5.7-5.8 GHz Series Broadband Wireless Access Point

AP5857

INSTALLATION AND OPERATION GUIDE
FOR SYSTEM OPERATORS

VCom® Inc.
www.vcom.com
Advanced Broadband Products

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Specifications subject to change without notice — Printed in Canada

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VCom Inc.'s Corporate Mandate

is to be a leading worldwide designer and manufacturer of state-of-the-art communications equipment and components. Through the remarkable success of our customers and business partners, VCom innovations are achieving this goal.

SAFETY PRECAUTIONS

1. Before installing and operating this equipment, read all Safety, Installation and Operating sections. Retain this manual for future reference.
2. Follow all instructions — Failure to do so may result in damage to the unit or severe personal injury.
3. Servicing should not be attempted by the user. There are no user serviceable parts inside. Refer all servicing to factory qualified personnel.
4. Shock Hazard — An electrical shock hazard exists when the chassis cover is removed as is required to set internal controls. Always disconnect power from the unit before removing the cover.
5. Cleaning — Do not use liquid or aerosol cleaners. Use a damp cloth for cleaning.

LES PRÉCAUTIONS DE SÉCURITÉ

1. Avant d'installer ou d'opérer cet équipement, lisez, toutes les sections de sécurités, d'installations et d'opérations. Gardez ce manuel comme source de référence.
2. Suivez toutes instructions - si non, vous risquez d'endommager la machine ou de vous blesser sérieusement.
3. N'essayez, pas de réparer cet équipement vous même. Référez toutes revisions nécessaire au personnel qualifié de la manufacture.
4. Risque de choc - Il y a un risque de décharge électrique qui existe quand la couverture du châssis est enlevée, comme est nécessaire pour ajuster les contrôlcs internes. Il faut toujours couper l'électricité avant d'enlever le couvercle pour faire aucun ajustage.
5. Le nettoyage - n'utilisez pas de nettoyeurs aérosols ou liquides. Utilisez un tissu humide pour nettoyer.

☛ Important Installation Instructions

☛ Caution: To comply with FCC RF exposure limits in Section 1.1307, the AP5857 requires a minimum distance of 0.2 meters between it and all persons.

☛ Modifications not expressly approved by the manufacturer may void the user's authority to operate this equipment.

This device complies with FCC Part 15, Subparts B and E.

This device complies with Industry Canada RSS 210, Issue 5 including Amendments 1, 2, 3, and 4.

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1.0 GENERAL INFORMATION

1.1 Overview

The AP5857 Strand Radio is a wireless access solution to extend DOCSIS service via strand and pole mount access points. The radio system consists of an Access Point (AP) and a Subscriber Unit (SU). The AP mounts to the strand (CATV cable) and provides a point-to-multipoint radio link in the 5.8 GHz unlicensed UNII band to several subscriber units (SU) located up to 2 miles away. The AP functionality includes powering from the strand, remote control and monitoring via SNMP, and transmission and reception of standard DOCSIS signals at the levels found at a regular cable tap point. The SU consists of a wireless transceiver with functionality similar to the TRI5758. The SU will interface with a standard DOCSIS cable modem.

The AP5857 Strand Radio provides a wireless entry point to the HFC (hybrid fiber/coax) network, extending access to locations that may otherwise be unable to connect to the system.

The AP5857 includes a DOCSIS cable modem for communications and control. Note that the data passing over the wireless network does not pass through the cable modem, so the cable modem does not limit data rate or features available over the wireless link. In the downstream direction, the AP5857 includes a repeater that demodulates the downstream data, removes noise and errors, and remodulates. This ensures a top quality signal on the wireless link, independent of the quality of the CATV signal.

1.2 Module Features

- Up to a 2 Mile range
- Wide upstream gain range
- Excellent upstream noise figure performance
- Automatically configures downstream CATV frequency
- Internal modulator/demodulator regenerates signal for optimum downstream SNR
- Reports power level of bursty upstream signal
- Upstream can be set to auto mode, which minimizes noise put onto the cable system by keeping the upstream output muted until there is a signal to transmit
- High reliability, state of the art design using microstrip MMIC and surface mount technology
- Conservative component derating and 100% burn in help ensure reliable operation

1.3 System Features

- Local control via RS232 command line local interface
- Remote control via SNMP v1.1
- Flash memory for easy firmware upgrades
- Firmware upgradeable via SNMP remote access
- Internal power supply requires only 35 to 90 VAC power supplied on strand for operation

1.4 Specifications

DOWNSTREAM

Transmit RF frequency band	5799 to 5823 MHz
Transmit EIRP	+15 to +28 dBm rated maximum, strand mount configuration
IF input frequency range	91 to 857 MHz (channel center frequencies)
IF input level range	0 to +20 dBmV per channel
Downstream modulation	64QAM, 5.06 Msym/sec or 256QAM, 5.36 Msym/sec
Downstream flatness	1 dB over 5 MHz, typical
Transmit mute	Muted on failure. Unmuted with a valid DOCSIS downstream signal present to which internal cable modem can register.

UPSTREAM

Receive RF frequency band	5727 to 5751 MHz
Noise figure (at RF connector)	6 dB max at max gain
Image rejection	90 dB minimum
IF output frequency band	18 to 42 MHz
Gain range	36 ± 2 dB to 76 ± 2 dB at mid band
IF level	17 to 50 dBmV
Gain flatness (frequency response)	±0.5 dB over 3.2 MHz, 2.5 dB p-p full band
Spectral inversion	No spectral inversion
Return loss (IF)	13dB min.: 5 to 42 MHz and 88 to 857 MHz

GENERAL

Upstream ingress mitigation	Automatic upstream IF mute Upstream gain control Upstream mute control via remote access Upstream power detector
IF connector	F female, 75 ohms
Power requirements	35 to 90 VAC, 60 Hz
Power consumption	27 W maximum
Management	Remote and local status monitoring and control SNMPv1.1 remote access RS232 command line local interface
Operating temperature range	-40 to +60 °C
Antenna	Integrated, 60° horizontal and 30° vertical beamwidth
Downstream link margin (line of sight)	16.5 dB (64 QAM, 1 mile) 3.8 dB (256 QAM, 2 miles)
EMC compliance	FCC CFR 47, Part 15, Subpart B FCC Part 15 subpart E, Section 15.401 Industry Canada RSS-210, Issue 5, 6.2.2 (q1) LELAN Devices
Configurations	Strand mount, utility pole mount, pipe mount (options STRAND, POLE, PIPE)
Size	60.2 x 22.3 x 12.4 cm (23.7” x 8.8” x 4.9”)
Weight	7.1 kg (15.6 lbs)

Specifications subject to change without notice.

See section 1.5 Options for list of available options.

1.5 Options

The AP5857 Strand Radio is available with the following options:

Mounting:

For the normal configuration of the radio, it must be mounted in the orientation indicated (horizontally for STRAND mount and vertically for POLE or PIPE mount). This ensures the antenna pattern is correctly oriented. The main label on the unit indicates the appropriate orientation

Strand
This includes brackets and clamps to mount the radio in a horizontal orientation to the cable strand. The antenna is mounted internally to produce a horizontal polarization.

