# COM3000 INTEGRATOR'S INSTALLATION MANUAL


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| Revision Record | | | |
|---|---|---|---|
| Revision | Date | Revision Editor | Revision Description |
| 1. | 1/25/2024 | Angelo Peruch | Draft one of Installation only manual |
| 1.1 | 5/28/2024 | Angelo Peruch | Add AEP2 EPG section 10.11 |

# 1 INTRODUCTION

This document describes the Vantiva COM3000 System and related configuration procedures. It is recommended that you read the entirety of the manual before working with the system.
This manual assumes the reader is familiar with the following:

- DirecTV standards for MFH2 satellite installation
- National and Local Electric Codes
- Industry standards for RF coaxial distribution
- Networking skills including IGMP networking of multicast video streams.
- Intended Usage

**Commercial Use**

This product is designed to go into areas that are not accessible to the public at large and are not for home use. Vantiva COM3000 Products provide Head-End systems for distribution solutions for the DIRECTV Commercial and Lodging and Institutions (L&I) markets.

**Warning**

Class 1 Equipment. This equipment must be earth grounded. The power plug must be connected to a properly wired earth ground socket outlet. An improperly wired socket outlet could place hazardous voltages on the accessible metal parts.

**IT Room warning message:**

Suitable for installation in Information Technology Rooms in accordance with Article 645 of the National Electrical Code and NFPA 75.

**RAL warning message**

The device can only be used in a fixed location such as a lab or a machine room. When you install the device, ensure that the protective earth ground connection of the socket-outlet is verified by a skilled person.

**Note to System Installer**

This reminder is provided to call the SMATV systems installer's attention to Section 820-93 of the National Electric Code which provide guidelines for proper grounding and specify that the Coaxial cable shield shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

# 2 COMPATIBILITY WITH PREVIOUS HARDWARE

| Chassis | COM360 | COM400 | Notes |
|---|---|---|---|
| Equipment | | | |
| COM46 | X | X | |
| COM51 | X | X | |
| QAM6 | X | | No QAM6 in COM400 |
| QAM4 | | X | No QAM4 in COM360 |
| Note:COM400 chassis will support COM46 cards, however one COM51 is required to program QAM4 | | | |

# 3 PRE-INSTALLATION

## 3.1 TRAINING AND SUPPORT

It is recommended that installation technicians have completed the COM3000 system and MFH2 training.

Primary support for all Vantiva products is provided by the distributor who sold the product.

The Vantiva website is a valuable resource for information.

https://www.vantiva.com/video-multi-client-solutions-documentation-library/

The website contains:

- Product Documentation and Manuals
- Current Software Versions
- Technical Tips

## 3.2 REQUIRED TOOLS

In addition to normal hand tools required for Coaxial and Ethernet installations the technician will need the following tools:

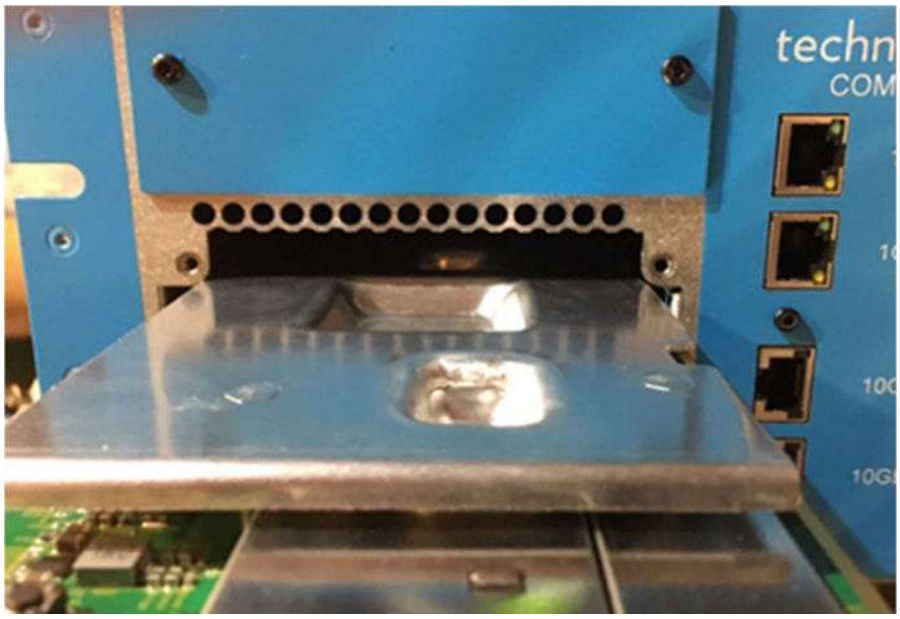
- DIRECTV Advanced Installation Meter (AIM)
- Digital RF (QAM) signal level meter
- Laptop computer
- #10 Torx driver
- All required personal protective equipment as required by OSHA and/or local requirements.

## 3.3 SITE SURVEY

A site survey of the property should be completed per DIRECTV requirements.

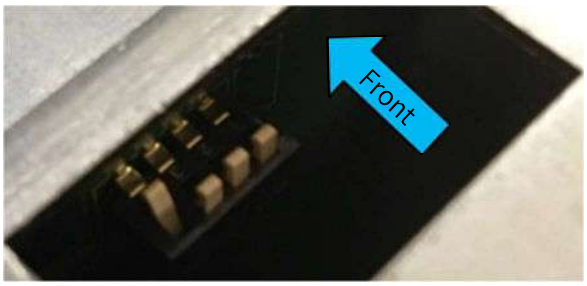
# 4 COMPONENT ASSEMBLY

If you have purchased an assembled system from your distributor you may skip to section 5.
Carefully unpack and install the QAM20 / QAM4 and COM51 cards in the COM400/421 Chassis as shown below. Be sure to line up the cards with the guides in the chassis.
After inserting the COM51 card, finger tighten the two thumb screws to secure the card in the chassis.
QAM20 / QAM4 should mount in the lower QAM port of the chassis.
A #10 Torx driver is required to secure the QAM20 / QAM4 in the chassis.

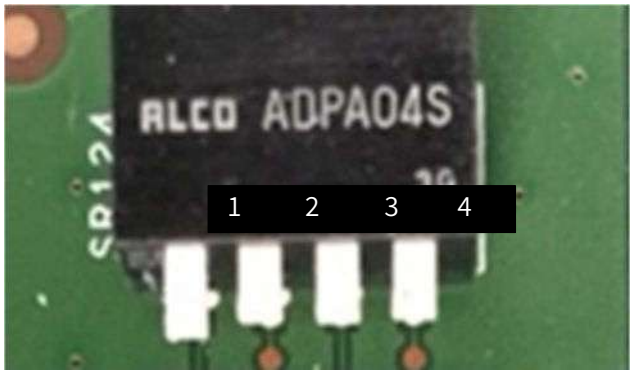


## 4.1 SETTING UP MULTIPLE CHASSIS (COM400 ONLY)

For multi-chassis COM400 installations each chassis will need to be assigned a unique chassis ID. COM421 are set to chassis one by default, there is no dipswitch as multiple 421 chassis are not recommended.
The COM400 chassis has a default setting as chassis one.
Chassis identification is configured via a dipswitch on the backplane circuit board.
To access the switch, you will need to remove the access door on the top panel of the COM400 chassis as shown below:




Facing the back, dipswitches are 1-4 from the right to the left as shown below:
Dipswitch numbers as shown below are added to the photo. They are not actually labeled.




The default IP address of each COM51 card in a system is determined by the chassis ID and slot number.
The formula for determining this address is 192.168.3.[1 + (chassis ID X 16) + slot number]. Example for chassis one:
1 + (16*1) + 1 = 18 IP address of chassis one slot one is 192.168.3.18

The table below details COM400 chassis dipswitch settings and the corresponding IP address.

| Chassis ID | Switch1 | Switch 2 | Switch 3 | Switch4 | Default IP |
|---|---|---|---|---|---|
| 1 | UP | DOWN | DOWN | DOWN | 192.168.3.18 |
| 2 | DOWN | UP | DOWN | DOWN | 192.168.3.34 |
| 3 | UP | UP | DOWN | DOWN | 192.168.3.50 |
| 4 | DOWN | DOWN | UP | DOWN | 192.168.3.66 |
| 5 | UP | DOWN | UP | DOWN | 192.168.3.82 |
| 6 | DOWN | UP | UP | DOWN | 192.168.3.98 |
| 7 | UP | UP | UP | DOWN | 192.168.3.114 |
| 8 | DOWN | DOWN | DOWN | UP | 192.168.3.130 |
| 9 | UP | DOWN | DOWN | UP | 192.168.3.146 |
| 10 | DOWN | UP | DOWN | UP | 192.168.3.162 |
| 11 | UP | UP | DOWN | UP | 192.168.3.178 |
| 12 | DOWN | DOWN | UP | UP | 192.168.3.194 |

# 5 INSTALLATION

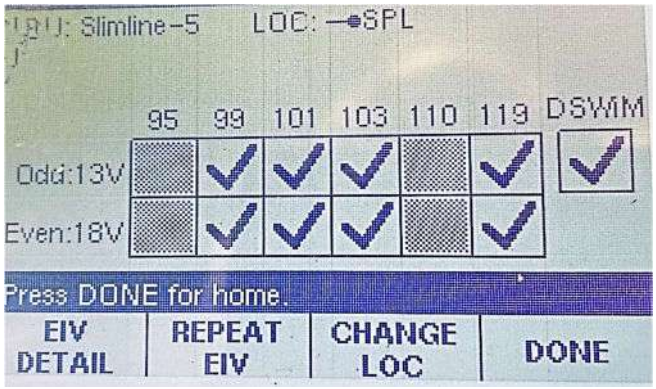
## 5.1 SATELLITE SIGNAL INPUT

COM51 Card requires two inputs from a digital SWiM 30 as part of a DirecTV approved MFH2 trunk. Input signal levels must be between -30 and -45dBm with SnR >11.

