a broadcast BootP command that asks all AnaCom devices on the LAN to respond with their serial number and current IP address. If the computer running Supervisor and the ODU are on a LAN where the network communication has to go through a smart switch or a router that has been configured to block the BootP protocol, then the unit's IP address will have to be retrieved directly either by a serial port connection, a direct connection to a laptop that has been assigned an IP address, or via the temporary use of a dumb switch that does not block BootP protocol packets. Supervisor should then be able to connect to the unit using it's IP address.

Once the ODU's IP address has been found, entering the following command in Supervisor's Terminal command field ought to work:

```
>IPCONN  IP_Addr
```

where ***IP_Addr*** is the IP address of the ODU we wish to recover.

More information about using Supervisor to monitor and control AnaCom, Inc. devices is available in Supervisor's built-in help documentation. This is also available on the AnaCom, Inc. website, see: http://www.anacominc.com/Svr10Help/index.html

Appendix C: Ethernet Status

Counters for the various layers of the firmware Ethernet stack can be displayed using the command **STATUS ETH**.

Example:

```
[072925] STATUS ETH
Eth: [786D] Auto-Negotiation successful
Counts, during elapsed time of 142840 seconds:
ARP  rx=3745, tx=3744,  IP rx=151723, tx=23261, dropped=148, chksum=4
TCP  rx=0, tx=0, dropped=0, rexmit=0, chksum=0, conns=0, resets=0
UDP  rx=28863, tx=23257, dropped=9, chksum=9
ICMP rx=5, tx=4, dropped=1  cmd_svcd=23251
TX   ARP=1, BootP=4, DHCPC=4
DHCP timers (server=192.168.1.1):
     lease: 86400 secs =  24:00:00 (4 updates)
     renew: 30319 secs =   8:25:19 enabled
NTP  last update=0, auto-update disabled
```

In the above example, there are counters present for a number of protocols used over an Ethernet LAN. These counters are initialized at boot, and reset back to zero whenever we print this report. The elapsed time since boot or the last time the counters were reset is given in seconds, see above.

Counters:
ARP requests received and responses returned.

IP packets successfully received and the number responses sent, packets dropped due to a bad header or a bad checksum.

TCP packets are used by the web page server, and telnet. There were none here, because during these services were not used.

UDP packets, used by Supervisor to poll devices.

ICMP packets, typically this is a ping request.

cmd_svcd, this is the number of commands received and serviced by the device firmware. In the example above, this is a high number because every polling request from Supervisor counts as a command.

TX, these counters keep track of different protocol requests sent out by the firmware. Normally the device firmware only sends responses to requests and does not send requests of it's own, so these counters will typically be very low. When a particular counter is zero, it is not shown.