Pole
This option includes a mounting bracket and cable-based clamp to secure the radio to a wooden or metal utility pole from 10 cm to 36.8 cm (4" to 14.5") diameter, in a vertical orientation. The antenna is mounted internally to produce a horizontal polarization.

Pipe
This option is the same as the pole mount, except a shorter cable is provided.

Configuration:

Normal
The normal configuration of the AP5857 includes an internal antenna and is used for point-to-multipoint operation. The antenna is oriented based on the type of mounting selected. The antenna provides for horizontal polarization, 60° horizontal beamwidth and 30° vertical beamwidth. The antenna has a 14 dBi nominal gain, but with cable and radome loss, the effective gain is 12.0 dBi.

Note: See important installation note in Section 2.0.

2.0 INSTALLATION

☛ The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website www.hc-sc.gc.ca/rpb.

2.1 Unpacking the unit

Carefully remove the equipment from its packing material and set it on a solid surface, such as a table or desk. If it appears damaged in any way, notify the carrier, and keep all packing materials for inspection by the carrier's agent.

2.2 Operating Environment

The AP5857 is designed to operate in an outdoor environment at temperatures ranging from –40 to +60°C (-40 to +140°F). As with all electrical equipment operation outside specified temperature ranges will accelerate the deterioration of components.

2.3 Power Requirements

The equipment has an auto-ranging internal power supply, which allows it to be powered from the 35-90VAC 60Hz power tap on the strand. This power tap must capable of delivering a minimum of 27 watts per AP5857.

Note: Most power taps are current limited and will shut off when the current gets above a certain level. Care must be taken to ensure that under the worst case conditions of elevated temperature and long lines between power supply and AP5857, that the AP5857 can receive enough current without tripping the overcurrent switch and shutting off the power.

2.4 Radio Mounting

Pipe/Pole Mounting

With the pipe or pole mount option, the Strand Radio may be mounted vertically on a wooden or metal utility pole up to 36.8 cm (14.5") diameter or a pipe with diameter greater than 10 cm (4"). If the pole or pipe mount option is selected with the NORMAL configuration (which includes an internal antenna), the radio must be oriented vertically. Ensure the unit is oriented so that the text on the label is upright. This puts the internal antenna in the correct orientation which is horizontal polarization, 60 Deg horizontal beamwidth and 30 Deg vertical beamwidth. Mounting the radio with a non-vertical orientation will prevent proper operation of the system.

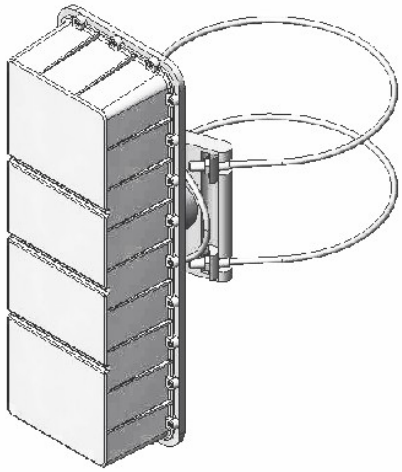
Step 1. An adapter bracket is used to attach the Strand Radio to the pole clamp. Use a ½" wrench and the four hex-head bolts with lockwashers to attach the adapter bracket to the pole clamp. The bolts go through the pole clamp holes, through the outside of the adapter bracket, and are secured on the inside of the bracket with the lockwashers and nuts. This assembly can then be attached to the Strand Radio baseplate using the two sets of four screws and lockwashers. Confirm that the radio is oriented with the labels reading right-side-up.

Step 2. A cable is used to strap the radio mount to the pole or pipe. First loosen the two 4-bolt clamps near the loop end of the cable so the cable can slide free through them. Wrap the two ends of the cable around the pole or pipe and place the ends in the two notched sections of the mount. Then pull the loop end of the cable to take up any slack and tighten the two 4-bolt clamps with a ½" wrench to secure the cable. The nuts at the ends of the cable can then be tightened using a 5/8" wrench to cinch the cable around the pole or pipe to the desired tension. If necessary, adjust the bracket rotation using the 5/8" wrench on the two bolt heads.

Ensure all bolts are tight and the cable loop will not rattle against the unit in windy conditions. If the latter is a problem, secure the loop of the cable to one of the ends of the cable with a cable-tie.

Figure 2.1 shows the AP5857 with cables attached.

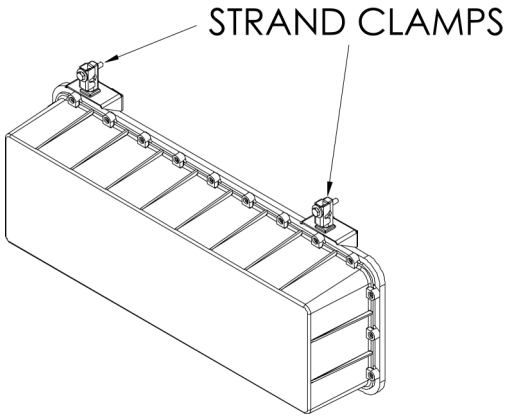
Figure 2.1 AP5857 Pipe or Pole Mounting



Strand Mounting

There are two mounting brackets supplied. These are to be installed on the back of the AP5857 using the supplied screws and lockwashers. With the brackets installed to the AP5857, secure the AP5857 to the strand using the two clamps provided. See figure 2.2 for details.

Figure 2.2 AP5857 Strand Mounting



Note that if the strand mount option is selected for the radio along with internal antenna, the radio **must** be mounted horizontally on the strand as shown.

3.0 CONNECTORS & CONFIGURATION

3.1 AP5857 Connection

The only required connection to the AP5857 is made through the F-connector. Connect the coaxial cable from the powered tap to the F connector of the AP5857.
Note the power and voltage requirements as mentioned in the Power Requirements section.

3.2 AP5857 Configuration

The AP5857 status and configuration may be monitored and modified either remotely through an Ethernet connection via the cable, or locally via the local interface. For local control of the radio, use the 9-pin RS232 local interface located on the baseplate of the unit, with settings as described in the Direct Connection section of this manual.

Since the AP5857 is capable of providing a wide range of upstream gains and downstream transmit levels, the setting of these levels is very important to maintain optimum performance.

☛ The downstream frequency of the radio is automatically configured by the radio to match the internal cable modem downstream frequency. Note that the downstream frequency cannot be set directly by the user. The user may either let the internal cable modem lock on to a channel by itself, or the configuration file for the modem used by the CMTS may be written to direct the cable modem to a specific downstream channel.

3.2.1 Downstream Transmit EIRP

The downstream transmit EIRP is normally set to the maximum value of 28 dBm EIRP. For very short distances, the transmit power should be reduced to prevent overdriving of the CM at the customer site.

When operating normally, the status will show the downstream output as “Unmuted”. The AP5857 automatically mutes if there is a problem such as the internal cable modem unable to register on the system, no valid signal for the downstream demodulator, or a hardware problem indicated by a hardware alarm. It will indicate “Muted (Alarm)” under these conditions. If it shows “Muted (Manual)”, this indicates that the output has been manually muted by the user. It can be unmuted in the downstream menu.

The downstream power may also be adjusted to optimize subscriber CM receive SNR if desired. On all but the longest links, reducing the transmit EIRP by a few dB may improve downstream receive SNR by improving transmit linearity.