All signals should be verified with a DirecTV Advanced Installation Meter EIV+ test.

AIM Meter


Positive EIV+ Results

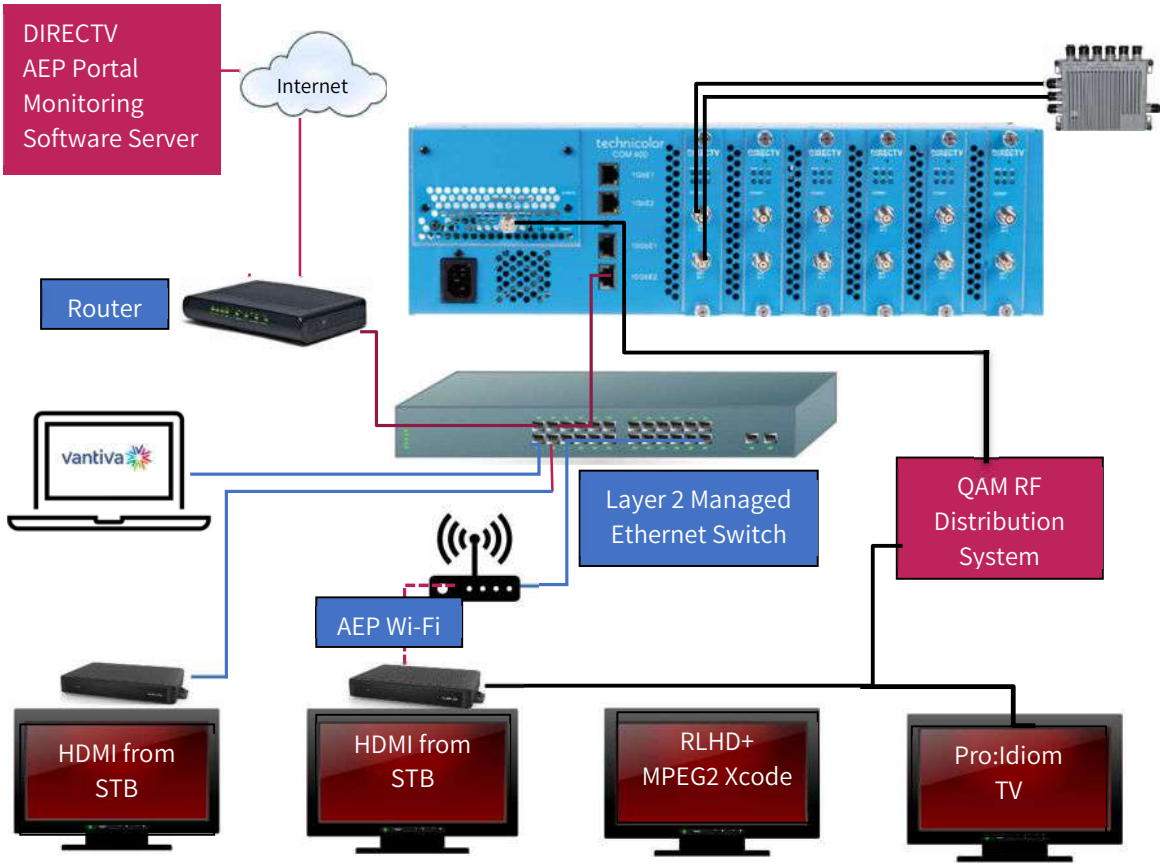



**Attenuation**

If the cable distance between the COM51 cards and the SSWIM30 is less than 25ft it is possible for the SWIM L-Band signals to disrupt the low band FSK communication channel at 2.3MHz. This could result in channel tune issues with the COM3000 system. The syslog will then often report SWM errors. Additional attenuation between the DSiM30 and the COM51 is required. Recommended device is a DIRECTV approved DRE loop through tap with a 6-, 9-, or 12-dB value. Connect the input port to the DSWiM30 and the tap port to the COM51. Terminate the output port.

## 5.2 CONNECTIVITY OVERVIEW DIAGRAM

The diagram below illustrates connections to a COM3000 system.




**Definitions**

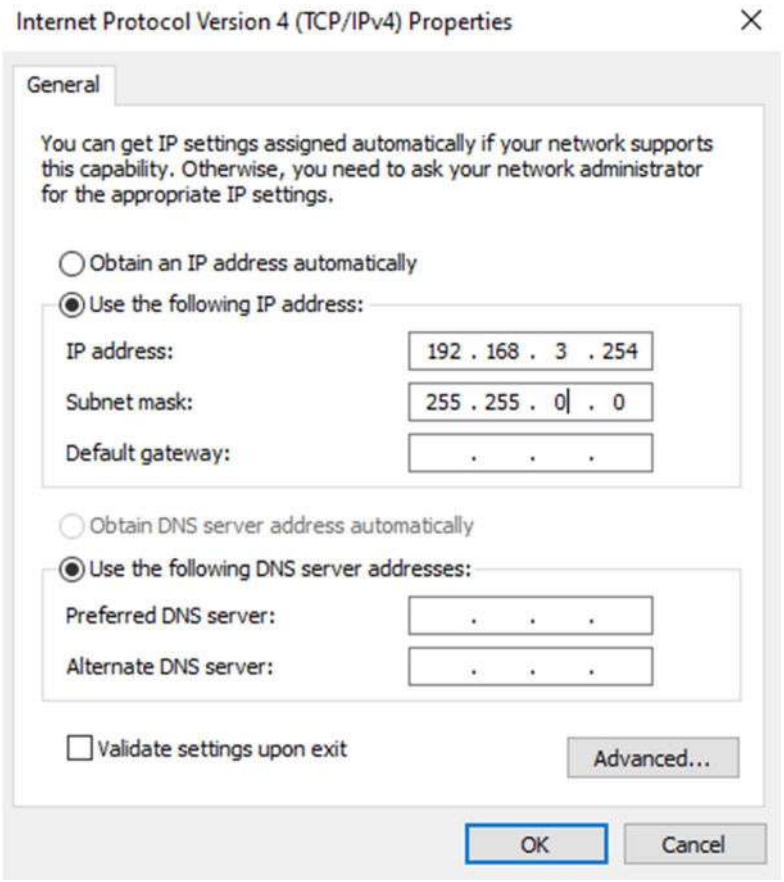
| | |
|---|---|
| Laptop Computer | Required for COM configuration. |
| Router | Router provides LAN connectivity to all devices. Issues DHCP IP addresses to all devices on the network. |
| MPEG2-4 Transcoder | Transcoders change signal from native DIRECTV MPEG4 to MPEG2 for use in RLHD+ systems. |
| NTSC transcoder Encoders | NTSC devices ingest HD digital streams and output 6MHz analog channels. Encoders are used for local channel insertion (LCI). They ingest A/V from a variety of sources and output ethernet to the QAM or RF to be combined with other video sources. |
| Pro:Idiom TVs | Pro:Idiom enabled TVs will decrypt Pro:Idiom encrypted HD signals from the COM3000 |
| RLHD+ | DIRECTV authorizes some institutions to use an unencrypted signal. The "Clear HD" signal is MPEG4. Not all consumer TVs will tune MPEG4 video in which case a transcoder, or set top box is required |

## 5.3 PC CONFIGURATION FOR COM3000 INTERFACE

The COM system is configured via a laptop computer connected to the system via an ethernet cable. Configuration can be accessed via any of the ethernet ports on the front of the COM400 chassis.
Configure the laptop with a fixed network address:

IP 192.168.3.254
Sub Net Mask 255.255.0.0

Below is an example of Windows 10 IPv4 configuration.



# 6 SYSTEM POWER UP

Once assembled and connected to RF distribution power up the COM3000 by plugging in the power cord. There is no external power switch.

System startup LED Behavior


The COM51 card has 6 LEDs on the front panel the top three are:

PWR – Displays solid green when the card is powered.

Activity – Flashes green when there is Ethernet activity between the chassis and card.

Link – Displays solid green indicating the card has Ethernet link to the chassis backplane.