3.2.2 Upstream Gain

The upstream gain setting is used both to compensate for the link distances and to enable the upstream signal to meet the required level into the tap. Note that the broadband noise level in the 18 to 42 MHz upstream band is directly proportional to the upstream gain setting, so in general it is desirable to operate with the lowest practical gain setting to minimize the noise level.

☛ On the setup of at least the first RF link to the AP5857, the setup should be performed with the Upstream Mute set to "Unmute", and the Output Alarm Threshold set to "Disable" so that the upstream signal is continuously on. This will simplify the setup.

It is recommended that the upstream gain be set to approximately 50 dB for initial setup. Since some taps may require higher upstream levels than this will produce, the CM may not be able to register with the initial gain settings. If that is the case, the upstream gain can be increased in 10 dB increments until the subscriber CM registers, allowing time for registration at each gain.

When registration is achieved, the upstream gain should be optimized by setting it to a value that has the subscriber CM transmitting between 40 dBmV and 50 dBmV. The optimal gain setting for a specific link will depend on both the link distance and the upstream level required at the tap. Lower upstream gain settings will cause the CM to transmit harder to maintain the same level at the tap. This may improve the signal-to-noise ratio (SNR), but will also reduce margin to compensate for gain variations in the path between the CM and the CMTS. Conversely, higher upstream gains will cause the subscriber CM to reduce it's transmit power to maintain the same level at the tap, and this may degrade the upstream SNR.

3.2.3 Upstream Muting

The upstream muting has three modes, which include Unmuted, Muted and Automatic.

The Unmuted setting should be used for initial setup and may also be used for normal operation. In this mode, the upstream output is always on.

The Muted setting is used to manually turn off the AP5857 upstream signal. This may be used for example if the unit is put out of service. Manually muting the upstream output does not affect the internal cable modem, so communications and control are unaffected.

The Automatic Mute setting may be used to reduce the impact of the upstream noise on the cable system. In the automatic mute mode, the upstream output is muted unless there is a signal above the Output Auto Mute Threshold level. When a signal above the threshold is detected, the upstream output is turned on only for the duration of the upstream burst. The Output Level reading in the Upstream Settings group indicates the approximate measured level of the upstream burst signal. The threshold is typically set near that level or up to a few dB lower. The threshold setting is important since if the threshold is set too low, noise may keep the output unmuted, while setting the threshold too high will not allow the signal to turn on the output.

Note that there is more latitude in setting the threshold if the AP5857 upstream output is higher. The range between highest and lowest threshold setting at +50 dBmV output is approximately 7 dB, but only 3 dB at +35 dBmV. The automatic muting is not recommended for upstream output levels below 35 dBmV.

4.0 AP5857 CONTROL

4.1 Description

The AP5857 may be controlled via the local RS232 Interface connector (see Section 5.0) or via the 10/100 Ethernet interface. There are 3 modes of operation: VT100 Terminal Emulation Mode, Telnet over 10/100 **Ethernet**, or SNMPv1 over 10/100 **Ethernet.**

5.0 CONTROL VIA THE LOCAL INTERFACE

This part of the Management Section describes how to use the local interface to manage the AP5857. With the local interface, you can access AP5857 settings and status information from a PC or terminal using a direct connection or through Telnet.

5.1 Setting up

The connection between an ASCII terminal and the AP5857 may be direct or through Telnet. If you plan to use Telnet, you can first use a direct connection to set up network parameters.

5.1.0 Direct Connection

The Local interface can be accessed through a direct connection to the AP5857. From an ASCII terminal or PC with terminal emulator program, proceed as follows:

1. Connect the ASCII terminal to the 9-pin RS232 port located on the baseplate.
   Use a standard 9-pin serial cable.
2. Go to the terminal settings screen of your terminal or terminal emulator.
3. Set your terminal parameters to the following values:

- 9600bit/s baud rate
- 8 data bits
- no parity
- one stop-bit
- no flow-control
- X-ON, X-OFF disabled
- Local Echo should be disabled for the terminal (the AP5857 will echo the characters).
- The terminal type can be TTY or VT100 or similar.
- CR -> CR/LF mapping should be disabled for both inbound and outbound traffic
- The only special characters that are implemented are carriage return (0x0D, ^M), linefeed (0x0A, ^J), and destructive backspace (0x08, ^H). All other characters are processed as part of the message.
- The maximum message length is 80 characters

5.1.1 Telnet

Telnet access is available for the AP5857. Prior to accessing the local interface using Telnet, you must configure the Ethernet IP address and related network parameters.
The local interface can be used to set the network parameters (see below), DHCP can be used, or a static ARP path can be setup (see section 6.4 Network Interface Configuration).
In a shell, terminal, browser, or Telnet application window, use a command similar to the following (substitute the IP address of the desired AP5857):

```
C:\> telnet 10.10.10.11
```

A message indicates you have connected to the AP5857:

Figure 5.1 Telnet Session Connecting

```
Establishing Connection...
```

```
*** VCom Inc. AP5857 ***
Serial Number 6855176
112 Pine Street
Password>_
```

Exiting From Telnet

Exit from the shell and close the Telnet connection by returning to the password prompt.

5.2 Logging On

Figure 5.2 Logon Menu

```
*** VCom Inc. AP5857 ***
Serial Number 6855176
112 Pine Street
Password>_
```

The password prompt is: password> If you are accessing the AP5857 for the first time, press ENTER at the password prompt. Until you change it, the ENTER key is the default password. If you have changed the password, type the correct password (up to sixteen characters). The screen will display placeholders (******) as you type the password. Press ENTER. The local interface Main Menu is then displayed.

To add an extra level of security to the password operation, the radio incorporates a lockout feature to make access much less practical for someone not in posession of the correct password. If five successive invalid passwords are entered in a row, the radio will enter a password lockout state. The prompt will change to:

```
Password (Lockout Active)>
```

This prompt will be active for approximately 5 minutes, during which the radio will not process any further passwords. At the end of the interval, the radio reverts back to the regular password prompt and will again accept passwords.

5.3 Timeout

The local interface will time out after 5 minutes of inactivity and automatically return to the password> prompt. If accessing the unit via telnet, the session will disconnect.

5.4 The Main Menu

Figure 5.3 Main Menu

```
*** VCom Inc. AP5857 Main Menu ***
1)Status Information
2)Vendor Information
3)Downstream Settings
4)Upstream Settings
5)General Settings
6)Ethernet Settings

X)Exit
ENTER)Refresh

Select>_
```

5.4.1 Interpreting the Main Menu

The Main Menu shown in Figure 5.3, provides access for:

- Status information
- Downstream settings
- Upstream settings
- General settings
- Ethernet settings

5.5 Using the Local Interface

5.5.1 Command Line Prompt

The *command line prompt consists of one of three forms:*

1) Password prompt, Password>

2) Option prompt, Select>

3) Setting prompt, Setting [] ()>, see Modifying Settings From the Local Interface section below for details of setting prompt.

5.5.2 Entering Commands

Commands can be entered in upper or lower case.

To clear typed entries or an entry mistake and start again, press CONTROL-H or the backspace key to make corrections.

If you enter an invalid value, the value will be rejected and the current menu and prompt will be displayed again.