Upon powering up the COM51 cards LEDs will go through a series of flashing indicating boot up. Error! Reference source not found.The table below describes the LED activity during boot and normal operation.

| LED 1 | LED 2 | LED 3 | Stage | Note |
|---|---|---|---|---|
| OFF | OFF | OFF | Power Off | Normal Boot |
| ON | OFF | OFF | Power On | Normal Boot |
| OFF | ON | OFF | Checking imageA signature | Normal Boot |
| ON | ON | OFF | Checking imageB signature | Normal Boot |
| OFF | OFF | ON | Booting ImageA | Normal Boot |
| ON | OFF | ON | Booting ImageB | Normal Boot |
| OFF | ON | ON | Failsafe downloading image. Card will attempt TFTP download from 192.168.1.254. COM51.bin. Using external TFTP software. | Fail Safe Mode |
| FLASH | OFF | OFF | Failsafe image download failed, reboot after 10 seconds | FATAL ERROR |
| OFF | FLASH | OFF | Failsafe image invalid, reboot after 10 seconds | FATAL ERROR |
| OFF | OFF | FLASH | Programming failsafe image into flash failed | FATAL ERROR |
| ON | ON | ON | Failsafe flash programming | Fail Safe Mode |

LED Behavior after Boot up
Once the COM51 has successfully booted the LEDs will provide operational information as shown below.

| LED 2 | LED 3 | Meaning |
|---|---|---|
| OFF | OFF | SWM error |
| OFF | FLASH | SWM error while APG acquisition |
| OFF | ON | SWM error |
| ON | OFF | HW initialization (FPGA loading) |
| ON | FLASH | APG acquisition |
| ON | ON | Running |
| FLASH | OFF | Software upgrading |
| FLASH | ON | Software upgrading |
| FLASH | FLASH | Software upgrading (flashing at same time) |
| FLASH | FLASH | Software upgrade failure (alternate flash) |

Under normal operations all three LEDs are solid green:
LED1: ON if all requested tuners are locked.
LED2: OFF=SWM error; ON=Running; FLASH=SW upgrading
LED3: OFF=FPGA loading; ON=FPGA loaded; FLASH=APG acquisition LED 1 indicating all requested tuners are locked.

# 7 THE COM400 CHASSIS

The COM400 Chassis houses, powers and connects the COM51 to QAM4 and provides ethernet connections. It has an internal layer 2 ethernet switch. The default settings are adequate for most installations.
If the system is a QAM based RF output, skip this section, and continue to COM51 configurations.

## 7.1 ACCESSING THE COM400 CHASSIS

To determine the IP address of the COM400 user interface use the following formula:
192.168.10. (chassis id +1)
For most single chassis configurations this would equate to 192.168.10.2
Login is Admin, leave Password field blank.

## 7.2 PORT STATE OVERVIEW

The first page of the interface displays the Port State overview.
Ports 1-11 are utilized in the COM400 chassis and are displayed as lit when connection to each port is made.

In the example below all ports are connected except #7, the top QAM port.


| Port # | COM400 Connection | Port # | COM400 Connection |
|---|---|---|---|
| 1 | COM51 slot 6 | 7 | QAM Port 2 (TOP) |
| 2 | COM51 slot 5 | 8 | QAM Port 1 (Bottom) |
| 3 | COM51 slot 4 | 9 | Internal unmanaged Ethernet switch to both 1 GIG ports |
| 4 | COM51 slot 3 | 10 | Top 10 GIG |
| 5 | COM51 slot 2 | 11 | Bottom 10 GIG |
| 6 | COM51 slot 1 | | |

Note: Both 1 gigabit ports are connected to the same port on the layer 2 switch via an unmanaged Ethernet switch. All multicast traffic requested by one port will be present on the other. For this reason, it is recommended that the 1 gigabit ports not be used for multicast traffic.

## 7.3 SETTING A COM400 PASSWORD

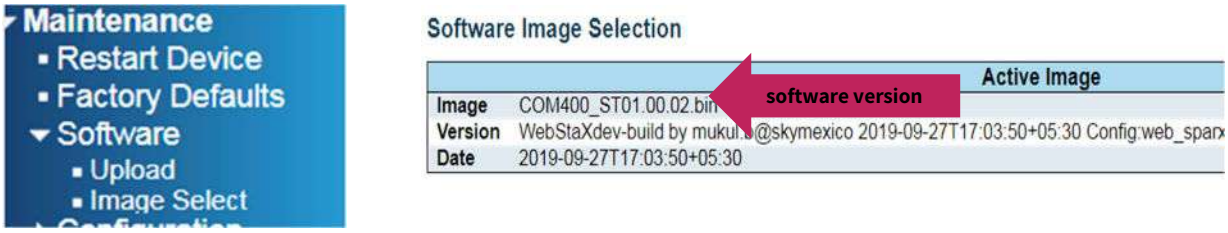
To set a password navigate to >Configuration>Security>Password.


Lost passwords can be recovered by your distributor.
Admin login cannot be changed.

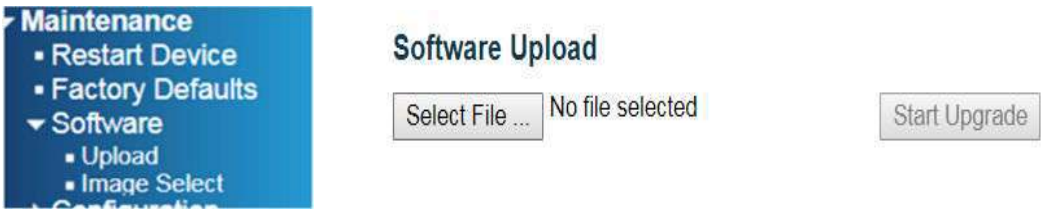
## 7.4 COM400 SOFTWARE UPDATE

COM400 should always be running the latest software available. Software is available at the Vantiva website:
https://www.vantiva.com/video-multi-client-solutions-documentation-library/

To determine the current software running on the COM400 navigate to:
Maintenance > Software > Image Select
As shown below the software version is displayed on the top line labeled Image.




To update COM400 software navigate to Maintenance > Software > Upload.
Click Select File and navigate to the folder in which the software is saved. Upload to the COM400.
Then select Start Upgrade as shown below.
**When software upgrade is completed reset the system to factory defaults:**
**Navigate to maintenance > Factory Defaults click Yes.**



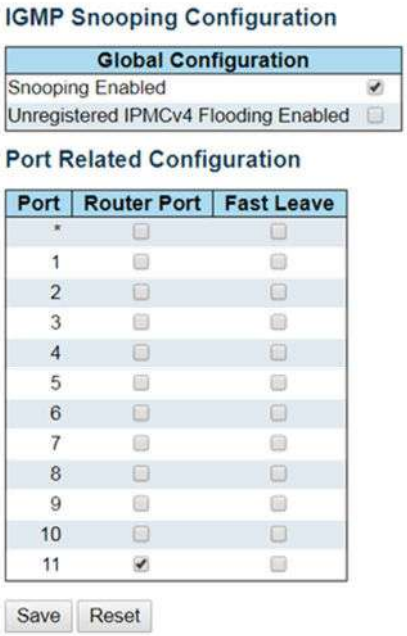

## 7.5 SETTINGS FOR MULTICAST

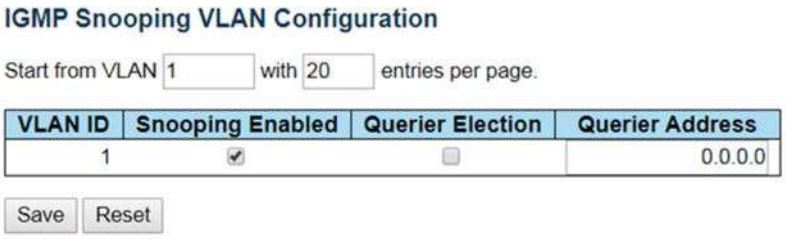
By default, the COM400 is set to provide a stable environment, however, if you are using the system to output IP multicast video, a couple simple settings can be implemented for a more robust solution. These steps have been tested and proven using a variety of managed Ethernet switches from well-known manufacturers. No other advanced or further setup should be necessary for the COM400 and COM51 cards to work properly in a Multicast environment.

If other specific settings are required by the managed Ethernet switch provider that you have selected, please continue with caution and test in a lab environment before installation on a live site.

The recommended setting / actions are:
Verify the COM400 is running current software
Verify IGMP Snooping is enabled
Connect your managed Ethernet switch to one of the 10GbE ports (they can negotiate to 1GbE)
Enable Router Port for the port connected to the managed Ethernet switch
Keep it simple. Don't depend on advanced settings or modes
Persistently save your settings

IGMP Settings
From the main menu navigate to:
Configuration > IMPC > IGMP snooping > Basic Configuration
Verify **Snooping Enabled** is checked. If not, check the box and then click **Save.**
**Fast Leave** should be unchecked unless a STB is connected directly to the COM400.
Select **Router Port** for the port connected to your core switch. This will allow all Multicast traffic through the port. The external switch can then handle all IGMP functions.

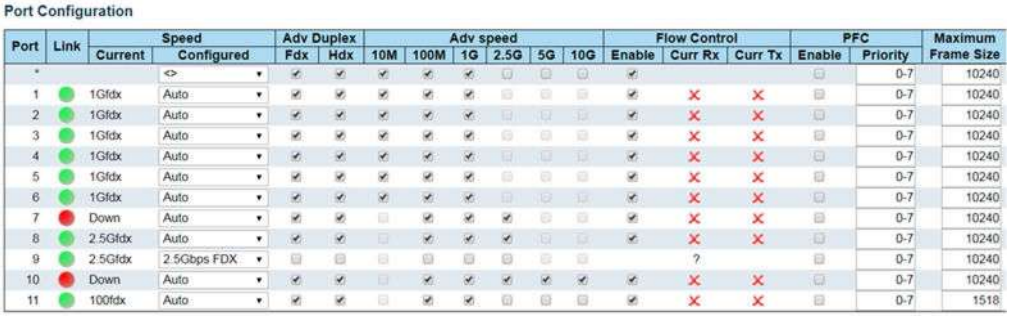




From the IGMP snooping menu navigate to VLAN Configuration. Verify Snooping is enabled. If not, check the box and then click Save.

**Querier Election** should be off if you are using a managed external Ethernet switch.

## 7.6 PORT SETTINGS

From the main menu navigate to Configuration >Ports as shown below:



This screen provided information for the state and settings of each port on the switch.
Verify that the port connected displays a green link light as shown in the figure below.

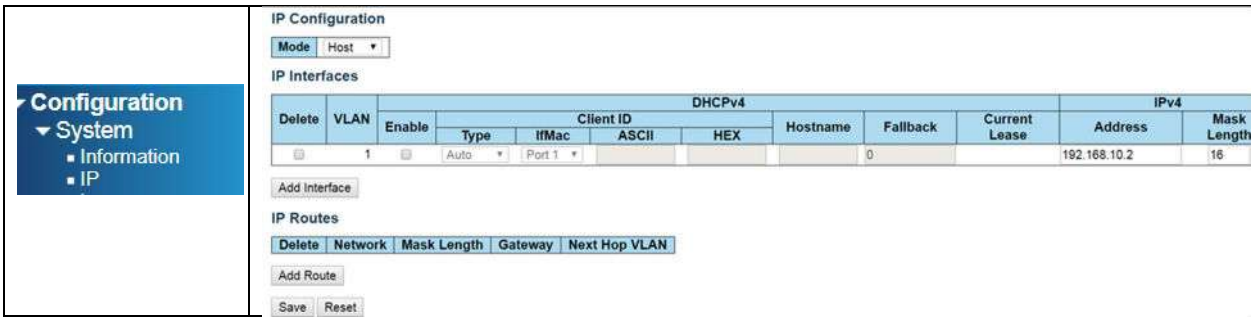
**Flow Control**
Some switches will use a flow control that allows the switch to request a slower data rate if the buffers start to fill. Checking the flow control box will allow the COM400 to respond to these requests. We recommend enabling flow control on all ports.

**Advertised Port Speed**
Informational
The 10G ports "advertise speeds between 100M and 10G. If your switch is having problems auto negotiate the connection, you can shut off advertised speeds above the rated bandwidth of your switch port.

**MTU**
Informational
COM51 maximum transmission units (MTU) is 1500. Some external switches may prefer the COM400 switch settings to be set to a matching MTU (Frame Size) setting. The lowest MTU setting available in the COM400 switch is 1580 as shown below on port 11.

## 7.7 CHANGING THE CHASSIS MANAGEMENT IP ADDRESS (OPTIONAL)

Making changes in this area can affect system communication. Proceed with caution.
Management IP address should only be changed when it is necessary to manage the entire system from a different subnet. The IP address of all COM51 cards will need to be changed to the same subnet as the chassis. Change the COM51 card IP address and add an alternate IP address for the QAM before proceeding.
To change the IP address used to access the COM400 chassis navigate to Configuration->System->IP, as shown below:




Click on **Add Interface**
Set the following:
VLAN = 2
Fallback =1
IP address = new management IP address (for this example we will use 10.0.0.251)
Mask Length = 16
Click on **Save**

IP Interfaces

| Delete | VLAN | DHCPv4 | | | | | | | IPv4 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Enable | Client ID | | | | Hostname | Fallback | Current Lease | Address | Mask Length |
| | | | Type | IfMac | ASCII | HEX | | | | | |
| | 1 | | Auto | Port 1 | | | | 0 | | 192.168.10.3 | 16 |
| | 2 | | Auto | Port 1 | | | | 0 | | 172.16.80.99 | 16 |

Next navigate to:
Configuration->VLANs->Configuration


Global VLAN Configuration

| | |
|---|---|
| Allowed Access VLANs | 2 |
| Ethertype for Custom S-ports | 88A8 |

Port VLAN Configuration

| Port | Mode | Port VLAN | Port Type | Ingress Filtering | Ingress Acceptance | Egress Tagging | Allowed VLANs | Forbidden VLANs |
|---|---|---|---|---|---|---|---|---|
| * | <> | 1 | <> | ☑ | <> | <> | 1 | |
| 1 | Access | 1 | C-Port | ☑ | Tagged and Untagged | Untag All | 1 | |
| 2 | Access | 1 | C-Port | ☑ | Tagged and Untagged | Untag All | 1 | |
| 3 | Access | 1 | C-Port | ☑ | Tagged and Untagged | Untag All | 1 | |
| 4 | Access | 1 | C-Port | ☑ | Tagged and Untagged | Untag All | 1 | |
| 5 | Hybrid | 2 | C-Port | ☐ | Tagged and Untagged | Untag Port VLAN | 1-4095 | |
| 6 | Hybrid | 2 | C-Port | ☐ | Tagged and Untagged | Untag All | 1-4095 | |
| 7 | Access | 1 | C-Port | ☑ | Tagged and Untagged | Untag All | 1 | |
| 8 | Hybrid | 2 | C-Port | ☐ | Tagged and Untagged | Untag Port VLAN | 1-4095 | |
| 9 | Hybrid | 2 | C-Port | ☐ | Tagged and Untagged | Untag Port VLAN | 1-4095 | |
| 10 | Hybrid | 2 | C-Port | ☐ | Tagged and Untagged | Untag Port VLAN | 1-4095 | |
| 11 | Access | 1 | C-Port | ☑ | Tagged and Untagged | Untag All | 1 | |

Save Reset

To access the chassis and the associated COM cards and QAM from the same port all connected ports will need to be set to the same VLAN.
Set Allowed Access VLANs to 2
Refer to the chart on page 1 to identify the ports being used.
Set each port to be used on VLAN2 to the following settings:
Mode = Hybrid
Port VLAN =2
Once the port is changed you will no longer be able to access the COM400 on the default IP address from that port. It is recommended to leave one port on VLAN1 so the chassis can be accessed with the default IP.
In the example shown, both one gigabit ports (port 9) and the top 10 gigabit port (port 10) will use the new VLAN IP assignment.
Connecting directly to the bottom 10 gigabit port (port 11) will allow connection with the default IP address.
Ports 5, 6, and 8 have been set to the new VLAN settings. This sets COM51 cards in slot one and two and the QAM to VLAN2

To verify the change has taken effect connect your PC to a VLAN two port.
Change the IP settings in your PC's ethernet connection to the correct subnet to access the new IP address. Enter the new IP address into the browser and verify you connect to the COM400 and the COM51 cards. (COM51 cards will need static IPs assigned to match the new subnet)
Change your IP setting back to match the default 192.168.3.XX subnet 255.255.0.0. Connect to a VLAN

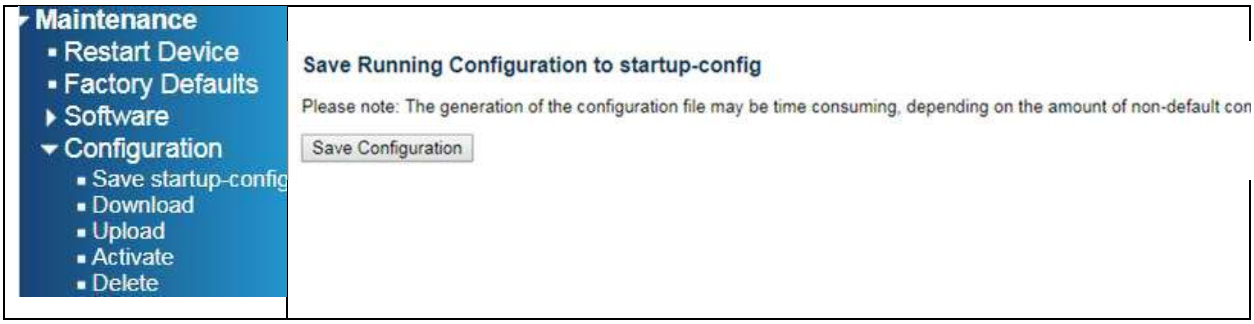
one port and verify you can access the COM400 at the default 192.168.10.2 address.

If you encounter problems, reboot the COM400 chassis and all configurations will return to default. Once operations are verified save the configuration to running config as described in Section 10.6 below.

## 7.8 SAVE CHANGES TO RUNNING CONFIGURATION

Once you have verified all the setting changes are correct, save the settings to running configuration. Failure to complete this step will result in all new settings being lost upon power cycle.
As shown below Navigate to:
Maintenance > Configuration > Save startup-config.

Click Save Configuration



# 8 COM51 SETUP

## 8.1 ACCESS TO THE COM51 WEBSERVER

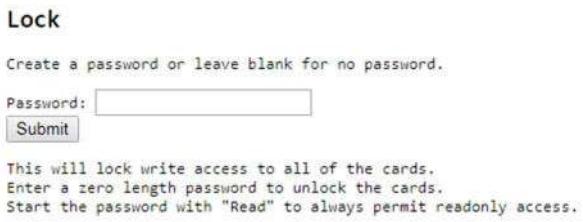
Enter the IP address of the COM51 in an internet browser. IP address can be found in the table on page 11 of this manual. Typically, chassis one card one can be accessed at 192.168.3.18. Chrome is the recommended browser.

## 8.2 PASSWORD

The default User Password is, "com3k".


## 8.3 CHANGING PASSWORD

Once the default password has been entered you can change the password via the Lock tab of the COM51 user interface.




To change the password, enter an alpha numeric text in the Password field and click submit.
Note: no spaces in password.