5.5.3 Conventions Used

The Local interface uses the following conventions:

- Ranges of permitted values are depicted with square braces[].
- A letter or number followed by a parenthesis, 1), indicates a user-settable option.
- Fields *without* a letter or number followed by a closed parenthesis, 1), are status/informational fields.

5.5.4 Exiting From the Local Interface

You can exit every menu by using the X command. Each time you type "x", you return to the next higher (previous) menu. At the Main Menu, typing X exits you from the local interface and logs you off.

5.5.5 Modifying Settings From the Local Interface

Sub Menu items preceded by a letter or number followed by a parenthesis are user-settable options and allow that particular setting to be changed. Upon selecting desired setting, the local interface prompt will change to a setting prompt. A setting prompt consists of the setting name, the setting limits (shown in [] braces), and the current value (shown in () brackets). The new setting can be entered at the prompt or ENTER can be pressed to continue to use the current value. If a new setting is entered that is not within range of the limits specified, "Error" will be returned and the setting prompt will be displayed again. For example, the following figure illustrates entering an invalid Downstream Input Frequency:

Figure 5.4 Setting Prompt

```
Output Frequency [5802.000 to 5820.000 MHz](5811.000)>5790.000
Error
Output Frequency [5802.000 to 5820.000 MHz](5811.000)>_
```

5.6 Submenus

From the Main Menu, other functions such as status and configuration are accessed through the submenus.

5.6.1 Status Information

The Status Information Menu provides access to unit status and alarms. To access this menu from the Main Menu, type "1" to display the Status Information Menu.

Figure 5.5 Status Information Menu

```
*** VCom Inc. AP5857 Status Information ***
Temperature (deg C)                     27
Over Temperature Alarm                  OK
Hardware Failure Alarm                  OK
Downstream CATV Signal Validation       OK

Upstream Output Threshold Alarm         OK

Downstream CATV Frequency (MHz)         609.000
Downstream RF Frequency (MHz)           5808.000
Downstream Transmit EIRP Setting (dBm)  28.0
Downstream Output                       Unmuted
Downstream Modulation                   64QAM
Downstream Interleaver                  16,8
Downstream Demodulator Status           Locked
Downstream Demodulator SNR              35.0 dB

Upstream Gain (dB)                      50.0
Upstream Level (dBmV)                   27.2
Upstream Output                         Unmuted
X)Exit
ENTER)Refresh

Select>_
```

Temperature

Indicates the internal temperature of AP5857. It is typically 8°C higher than the external ambient temperature due to self-heating of the radio circuitry.

Over Temperature Alarm

When active, indicates that the internal temperature exceeds the recommended operating limit (75°C) for reliable operation. It will indicate “OK” or “Over Temperature”.

Hardware Failure Alarm

When active, indicates that there is a hardware failure in the radio. This usually requires the unit be sent back to the factory for repair. It will indicate “OK” or “Fail”.

Downstream CATV Signal Validation

This indicates whether the internal cable modem is currently demodulating a valid DOCSIS downstream signal. If so, it indicates “OK”. If not, it indicates “Signal Invalid”. The downstream RF signal will be muted unless the state is OK.

Upstream Output Threshold Alarm

When active and the alarm is enabled, it indicates that the upstream output level is higher than the upstream output alarm threshold value. The upstream signal is muted under this condition. It will indicate “OK” or “Threshold Exceeded”.

Downstream CATV Frequency

Indicates the frequency of the signal from the CATV strand to which the the radio is currently tuned.

Downstream RF Frequency

Indicates the frequency of the RF transmit signal to which the radio is currently set.

Downstream Transmit EIRP Setting

Indicates the current downstream transmit power setting, expressed as Effective Isotropic Radiated Power (EIRP).

Downstream Output

Indicates current state of the downstream output. There are three valid output states: Muted (Manual) indicates that user has forced the output to be disabled, Muted (Alarm) indicates that the output has been muted by an alarm condition, Unmuted indicates that the output is enabled.

Downstream Modulation

Indicates the selected downstream modulation. It will indicate 64QAM or 256QAM.

Downstream Interleaver

Indicates the selected downstream interleaver setting. Valid settings are 128,1; 64,2; 32,4; 16,8; and 8,16. See the downstream menu section for details on interleaver settings.

Downstream Demodulator Status

Indicates the lock status of the downstream demodulator. It will display Locked or Not Locked. If the demodulator is not locked, this may indicate that there is no valid signal or the signal quality is too low for proper operation.

Downstream Demodulator SNR

Indicates the estimated downstream Signal to Noise Ratio as seen by the demodulator. The best signals will result in SNR values of 35 dB or more, however good operation will be maintained to SNR values of 30 dB or less. Lower SNR values indicate poor signal conditions, which may include interference or low signal level. The indicated SNR is an instantaneous reading, so the value of the SNR will vary from reading to reading.

Upstream Gain

Indicates the current upstream gain setting.

Upstream Level

Indicates the latest reading of the upstream signal level at the IF port. Pushing ENTER will update the screen with a new measurement.

Upstream Output

Indicates current state of the upstream output. There are four valid output states: Muted (Manual) indicates that user has forced the output to be disabled; Muted (Alarm) indicates that the output has been muted by an alarm condition; Auto indicates that mute is controlled by system; Unmuted indicates that the output is enabled.

5.6.2 Vendor Information

The Vendor Information Menu provides access to factory model and revision history. To access this menu from the Main Menu, type "2" to display the Vendor Information Menu.

Figure 5.6 Vendor Information Menu

```
*** VCom Inc. AP5857 Vendor Information ***
Vendor Name                             VCom Inc.
Serial Number                           6855176
Model Number                            AP5857
Hardware Revision                       PC3B0102
Software Revision (Boot)                1.00
Software Revision (App)                 1.00
Software Revision (Eth)                 5.20
X)Exit
ENTER)Refresh

Select>_
```

Vendor Name

Company name of AP5857 vendor.

Serial Number

Serial Number of AP5857 unit.

Model Number

Model Number of AP5857 unit.

Hardware Revision Number

Hardware Revision of AP5857 unit.

Software Revision (Boot)

Software revision number of AP5857 unit microcontroller bootloader section.

Software Revision (App)

Software revision number of AP5857 unit microcontroller application section.

Software Revision (Eth)

Software revision number of AP5857 unit Ethernet controller.

5.6.3 Downstream Settings

The Downstream Settings Menu provides access to the settings used to configure the downstream chain. To access this menu from the Main Menu, type “3” to display the Downstream Settings Menu.

Figure 5.7 Downstream Settings Menu

```
*** VCom Inc. AP5857 Downstream Settings ***

1)RF Frequency (MHz)                    5808.000
2)Output EIRP (dBm)                     26.0
3)Downstream Modulation                 64QAM
4)Downstream Interleaver                16,8
5)Output Mute                           Muted
  CATV Frequency (MHz)                  609.000
  Downstream Demodulator Status         Locked
  Downstream Demodulator SNR            35.0 dB

X)Exit
ENTER)Refresh
Select>_
```

Downstream RF Frequency

This setting allows the user to set the downstream output RF frequency (center frequency of the carrier). Valid frequencies are multiples of 1.0 MHz. If the frequency is within the setting limits but the step size is not correct, the frequency will be rounded to the nearest valid step size boundary.