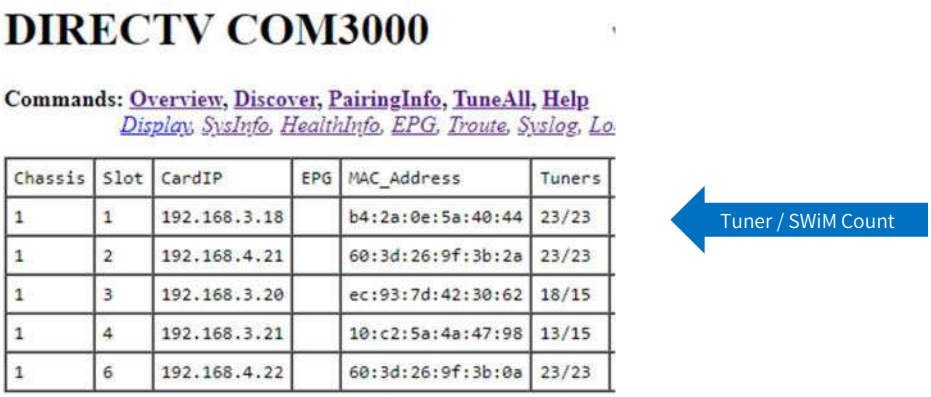
Some circumstances require a blank COM51 password, such as Mediatune. To set a blank password leave the Password field blank and click on Submit.

## 8.4 COM51 TUNER LICENSING

The COM51D comes with all 23 video tuners enabled. Below material is reference for COM51 purchased prior to January 2024.

The COM51 card default setting enables eight tuners, additional tuners can be licensed in one tuner increments. This process should be completed during the order process. Tuner licensing is the responsibility of the Distributor providing the system. Additional tuners can be purchased post sale if a customer chooses to upgrade.

Tuner licensing count is displayed in the "Tuners" column of the COM51 SysInfo page.



**DIRECTV COM3000**

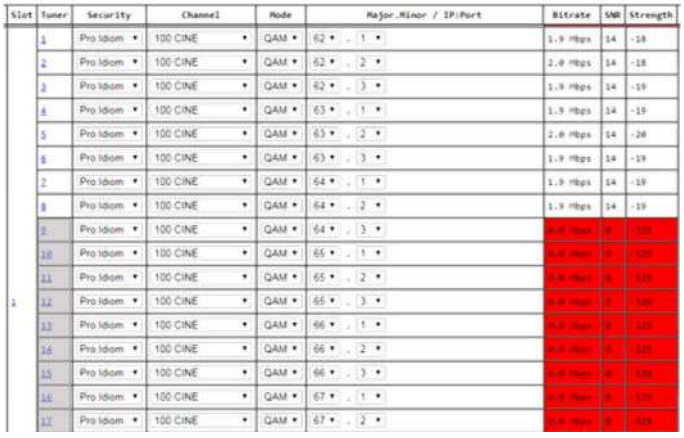
**Commands:** Overview, Discover, PairingInfo, TuneAll, Help
*Display, SysInfo, HealthInfo, EPG, Troute, Syslog, Lo*

| Chassis | Slot | CardIP | EPG | MAC_Address | Tuners |
|---|---|---|---|---|---|
| 1 | 1 | 192.168.3.18 | | b4:2a:0e:5a:40:44 | 23/23 |
| 1 | 2 | 192.168.4.21 | | 60:3d:26:9f:3b:2a | 23/23 |
| 1 | 3 | 192.168.3.20 | | ec:93:7d:42:30:62 | 18/15 |
| 1 | 4 | 192.168.3.21 | | 10:c2:5a:4a:47:98 | 13/15 |
| 1 | 6 | 192.168.4.22 | | 60:3d:26:9f:3b:0a | 23/23 |

Tuner / SWiM Count

The first number represents the number of licensed tuners, the second represents the number of SWiM frequency slots available.

On the Overview tab, COM51 will highlight unlicensed tuner numbers in grey, and the bitrate, SNR, and Strength fields will be highlighted in red.



| Slot | Tuner | Security | Channel | Mode | Major.Minor / IP:Port | Bitrate | SNR | Strength |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | Pro Idiom | 100 CINE | QAM | 62 . 1 | 1.9 Mbps | 14 | -18 |
| | 2 | Pro Idiom | 100 CINE | QAM | 62 . 2 | 2.0 Mbps | 14 | -18 |
| | 3 | Pro Idiom | 100 CINE | QAM | 62 . 3 | 1.9 Mbps | 14 | -19 |
| | 4 | Pro Idiom | 100 CINE | QAM | 63 . 1 | 1.9 Mbps | 14 | -19 |
| | 5 | Pro Idiom | 100 CINE | QAM | 63 . 2 | 2.0 Mbps | 14 | -20 |
| | 6 | Pro Idiom | 100 CINE | QAM | 63 . 3 | 1.9 Mbps | 14 | -19 |
| | 7 | Pro Idiom | 100 CINE | QAM | 64 . 1 | 1.9 Mbps | 14 | -19 |
| | 8 | Pro Idiom | 100 CINE | QAM | 64 . 2 | 1.9 Mbps | 14 | -19 |
| | 9 | Pro Idiom | 100 CINE | QAM | 64 . 3 | 0.0 Mbps | 0 | 125 |
| | 10 | Pro Idiom | 100 CINE | QAM | 65 . 1 | 0.0 Mbps | 0 | 125 |
| | 11 | Pro Idiom | 100 CINE | QAM | 65 . 2 | 0.0 Mbps | 0 | 125 |
| | 12 | Pro Idiom | 100 CINE | QAM | 65 . 3 | 0.0 Mbps | 0 | 125 |
| | 13 | Pro Idiom | 100 CINE | QAM | 66 . 1 | 0.0 Mbps | 0 | 125 |
| | 14 | Pro Idiom | 100 CINE | QAM | 66 . 2 | 0.0 Mbps | 0 | 125 |
| | 15 | Pro Idiom | 100 CINE | QAM | 66 . 3 | 0.0 Mbps | 0 | 125 |
| | 16 | Pro Idiom | 100 CINE | QAM | 67 . 1 | 0.0 Mbps | 0 | 125 |
| | 17 | Pro Idiom | 100 CINE | QAM | 67 . 2 | 0.0 Mbps | 0 | 125 |

The final verification of licensing is in the COM51 Syslog. A COM51 exceeding the license count will display the following message in the Syslog:

```
user.err syslog: a: ***Need Tuner License File: tuners=8.
```

## 8.5 COM51 FEATURE LICENSES

| Feature | License Name | Function |
|---|---|---|
| IP | NoQamCheck | If you are using a COM51 system in an IPTV system with no QAM or NTSC-8 the cards will need to be licensed for use by your distributor. |
| Clear HD | Clear_HD | Allows all channels to be in clear QAM (no Pro:Idiom) |
| Transcode | Transcode | Allows streaming to Transcoders using "Transcode" security setting |
| Manufacturer Index | keyIndex | Transcode manufacturer ID. 1= Video Propulsion; 2=Blonder-Tounge |
| Mediatune | MT | Licenses COM51 to run Mediatune software (includes 10 MMS) |
| Mediatune IP TVs | mms | Additional IPTVs for Mediatune MMS (Multicast Media Server) |
| Flextune | igmpTune | Licenses COM51 to run Flextune software (one COM51 card per system) |
| HD output | HD | Enables HD channels to be streamed. Enabled by default, except on COM46 FLEX |
| Stream out | StreamOut | Enables video to be streamed to any device. Enabled by default except COM46A and COM51A. |

**Symptoms of no IP license:**

- All tuners will work after re-boot, after several minutes all tuners other than the first tuner will stop. COM51 card will display tuners >1 in red.
- Syslog will report, "No QAM found need license".

Loading a COM51 license file overwrites any existing license in the card. Any new license file must contain any existing license features.

.

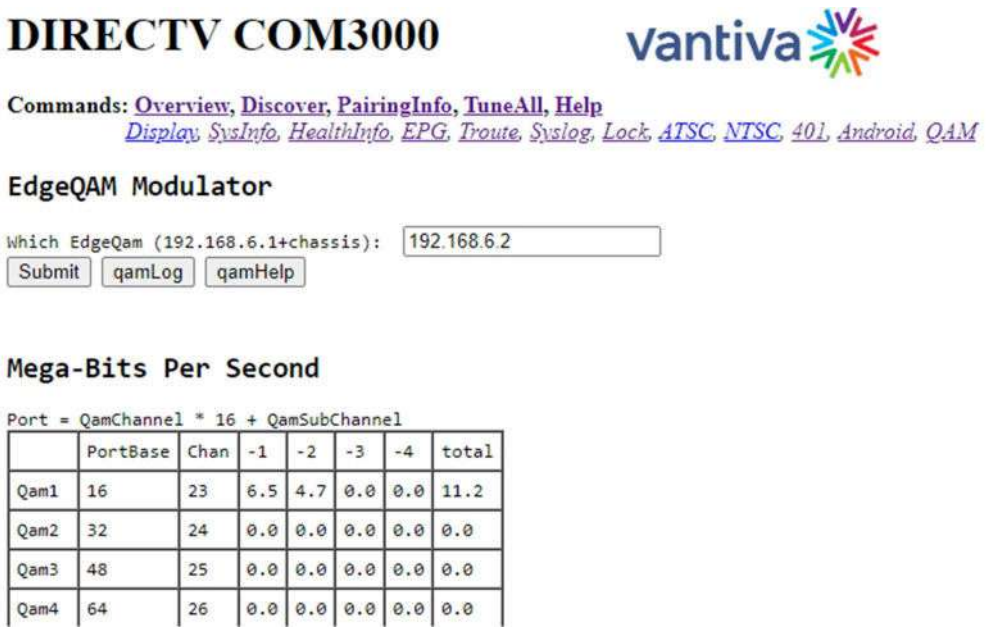
# 9 QAM4 SETUP

## 9.1 ACCESS THE QAM4 INTERFACE

The first step is setting up the COM3000 system is to assign channel outputs to the QAM Modulator. This may have been done in advance by the distributor, however it is good practice to check, and know how to change if necessary.