To change the Downstream Output Frequency, type “1”. The local interface prompt will change to:

```
Output Frequency [5802.000 to 5820.000 MHz](5808.000)>_
```

Enter the new frequency or press ENTER to use the current value.

Downstream Output EIRP

This setting allows the user to set the downstream output EIRP (Effective Isotropic Radiated Power). Valid levels are multiples of 0.5 dBm. If the level is within the setting limits but the step size is not correct, the level will be rounded to the nearest valid step size boundary

To change the Downstream Output EIRP, type “2”. The local interface prompt will change to:

```
Output EIRP[15.0 to 28.0 dBm](26.0) _
```

Enter the new level or press ENTER to use the current value.

Downstream Modulation

This setting allows the user to set the downstream modulation to either 64QAM or 256QAM. Valid inputs are 64 or 256. To change the Downstream modulation, type “3”. The local interface prompt will change to:

```
Downstream Modulation[64, 256 QAM](64) _
```

Enter the new modulation or press ENTER to use the current value. Note that the symbol rate automatically set along with the modulation. Symbol rates are 5.05964 Msym/sec for 64QAM and 5.36054 Msym/sec for 256QAM.

Downstream Interleaver

This setting allows the user to set the length of the interleaver for the downstream modulation. Valid inputs are 128,1; 64,2; 32,4; 16,8; and 8,16. To change the Downstream interleaver length, type “4”. The local interface prompt will change to:

```
Downstream Interleaver[128,1 64,2 32,4 16,8 8,16](16,8) _
```

Enter the new interleaver length or press ENTER to use the current value. The values entered into the interleaver represent the I,J values in the convolutional interleaver. Longer lengths such as 128,1 provide more protection against burst errors since it spreads the errors out over a longer period of time, and it is more likely that the error correction can correct them. The cost is an increased delay time. For the longer interleaver depths, it is possible that the cable modem will be unable to lock due to delay limits set in the CMTS, so they should be used with caution. The AP5857 is shipped with the interleaver set to 16,8 which provides adequate protection while keeping delay low. Delays from the interleaver vary (for 64/256QAM) from 8/5.6 ms for 128,1 to 0.44/0.30 ms for 8,16. The cable modem at the subscriber side will automatically adjust to the selected interleaver value.

Downstream Output Mute

This setting allows the user to mute the downstream output. If the setting is set to muted, the output will remain muted until the setting is changed to “unmuted” and no alarm condition exists.

To change the Downstream Output Mute state, type “4”. The local interface prompt will change to:

```
Output Mute [0 unmute, 1 mute](1)>_
```

Enter the new value or press ENTER to use the current value.

Downstream CATV Frequency

This indicates the center frequency of the downstream CATV channel to which the radio is tuned. This value is automatically configured by the radio to match the internal cable modem downstream frequency. Note that the value can not be changed directly by the user. The user may either let the internal cable modem lock on to a channel by itself, or the configuration file for the modem used by the CMTS may be written to direct the cable modem to a specific downstream channel. If the cable modem is not locked to a valid channel, the Input Frequency will indicate “No Channel”

Downstream Demodulator Status

Indicates the lock status of the downstream demodulator. It will display Locked or Not Locked. If the demodulator is not locked, this may indicate that there is no valid signal or the signal quality is too low for proper operation. Check also that the modulation (64QAM or 256QAM) is set to the correct value.

Downstream Demodulator SNR

Indicates the estimated downstream Signal to Noise Ratio as seen by the demodulator. The best signals will result in SNR values of 35 dB or more, however good operation will be maintained to SNR values of 30 dB or less. Lower SNR values indicate poor signal conditions, which may include interference or low signal level. The indicated SNR is an instantaneous reading, so the value of the SNR will vary from reading to reading.

5.6.4 Upstream Settings

The Upstream Settings Menu provides access to the settings used to configure the downstream chain. To access this menu from the Main Menu, type “4” to display the Upstream Settings Menu.

Figure 5.8 Upstream Settings Menu

```
*** VCom Inc. AP5857 Upstream Settings ***
1)Gain (dB)                             46.5
  Output Level (dBmV)                   23.0 (Stale)
2)Output Mute                           Auto
3)Output Auto Mute Threshold (dBmV)     30.0
4)Output Alarm Threshold (dBmV)         40.0
5)Output Alarm Threshold Enable         Enabled

X)Exit
ENTER)Refresh

Select>_
```

Upstream Gain

This setting allows the user to set the upstream gain level. Valid levels are multiples of 0.5 dB. If the gain setting is within the setting limits but the step size is not correct, the setting will be rounded to the nearest valid step size boundary.

To change the Upstream Gain, type “1”. The local interface prompt will change to:

```
  Gain [36.0 to 76.0 dB](46.5)> _
```

Enter the new gain or press ENTER to use the current value.

Upstream Output Level

This level gives an indication of the peak upstream output level. Because upstream signals are time-division multiplexed, the measured level is only valid while the signal is present. As a result, the peak measured level of the current signal will be latched and will remain the same until the signal is detected again. Upon detection of the new signal, the peak level will be measured and a new value returned. If a signal is not detected in 30 seconds, the value returned will remain unchanged, but will be marked “(Stale)” to indicate that a signal has not been detected in 30 seconds. The range of values returned is 17 dBmV to 50 dBmV.

Upstream Output Mute

This setting allows the user to set the upstream output mute state. There are three valid output states: Unmuted - force the output to be enabled, Muted – force the output to be disabled, Auto – output is controlled by system based upon received upstream signal level. Note: output mute setting will be overridden by active alarm conditions (i.e. output will be muted when an alarm condition is active)

To change the Upstream Output Mute state, type “2”. The local interface prompt will change to:

```
  Output Mute [0 unmute, 1 mute, 2 auto](2)>_
```

Enter the new value or press ENTER to use the current value.

Upstream Output Auto Mute Threshold

This setting allows the user to set the upstream output auto mute threshold level. When the upstream output state is set to “Auto” the detection circuitry will unmute the output when a level has been detected above the

set threshold. There is some hysteresis with this function so that once the output is unmuted it will stay unmuted until the output level drops several dB lower than the output mute threshold. Valid levels are multiples of 0.5 dBmV. If the level is within the setting limits but the step size is not correct, the level will be rounded to the nearest valid step size boundary.

To change the Upstream Output Auto Mute Threshold, type "3". The local interface prompt will change to:

```
Output Auto Mute Threshold [10.0 to 55.0 dBmV](30.0)>_
```

Enter the new threshold or press ENTER to use the current value.

Upstream Output Alarm Threshold

This setting allows the user to set the upstream output alarm threshold level. Thresholds are used to provide an alarm indication that the level is no longer within an acceptable range. Should the signal level exceed the specified threshold level, an alarm condition will be triggered and the upstream output muted. Valid levels are multiples of 0.5 dBmV. If the level is within the setting limits but the step size is not correct, the level will be rounded to the nearest valid step size boundary.

To change the Upstream Output Alarm Threshold, type "3". The local interface prompt will change to:

```
Output Alarm Threshold [17.0 to 50.0 dBmV](40.0)>_
```

Enter the new threshold or press ENTER to use the current value. It is recommended that the alarm threshold be set no less than 5 dB (and preferrably 10 dB or more) above the expected level of the upstream signal to accomodate expected CATV signal level variations.

Upstream Output Alarm Threshold Enable

This setting allows the user to enable threshold detection on the upstream output. Thresholds are used to provide an alarm indication that the level is no longer within an acceptable range. Should the signal level exceed the specified threshold level and threshold enabled, an alarm condition will be triggered and the upstream output muted.

To change the Upstream Output Threshold Enable, type "4". The local interface prompt will change to:

```
Output Alarm Threshold Enable[0 disable, 1 enable](1)>_
```

Enter the new values or press ENTER to use the current value.

5.6.5 General Settings

The General Settings Menu provides access to the general settings and options. To access this menu from the Main Menu, type "5" to display the General Settings Menu.

Figure 5.9 General Settings Menu

```
*** VCom Inc. AP5857 General Settings ***
1)Change Password                        ***
2)User Message                           112 Pine Street
3)Upgrade Firmware
4)Upgrade Modulator
5)Reset Unit
6)Load Factory Defaults
   Antenna Gain (dB)                     12.0
X)Exit
ENTER)Refresh

Select>_
```

Change Password

The access password is a user settable and restricts unauthorized access to the local interface.

To change the access password, type “1”. The local interface prompt will change to:

```
Change Password [0 = empty string](***)>_
```

Enter the new password or press ENTER to use the current value.

If a new password is entered, the user will be prompted to re-enter the same password (for verification).

```
Confirm Password [0 = empty string](***)>_
```

The password may be a maximum of 16 characters long.

User Message

The user message is a user definable string that is displayed at the password menu.

To change the user message, type “2”. The local interface prompt will change to:

```
User Message [32 chars max](112 Pine Street)>_
```

Enter the new message or press ENTER to use the current value.

Upgrade Firmware

The upgrade firmware menu option allows upgrading the application and bootloader flash areas via the local interface. Remote upgrades cannot be done through a telnet session but can be accomplished via TFTP over the 10/100 Ethernet interface. Note: Ethernet controller firmware can only be upgraded by TFTP. See section 6.7 for information on upgrading firmware via TFTP.

To upgrade the firmware, type “3”. The local interface prompt will change to:

```
Upgrade Firmware [Y/N](N)>_
```

Upon selecting Yes, the unit will wait for the firmware image. The local interface prompt will change to:

```
Waiting For Data [Ctrl-D to Abort]...>_
```

From your terminal emulator program send the firmware file using Xmodem protocol with CRC or press CONTROL-D to abort. Upon successful upgrade, the unit will reset and the password> prompt will be displayed.

Upgrade Modulator

The upgrade Modulator menu option allows upgrading the firmware for the QAM modulator via the local interface. Remote upgrades cannot be done through a telnet session but can be accomplished via TFTP over the 10/100 Ethernet interface. Note: Ethernet controller firmware can only be upgraded by TFTP. See section 6.7 for information on upgrading firmware via TFTP.

To upgrade the modulator, type “4”. The local interface prompt will change to:

```
Upgrade Modulator [Y/N](N)>_
```

Upon selecting Yes, the unit will wait for the modulator file. The local interface prompt will change to:

```
Waiting For Data [Ctrl-D to Abort]...>_
```

From your terminal emulator program send the firmware file using Xmodem protocol with CRC or press CONTROL-D to abort. Upon successful upgrade, the unit will reset and the password> prompt will be displayed. In general the firmware and modulator upgrades are independent unless it is otherwise indicated. That means that one may be upgraded without changing the other.

Reset Unit

The reset menu option allows the unit to be reset.

To reset the unit, type “5”. The local interface prompt will change to:

```
  Reset Unit [Y/N](N)>_
```

Enter Yes to reset the unit or enter No or press ENTER to abort.

Load Factory Defaults

The Load Factory Defaults allows the user to put all the radio settings into a known state. The settings are:

Vendor Information

Vendor Name	VCom Inc.
Serial Number	[system serial number]
Model	AP5857
Hardware Rev	PC3B0105 [or as appropriate]

Downstream Settings

Output Frequency	5808 MHz
Output EIRP	28 dBm
Downstream Modulation	64QAM
Downstream Interleaver	16,8
Output Mute	0 [unmuted]

Upstream Settings

Gain	50 dB
Output Mute	0 [unmuted]
Output Auto Mute Threshold	30
Output Alarm Threshold	50
Output Alarm Threshold Enable	0 [disabled]

General Settings

Password	[no change]
User Message	[no change]
Antenna Gain	12

Ethernet Settings

SNMP Enable	1 [enabled]

To load the factory defaults, “6”. The local interface prompt will change to:

```
  Load Factory Defaults [Y/N}(N)>_
```

Enter Y to load factory defaults or press ENTER to select No.

Antenna Gain

The antenna gain line shows the current antenna gain. It is factory set to 12 dBi for the internal antenna and 32.4 dBi for the point-to-point antenna. These values reflect the effective gain and include cable and radome loss. The gain cannot be set by the user.

5.6.6 Ethernet Settings

The Ethernet Settings Menu provides access to the Ethernet settings and options. To access this menu from the Main Menu, type “6” to display the Ethernet Settings Menu.

Figure 5.10 Ethernet Settings Menu

```
*** VCom Inc. AP5857 Ethernet Settings ***
  MAC Address                          00:20:4A:52:3A:34
1)IP Address                           10.10.10.11
2)Netmask                              255.255.255.0
3)Gateway IP Address                   10.10.10.10
4)Renew Ethernet Interface
5)SNMP Enable                          Enabled
6)SNMP Manager IP Address              10.10.10.10
7)SNMP Read Community                  public
8)SNMP Write Community                 private
X)Exit
ENTER)Refresh

Select>_
```

MAC Address

This address is unique for each unit and consists of 6 two digit hexadecimal values.

IP Address

The IP address must be set to a unique value in your network. Refer to Section 4 if you are not familiar with IP addresses. If set to 0.0.0.0, DHCP mode is automatically enabled. Provided a DHCP server exists on the network, it will provide the unit with an IP address, gateway address, and subnet mask when the unit boots up.

To change the IP address, type “1”. The local interface prompt will change to:

```
  IP Address [] (10.10.10.11)>_
```

Enter the new IP address or press ENTER to use the current value.

Netmask

A netmask defines how many bits from the IP address are to be taken as the network part and how many bits are to be taken as the host part (reminder: standard class A 8/24 (net/host), class B 16/16, class C 24/8 bits). The netmask is shown in standard format “255.255.xxx.xxx“.

To change the Gateway IP address, type “2”. The local interface prompt will change to:

```
Netmask [] (255.255.255.0)>_
```

Enter the new netmask or press ENTER to use the current value.

Gateway IP Address

The router/gateway address is needed to communicate to other LAN segments. The default gateway must be set to address the router that connects these segments. This address must be within the local network.
If in doubt, your network administrator should be consulted.

To change the Gateway IP address, type “3”. The local interface prompt will change to:

```
Gateway IP Address [] (10.10.10.10)>_
```

Enter the new IP address or press ENTER to use the current value.

Renew Ethernet Interface

In order to activate any changes to the Ethernet settings, the interface needs to be restarted.

To Renew the Ethernet Interface, type “4”. The local interface prompt will change to:

```
Renew Ethernet Interface [Y/N](N)>_
```

Enter Yes to renew the Ethernet interface or enter No or press ENTER to abort.