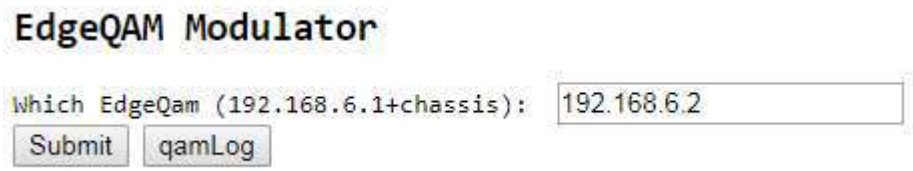
The QAM tab of the COM51 user interface can be accessed in one of two ways:

From the Overview Page QAM summary click on the QAM IP address hyperlink as shown below:




| | PortBase | Chan | -1 | -2 | -3 | -4 | total |
|---|---|---|---|---|---|---|---|
| Qam1 | 16 | 23 | 6.5 | 4.7 | 0.0 | 0.0 | 11.2 |
| Qam2 | 32 | 24 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Qam3 | 48 | 25 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Qam4 | 64 | 26 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

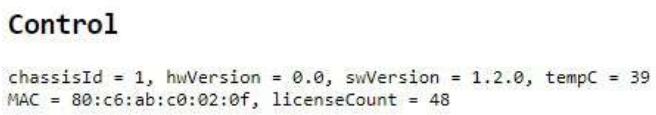
From the QAM tab of the COM51 user interface enter the IP address of the QAM in the field and click Submit as shown below:




The QAM4 will only output the licensed number of QAM carriers.

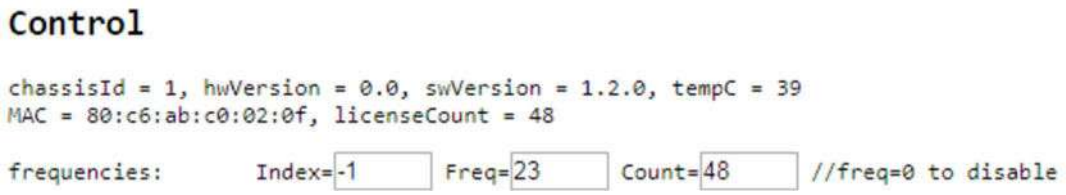
## 9.2 QAM CARRIER LICENSE

Verify the QAM4 license count is correct for your installation and matches the bill of materials from your distributor.
QAM4 license files are uploaded using the same procedure as software updates.
The license count is displayed in the Control section, next to the MAC address.




## 9.3 QAM CARRIER CHANNEL ASSIGNMENTS

The QAM carriers can be assigned in one of two 128 RF channel groups.
Low group channels 1-128
High Group channels 26-158
If you need to utilize channels above 128 you must have all QAM carriers at or above 26
Channel outputs are set using the three boxes in the control section as shown below.




The three boxes at the bottom of the control screen are used to reference the following:
**Index**
Sets the QAM index referenced in the first column of the QAM table. By default, the field is populated with -1. As a safety measure you must delete the -1 and enter the QAM Index.
**Freq**
Sets the QAM carrier index to be assigned to the QAM referenced in the first box.
**Count**
Sets the number of QAMs to be set in sequential order.

Index 1 Freq 23 Count 48 will set all the licensed QAM outputs sequentially, starting at Ch 23

Setting the Index to a specific QAM index and the count to 1 will change the output carrier to that channel.

Index 10 Freq 40 Count 1 will set the QAM index carrier 10 to output Ch 40

Changing the count will set output carriers in sequential order starting with the Index specified.

Index 10 Freq 40 Count 5 will set all the QAM index carrier 10 to output Ch 40, index 11 to 41, index 12 to 42, etc.

**Note: Index one must be set to 23 for Advanced Entertainment Platform systems.**

The QAM4 destination UDP port should be set to:

Port = QAM Channel * 16 + QAM Sub Channel

When completed the QAM will display the QAM Carrier Channel in the 3rd column as shown below:

| | PortBase | Chan | -1 | -2 | -3 |
|---|---|---|---|---|---|
| Qam1 | 16 | 23 | 5.4 | 4.6 | 4.6 |
| Qam2 | 32 | 24 | 6.4 | 5.9 | 5.3 |
| Qam3 | 48 | 25 | 4.9 | 7.0 | 6.2 |
| Qam4 | 64 | 26 | 12.4 | 12.0 | 12.2 |
| Qam5 | 80 | 27 | 5.4 | 5.3 | 4.6 |
| Qam6 | 96 | 28 | 6.7 | 8.1 | 8.1 |
| Qam7 | 112 | 29 | 6.4 | 8.0 | 5.0 |
| Qam8 | 128 | 30 | 5.5 | 4.3 | 4.5 |
| Qam9 | 144 | 31 | 5.4 | 4.2 | 4.4 |
| Qam10 | 160 | 32 | 4.2 | 6.7 | 4.4 |
| Qam11 | 176 | 33 | 4.5 | 6.5 | 4.4 |
| Qam12 | 192 | 34 | 5.4 | 6.9 | 4.5 |
| Qam13 | 208 | 35 | 5.4 | 3.6 | 13.9 |
| Qam14 | 224 | 36 | 6.1 | 11.5 | 8.6 |
| Qam15 | 240 | 37 | 6.7 | 5.4 | 7.4 |
| Qam16 | 256 | 38 | 6.0 | 5.2 | 5.0 |

# 10 COM51 SETUP

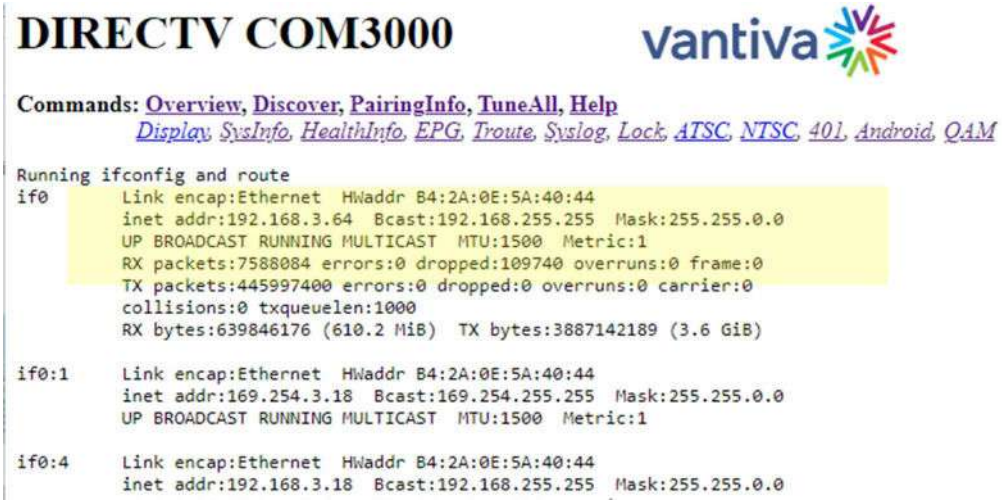
## 10.1 COM51 SATELLITE INPUT

COM51 requires two SWiM connections from a digital SWIM30 set up to MFH2 specification. Signal must be verified with a DIRECTV AIM meter.
SWiM input to COM51 must be attenuated by 9dB. Approved device is a DRE 9dB tap

## 10.2 COM51 CONNECTION TO THE INTERNET

It is recommended best practice to always connect the COM chassis and thus the COM51 to the internet.
Internet connectivity in AEP systems is required per DirecTV policy.
DIRECTV will access the system to push essential software updates to the AEP boxes.

COM51 Dual Network Capability
The first interface is reserved for the default IP address assigned via chassis and slot position.
Example, chassis one, slot one, will default to a 192.168.3.18 IP address.
The COM system will always be accessible at this address via a laptop configured for the correct subnet.
The second network interface is assigned via network DHCP.
When the COM51 is connected to a network with a DHCP server and internet access, the second interface will obtain an IP address on the network and connect to the DIRECTV dashboard.
When the connection is made the COM51 will report MONITORED in the SYSINFO tab feature column
The assigned DHCP address can be found in the COM51 IFCONFIG function found in the help tab of the COM51.



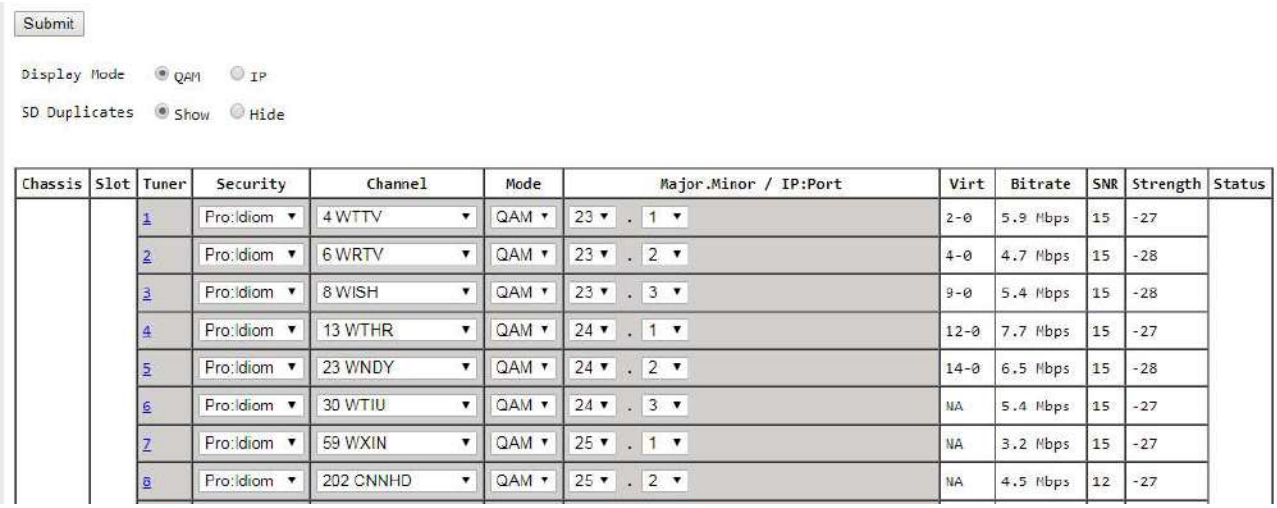

Since the COM51s will appear in the DHCP tables of the site network the MAC address of the COM devices (COM51s, COM400, and QAM4) should be provided to the local network administrator.

## 10.3 ACTIVATION

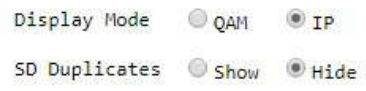
Verify the COM51 has been activated by DIRECTV.
Click on the CAMID hyperlink in the Pairing info tab to display activation status.
000 Card inserted = All tuned channels are activated
7XX errors are the result of activation problems
Each active tuner in the COM51 must be assigned a DIRECTV program, Security mode, and a destination IP address / QAM output.

## 10.4 PROGRAMMING SETUP

Channel programming is done from the COM51 Overview tab.




**Display Mode**
Select preferred options for display of QAM or IP output configuration and Hide SD duplicate channels.




**Chassis, Slot and Tuner Hyperlinks**
The chassis and slot number hyperlinks in the Chassis and Slot columns allow you to collapse the display for the selection so that multiple cards and chassis can be more easily displayed.

Chassis number hyperlink




Slot number hyperlink




Tuner number hyperlink will navigate to the COM51 advanced edit page.

**Security Mode**

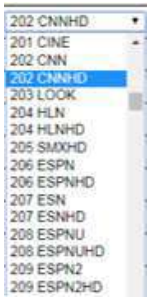
Select the appropriate Security mode from the drop down box.

Options are:

| | |
|---|---|
| None | This setting removes all DRM and will only function on standard definition channels by default<br>Removal of Pro:Idiom Encryption from HD channels must be authorized by DIRECTV. |
| Pro:Idiom | This is the standard setting for HD Pro:Idiom encrypted channels |
| Transcode | Enables AES encryption to approved 3rd party devices. Required feature license |
| Simulcrypt | Samsung Lynk (support provided by Samsung) |

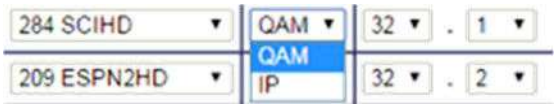
**Channel Tune**

Use the dropdown box in the Overview tab to select a DIRECTV program.

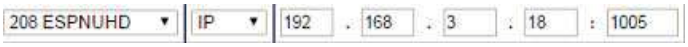



**Mode**

In QAM mode the interface will display the QAM major and minor numbers currently set in the QAM4 interface.




IP mode displays a field to enter an IP address and port assignment.




Once entries are complete click "Submit" to save.

Other Overview fields

| | |
|---|---|
| Virt | The "virt" column will display the mapped PSIP channel assigned in the EPG. |
| Bitrate | Bitrate is reported from the QAM. If no QAM is installed, the display will show the bitrate of the COM51 tuner output. |
| SNR | SNR is a measurement of signal quality on the satellite input for the tuned channel. SNR will display a yellow warning if signal to noise is between 7 and 10 and a red warning when less than 7. |
| Strength | Strength is a measurement of the satellite signal strength for the tuned channels in dBm. Strength read between -30 and -45dBm. |

## 10.5 SIMULTAINOUS QAM AND MULTICAST OUTPUT

The COM3000 system is capable of outputting both IP and QAM signals simultaneously. This process requires a specific multicast address range and an alternate IP address set in the QAM.

For unicast traffic, the QAM4 destination UDP port formula is "Port = QAM Channel * 16 + QAM Sub Channel". For multicast traffic, the destination UDP port should be 5000 or higher. Then the 3rd and 4th octets of the multicast address define the virtual destination port via the formula "3rd_octet * 256 + 4th_octet".

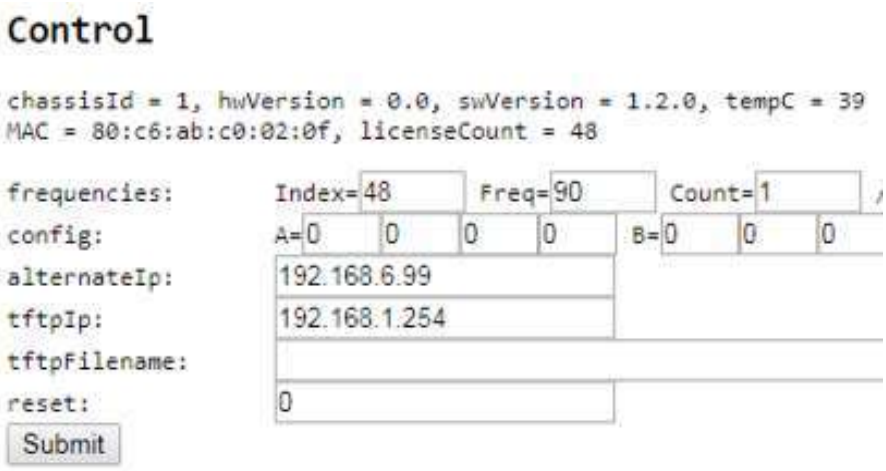
The COM3000 QAM4 has a much larger capacity, and the port designations extend beyond the limits of an IP address 4th octet.
To fully utilize the 48 QAM capacity of a QAM20 the port numbers for QAM Index 16 and above must be converted to use both the 3rd and 4th octet of the multicast IP address.

There is a formula to accomplish this:
Port # / 256 rounded down to whole number = 3rd octet
Port # - Third Octet value * 256

EXAMPLE:

| Port # | /256 = 3rd octet | Port # -third octet*256 |
|---|---|---|
| 257 | 257/256= 1.003<br>(ROUND DOWN) =1 | 257 –(256*1) = 1 |
| 257 | 1 | 1 |

Assuming you were using 239.100.X.X as your Multicast IP address range, the address for port 257 would be:
239.100.1.1.
In the Alternate IP field of the QAM20 set the alternate ip to 239.100.0.0



The table below details the 3rd and 4th octets for all QAM ports assuming 3 channels per QAM.