SNMP Manager IP Address

The SNMP manager IP address. This address is used to send SNMP traps.

To change the SNMP Manager IP address, type “5”. The local interface prompt will change to:

```
SNMP Manager IP Address [] (10.10.10.10)>_
```

Enter the new IP address or press ENTER to use the current value.

SNMP Read Community

To change the SNMP read community string, type “6”. The local interface prompt will change to:

```
SNMP Read Community [32 chars max] (public)>_
```

Enter the new community string or press ENTER to use the current value.

SNMP Write Community

To change the SNMP write community string, type “7”. The local interface prompt will change to:

```
SNMP  Write Community [32 chars max] (private)>_
```

Enter the new community string or press ENTER to use the current value.

6.0 REMOTE ACCESS

6.1 Description

Remote access of the AP5857 is available through Telnet and SNMPv1. TFTP is available for remote firmware upgrades.

6.2 Supported Network Protocols

The AP5857 Ethernet interface uses several TCP/IP protocols for network communication. The supported standards are ARP, UDP, TCP, ICMP, Telnet, TFTP and SNMP. The electrical interface is fully compliant with IEEE802.3 10-Base-T Ethernet and 100BASE-TX (auto-sensing).

6.3 Network Hardware Address

The hardware address of the AP5857 Ethernet interface is printed on a label on the inside cover of the unit. This address is unique for each unit and consists of 6 two digit hexadecimal values. The hardware address can also be obtained via the local Interface, refer to section 5.6.6.

An example address is: 00:20:4A:52:3A:34

6.4 Network Interface Configuration

6.4.1 Assigning an IP address

The unit's IP address must be configured before a network connection is available. You have the following options for assigning an IP to the unit:

1) Local Interface

2) DHCP

3) ARP and Telnet

LOCAL INTERFACE

The unit's Ethernet IP address, netmask, and gateway IP address can be assigned via the local interface, refer to section 5.0 for further information on configuring available Ethernet parameters.

DHCP

The unit ships with a default IP address of 0.0.0.0, which automatically enables DHCP. Provided a DHCP server exists on the network, it will provide the unit with an IP address, gateway address, and subnet mask when the unit boots up or the Ethernet interface is renewed (see Section 5.6.6 for enabling DHCP mode and renewing the Ethernet interface).

ARP AND TELNET

The following procedure sets a temporary IP address so that setup over the network can be done:

a) Set a static ARP route with the desired IP address using the hardware address of the AP5857 Ethernet interface, which is printed on a label on the inside cover of the module.

   In Windows 95/98/NT, a static route can be set from the DOS prompt using the ARP command. The following example command sets a default route to the IP address 10.10.10.11 via Hardware Address 00-20-4A-52-3A-34: **arp -s 10.10.10.11 00-20-4A-52-3A-34**

   In most UNIX systems, the following command can be used: **arp -s 10.10.10.11 00:20:4A:52:3A:34**

   - The IP address 10.10.10.11 is used here as an example only. This address must be replaced by one that is valid for the target network in order for this procedure to function properly. The IP address assigned must be on the same subnet as the computer doing the initial configuration. A network administrator can supply the proper values for these parameters.
     Refer to Section 7.0, IP Addresses, Netmask, etc. for more information on IP address selection.

   - In order for the ARP command to work in Windows, the ARP table on the PC must have at least one IP address defined other than its own. Type "arp –a" at the DOS command prompt to verify that there is at least one entry in the ARP table. If there is no other entry besides the local machine, ping another IP machine on your network to build the table. This has to be a host other than the machine on which you are working. Once there is at least one entry in the ARP table, use the commands shown above to ARP and IP address to the VCom SNMPv1 interface.

b) Open a Telnet connection to port number 1. This connection will fail, but the AP5857 Ethernet interface will change its IP address to the IP address assigned to the MAC address used by the arp –s command.

   The following example opens a Telnet connection to IP address 10.10.10.11 port 1:

   telnet 10.10.10.11 1

c) Open a Telnet connection to port 23 and set all required parameters.

   The following example opens a Telnet connection to IP address 10.10.10.11 port 23:

   telnet 10.10.10.11

d) When the Telnet connection is established, navigate through the menus until the Ethernet Settings menu is reach (see section 2 for navigating menus). Enter Ethernet IP address, netmask and gateway. Refer to Section 5.6.6 for further information on the Ethernet parameters available.

   - The temporary IP address set in the above procedure is cleared after every power cycle of the AP5857 Ethernet interface. Be sure to enter configuration data as described in Part d) to make the change permanent!
   - The AP5857 Ethernet interface configuration is stored in nonvolatile memory and is retained without AC power. The configuration can be changed any time.

6.5 Telnet

6.5.1 Operation

The steps required to enable telnet operation are as follows:

1. Configure the Network Interface as described in Section 6.4 above.
2. Login remotely using a shell, terminal, browser, or Telnet application window, refer to section 5 for further information on using the local interface via telnet.

6.6 SNMP

6.6.1 Operation

The steps required to enable SNMP operation are as follows:

1. Configure the Network Interface as described in Section 6.4 above.
2. Configure SNMP settings using the local interface (as described in Section 5.6.6) either locally or remotely via Telnet.

The steps required for configuring an SNMP Management Station to manage an SNMP enabled access point are as follows:

1. Load and compile the 2 supplied MIB files (supplied on disk) into the MIB database on the Management station. The supplied MIB files are described in Section 6.6.2.
2. Refer to the documentation that accompanied the Management station for information on Compiling Private MIB files, adding devices to manage, etc.

6.6.2 Supplied MIBs

There are 2 Private MIB files that are used by the SNMP agent. These files are provided on disk. These files must be compiled into the MIB used in the SNMP management station that will be managing the AP5857 unit.

The two files must be added in order. The file named wc-glob_r40.mib must be added first followed by the file named wcAP5857.mib

These MIB files have been tested with SNMPc V5.0 from Castlerock software, MG-SOFT MIB Browser Professional, and with HP OpenView from Hewlett Packard.

6.6.3 Configuration

SNMP can be enabled or disabled via the local interface (locally or remotely), refer to section 5 for details.

6.6.4 Community Strings

The SNMP read and write communities are user definable strings. SNMP Community strings are like a user id or password that allows access to device's statistics. A SNMP Manager sends the community string along with all SNMP requests. If the community string is correct, the device responds with the requested information. If the community string is incorrect, the device simply discards the request and does not respond. Refer to Section 5 for information on viewing and changing the SNMP community strings.

6.7 Firmware Upgrades

6.7.1 TFTP

The most recent version of firmware may be made available by contacting support@vcom.com or by registering with the VCom Technical Support page at http://www.vcom.com/support.htm.

MICROCONTROLLER FIRMWARE UPGRADE

To download a new firmware from a computer to the AP5857 microcontroller, it is necessary to have a TFTP client capable of sending a binary file. The parameters to send the firmware are:

Target filename: **APP**
Transfer mode: **binary (octet)**
Target port: **70**

☛ **The file to be downloaded must be the .bin (binary) image, not the hex version! File size should be 69,376 bytes.**

ETHERNET CONTROLLER FIRMWARE UPGRADE

To download a new firmware from a computer to the AP5857 Ethernet interface controller, it is necessary to have a TFTP client capable of sending a binary file. The parameters to send the firmware are:

Target filename: **X1**
Transfer mode: **binary (octet)**
Target port: **69**

☛ **The file to be downloaded must be the .ROM (binary) image, not the hex version! File size should be 32768 or 65536 bytes.**

7.0 IP ADDRESSES, NETMASK, ETC

7.1 IP Addressing

An IP address is a 32-bit value, divided into four octets of eight bits each. The standard representation is four decimal numbers (in the range of 0...255), divided by dots.

Example: 192.2.1.123

This is called decimal-dot notation.

The IP address is divided into two parts: a network and a host part. To support different needs, three "network classes" have been defined. Depending on the network class, the last one, two or three bytes define the host, while the remaining part defines the network.
In the following text, 'x' stands for the host part of the IP address:

Class A network

IP address 1.x.x.x to 127.x.x.x

Only 127 different networks of this class exist. These have a very large number of potential connected devices (up to 16777216).

Example: 10.0.0.1, (network 10, host 0.0.1)

Class B network

IP address 128.0.x.x to 191.255.x.x

These networks are used for large company networks. Every network can consist of up to 65534 devices.

Example: 172.1.3.2 (network 172.1, host 3.2)

Class C network

IP address 192.0.0.x to 223.255.255.x

These network addresses are most common. Most smaller companies' networks are class C networks. These networks can consist of a maximum number of 254 hosts.

Example: 192.7.1.9 (network 192.7.1, host 9)

Class D network

IP address 224.x.x.x to 239.x.x.x

These addresses are used as multicast addresses.

Example: 224.7.1.9 (network 224, host 7.1.9)

Class E network

IP address 240.x.x.x to 254.x.x.x

These addresses are reserved.

7.2 Network Address

An address with all host bits set to "0" is used to address the network as a whole (in routing entries, for example).

7.3 Broadcast Address

An address with the host part bits all set to “1“ is the broadcast address, meaning “for every station“.

Network and Broadcast addresses must not be used as a host address (e.g. 192.168.0.0 identifies the entire network, 192.168.0.255 identifies the broadcast address).

7.4 IP Netmask

The netmask is used to divide the IP address differently from the standard defined by the classes A, B, C. By entering a netmask, it is possible to define how many bits from the IP address are to be taken as the network part and how many bits are to be taken as the host part.

Standard IP Network Netmask: Class A 8 (network) 24 (host) 255.0.0.0 (mask)
Class B 16 (network) 16 (host) 255.255.0.0 (mask)
Class C 24 (network) 8 (host) 255.255.255.0 (mask)

7.5 Private IP networks and the Internet

If your network is not connected to the Internet and there are no plans to make such a connection, you may use any IP address you wish.

However, if you are not connected to the Internet and have plans to connect to the Internet, or you are connected to the Internet and want to operate your VCom SNMP Interface on an Intranet, you should use one of the following sub-networks for your network: Class A 10.x.x.x
Class B 172.16.x.x
Class C 192.168.0.x

These network numbers have been reserved for such networks. If you have any questions about IP address assignment ask your Network Administrator.

7.6 Network RFC’s

For more information regarding IP addressing see the following documents. These can be located on the World Wide Web.

RFC 950 Internet Standard Subnetting Procedure

RFC 1700 Assigned Numbers

RFC 1117 Internet Numbers

RFC 1597 Address Allocation for Private Internets

8.0 WARRANTY AND SERVICE POLICY

8.1 Warranty Statement

VCom warrants its products to be free from defects in workmanship or materials for a period of two years. The warranty begins on the date of the original shipment from VCom to its customer. No claim may be allowed for expenses incurred in installation or use. No other expressed or implied warranties shall apply to the goods sold. VCom is not responsible for delayed shipments, other loss beyond VCom's control, or consequential damages of any kind arising in connection with the use of its products. This warranty is a return-to-factory warranty only. During the warranty period VCom will at its option, replace, repair or refund the price paid for any item which is returned for service. This warranty does not apply to units that have been physically or environmentally abused.

8.2 Service Policies: How to Return an Item for Service:

Before returning any item for service, an R.M.A. (Returned Material Authorization) number must be assigned by VCom. A unique R.M.A. number will be assigned for each item being returned. When requesting an R.M.A. number, please be prepared to provide the model, VCom serial number, original invoice number, your purchase order number and an adequate fault description. The serial number of a unit can be found on a barcode label similar to the one pictured below. R.M.A. service is available Monday to Friday from 8:30 a.m. to 4:30 p.m. CST (statutory holidays excepted).

To obtain an R.M.A. number you may:

Call: (306) 955-7075, press '0' for Operator, or '3' for Service Dept.
Fax: (306) 384-0086 — Attention: R.M.A. Request
Email: support@vcom.com

Once an R.M.A. number has been assigned, please refer to it in all correspondence and make certain that all applicable R.M.A. numbers are clearly marked on the outside of each package being returned. You must also ensure that each product is shipped to VCom in its original shipping container (or equivalent) via Prepaid carrier, with appropriate insurance and customs documentation (where required). VCom will not accept collect shipments, damaged shipments or shipments unaccompanied by an R.M.A. number.

For items still under Warranty – Items will be returned from VCom Inc. to its customer via prepaid ground carrier. The customer is responsible for any additional costs incurred, including custom clearance and duties. Any alternate means of shipment must be requested by the customer and will be subject to additional charges.

For items no longer under Warranty – Items will be returned from VCom Inc. to its customer via prepaid ground carrier at the customer's expense. The customer is responsible for any additional costs incurred, including custom clearance and duties. Any alternate means of shipment must be requested by the customer and will be subject to additional charges.

Shipping Instructions will be provided by the repair center when the RMA number is sent to the customer.

8.3 Repair Charges and Warranty Exemptions

Items returned beyond the warranty period or items that do not qualify for warranty service are subject to additional out-of-warranty repair charges. Descriptions of these charges and warranty exemptions are below:

1) Repair turnaround time is typically 5-14 business days after receipt of the item at VCom. A Flat Rate Repair Charge will apply to all out-of-warranty items. Flat Rate Repair Charges are subject to change without notice.

2) Any faults due to customer error (i.e. - incorrect set-up or configuration settings) are subject to the current Test Fee and will be exempt from warranty.

3) Items returned with inadequate fault descriptions are subject to the current Test Fee and are exempt from warranty.

4) In the event that no fault is found, the item is subject to the current Test Fee and will be exempt from warranty.

5) Any product exhibiting external damage (either from shipping, improper handling or use) will be subject to inspection. If said damages are determined to be the cause of failure, the item will be exempt from warranty. All repairs to correct the external damage are subject to Time & Materials Charges (parts and labor at current rates).

6) Items with damage caused by unauthorized repairs or by external devices are subject to current out-of-warranty Flat Rate Repair Charges and are exempt from warranty.

7) All products returned for Factory Optioning are subject to the applicable current Option Charge plus Test Fee. Factory-optioned products carry the balance of the original warranty or a 90 day warranty, whichever is greater.

All out-of-warranty repairs must be approved by the customer in writing. No repairs will be made until the customer's Purchase Order or Out-Of-Warranty Repair Authorization is received.

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