**QAM Port / Multicast IP Assignments**

| QAM Index | Port # | 3rd . 4th |
|---|---|---|
| 1 | 17 | 0 . 17 |
| | 18 | 0 . 18 |
| | 19 | 0 . 19 |
| 2 | 33 | 0 . 33 |
| | 34 | 0 . 34 |
| | 35 | 0 . 35 |
| 3 | 49 | 0 . 49 |
| | 50 | 0 . 50 |
| | 51 | 0 . 51 |
| 4 | 65 | 0 . 65 |
| | 66 | 0 . 66 |
| | 67 | 0 . 67 |
| 5 | 81 | 0 . 81 |
| | 82 | 0 . 82 |
| | 83 | 0 . 83 |
| 6 | 97 | 0 . 97 |
| | 98 | 0 . 98 |
| | 99 | 0 . 99 |
| 7 | 113 | 0 . 113 |
| | 114 | 0 . 114 |
| | 115 | 0 . 115 |
| 8 | 129 | 0 . 129 |
| | 130 | 0 . 130 |
| | 131 | 0 . 131 |
| 9 | 145 | 0 . 145 |
| | 146 | 0 . 146 |
| | 147 | 0 . 147 |
| 10 | 161 | 0 . 161 |
| | 162 | 0 . 162 |
| | 163 | 0 . 163 |
| 11 | 177 | 0 . 177 |
| | 178 | 0 . 178 |
| | 179 | 0 . 179 |
| 12 | 193 | 0 . 193 |
| | 194 | 0 . 194 |
| | 195 | 0 . 195 |
| 13 | 209 | 0 . 209 |
| | 210 | 0 . 210 |
| | 211 | 0 . 211 |
| 14 | 225 | 0 . 225 |
| | 226 | 0 . 226 |
| | 227 | 0 . 227 |
| 15 | 241 | 0 . 241 |
| | 242 | 0 . 242 |
| | 243 | 0 . 243 |
| 16 | 257 | 1 . 1 |
| | 258 | 1 . 2 |
| | 259 | 1 . 3 |
| 17 | 273 | 1 . 17 |
| | 274 | 1 . 18 |
| | 275 | 1 . 19 |
| 18 | 289 | 1 . 33 |
| | 290 | 1 . 34 |
| | 291 | 1 . 35 |
| 19 | 305 | 1 . 49 |
| | 306 | 1 . 50 |
| | 307 | 1 . 51 |
| 20 | 321 | 1 . 65 |
| | 322 | 1 . 66 |
| | 323 | 1 . 67 |
| 21 | 337 | 1 . 81 |
| | 338 | 1 . 82 |
| | 339 | 1 . 83 |
| 22 | 353 | 1 . 97 |
| | 354 | 1 . 98 |
| | 355 | 1 . 99 |
| 23 | 369 | 1 . 113 |
| | 370 | 1 . 114 |
| | 371 | 1 . 115 |
| 24 | 385 | 1 . 129 |
| | 386 | 1 . 130 |
| | 387 | 1 . 131 |
| 25 | 401 | 1 . 145 |
| | 402 | 1 . 146 |
| | 403 | 1 . 147 |
| 26 | 417 | 1 . 161 |
| | 418 | 1 . 162 |
| | 419 | 1 . 163 |
| 27 | 433 | 1 . 177 |
| | 434 | 1 . 178 |
| | 435 | 1 . 179 |
| 28 | 449 | 1 . 193 |
| | 450 | 1 . 194 |
| | 451 | 1 . 195 |
| 29 | 465 | 1 . 209 |
| | 466 | 1 . 210 |
| | 467 | 1 . 211 |
| 30 | 481 | 1 . 225 |
| | 482 | 1 . 226 |
| | 483 | 1 . 227 |
| 31 | 497 | 1 . 241 |
| | 498 | 1 . 242 |
| | 499 | 1 . 243 |
| 32 | 513 | 2 . 1 |
| | 514 | 2 . 2 |
| | 515 | 2 . 3 |
| 33 | 529 | 2 . 17 |
| | 530 | 2 . 18 |
| | 531 | 2 . 19 |
| 34 | 545 | 2 . 33 |
| | 546 | 2 . 34 |
| | 547 | 2 . 35 |
| 35 | 561 | 2 . 49 |
| | 562 | 2 . 50 |
| | 563 | 2 . 51 |
| 36 | 577 | 2 . 65 |
| | 578 | 2 . 66 |
| | 579 | 2 . 67 |
| 37 | 593 | 2 . 81 |
| | 594 | 2 . 82 |
| | 595 | 2 . 83 |
| 38 | 609 | 2 . 97 |
| | 610 | 2 . 98 |
| | 611 | 2 . 99 |
| 39 | 625 | 2 . 113 |
| | 626 | 2 . 114 |
| | 627 | 2 . 115 |
| 40 | 641 | 2 . 129 |
| | 642 | 2 . 130 |
| | 643 | 2 . 131 |
| 41 | 657 | 2 . 145 |
| | 658 | 2 . 146 |
| | 659 | 2 . 147 |
| 42 | 673 | 2 . 161 |
| | 674 | 2 . 162 |
| | 675 | 2 . 163 |
| 43 | 689 | 2 . 177 |
| | 690 | 2 . 178 |
| | 691 | 2 . 179 |
| 44 | 705 | 2 . 193 |
| | 706 | 2 . 194 |
| | 707 | 2 . 195 |
| 45 | 721 | 2 . 209 |
| | 722 | 2 . 210 |
| | 723 | 2 . 211 |
| 46 | 737 | 2 . 225 |
| | 738 | 2 . 226 |
| | 739 | 2 . 227 |
| 47 | 753 | 2 . 241 |
| | 754 | 2 . 242 |
| | 755 | 2 . 243 |
| 48 | 769 | 3 . 1 |
| | 770 | 3 . 2 |
| | 771 | 3 . 3 |

## 10.6 TUNE ALL TAB

Once you have completed all the channel programming a text form of the tuning information will be in the COM51 "Tune All" tab. This text field should be saved as a backup configuration.
COM51 configuration can be changed via the tune all file

The text in the tuning table requires the following format.

| Chassis-Slot-Tuner | IP_Address:Port_Number | Major_Number-Minor_Number | Security Mode |
|---|---|---|---|
| 1-1-1 | 192.168.6.2:17 | 206-65535 | -1 |

Security Mode

| | |
|---|---|
| 0 | Clear |
| 1 | Pro:Idiom |
| 3 | Transcode |

Below is a sample of a tune all file

```
Current Tuning Table
1-1-1, 192.168.6.2:17, 3-65535-1;
1-1-2, 192.168.6.2:18, 10-65535-1;
1-1-3, 192.168.6.2:19, 29-65535-1;
1-1-4, 192.168.6.2:33, 6-65535-1;
1-1-5, 192.168.6.2:34, 17-65535-1;
1-1-6, 192.168.6.2:35, 259-65535-1;
1-1-7, 192.168.6.2:39, 209-65535-1;
1-1-8, 192.168.6.2:40, 276-65535-1;
```

## 10.7 DISCOVER PAGE

Most configurations on the COM3000 system can be done via the Overview page previously discussed. However, there is redundant information in the Discover page and links to advanced edit pages for feature configurations and troubleshooting.

The COM51 card issues a discovery call for all other COM51 (and COM46) cards in the system and populates a table with basic information on current tuning parameters and RF signal levels.
Once this information is complete the Discover Web Page is displayed.


| Chassis | Slot | Tuner | QAM | Bitrate | Channel | SNR | Strength |
|---|---|---|---|---|---|---|---|
| | | 1 | QAM 23-1 | 6.5 Mbps | 202 CNNHD | 14 | -32 |
| | | 2 | QAM 23-2 | 5.1 Mbps | 206 ESPNHD | 14 | -29 |
| | | 3 | QAM 23-3 | 5.9 Mbps | 209 ESPN2HD | 14 | -30 |
| | | 4 | QAM 24-1 | 9.2 Mbps | 212 NFLHD | 12 | -29 |
| | | 5 | QAM 24-2 | 7.5 Mbps | 218 GolfHD | 14 | -30 |

**Discover Page Fields**

Chassis — This field reports a unique identifier for the chassis. In systems that contain multiple chassis, this can be used to identify each chassis in the system.

Slot — This field identifies the card's location within a chassis, numbered 1 through 6.
If this field is grey, the slot number is a link to messages in the CAM Log.

Tuner — There are twenty-three entries per card for this column. The COM51 will display 23 tuners regardless of licensed tuner count.

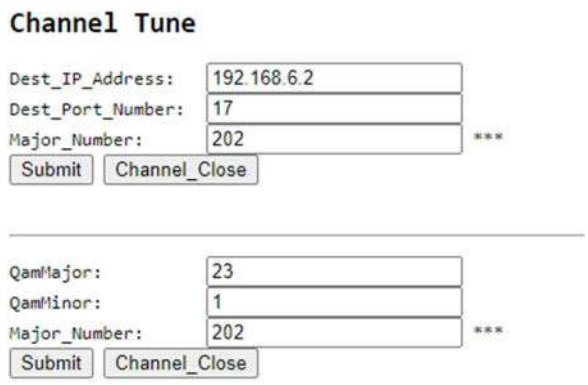
QAM/IP — If any tuner is streaming to a QAM20 / QAM4, then "QAM" is displayed as the column header else. "IP Address" will display as the column header.
If the card is sending video to a QAM20 / QAM4, this field shows a snapshot of the output QAM channel and QAM sub-channel number. If a card is streaming video to outside of the chassis, this field will contain the destination IP address. Both unicast and multicast addresses are supported.

Bitrate — If some of the programs are streaming to a QAM20 / QAM4, then "Bitrate" is displayed as the column header.
If streams are routed out of the system, then "Port" will display as the column header instead.
If the card is sending video to a QAM20 / QAM4, this field shows the instantaneous bitrate of the channels being sent out of the QAM20 / QAM4. Otherwise, this field contains the destination port

| | |
|---|---|
| | associated with the destination IP address described above. You must have a unique IP and or port number for each individual channel you wish to stream. |
| Channel | This field displays the name and the DIRECTV channel number tuned.<br>Field is also a link that permits the user to change channels.<br>If the card has not been authorized or paired, then the channel will be highlighted in red.<br>After the APG guide data has been acquired the channel's callsign will also be shown. |
| SNR | This field returns the Signal-to-Noise Ratio associated with the selected tuners.<br>SNR should be >11<br>Low SNR (7 to 11) results in a yellow highlight<br>Extremely low SNR (<7) results in a red highlight |
| Strength | Input signal measured in dBm. If the Strength is low, it will be highlighted in yellow and if the Strength is extremely low, it will be highlighted in red. Optimum signal strength -35dBm +/- 45dBm. |

**Channel Tune Screen**

The channel tune is accessed either by clicking on the tuner number from the COM51 Overview page or by clicking on the DIRECTV channel number from the Discover screen.




This page permits two different ways of tuning DIRECTV channels with Pro:Idiom encryption.

1. Specifies the destination IP address and port along with the DIRECTV channel number.
2. Allows entry of a QAM channel, sub-channel, and DIRECTV channel number. This is redundant to the channel tuning on the Overview screen.

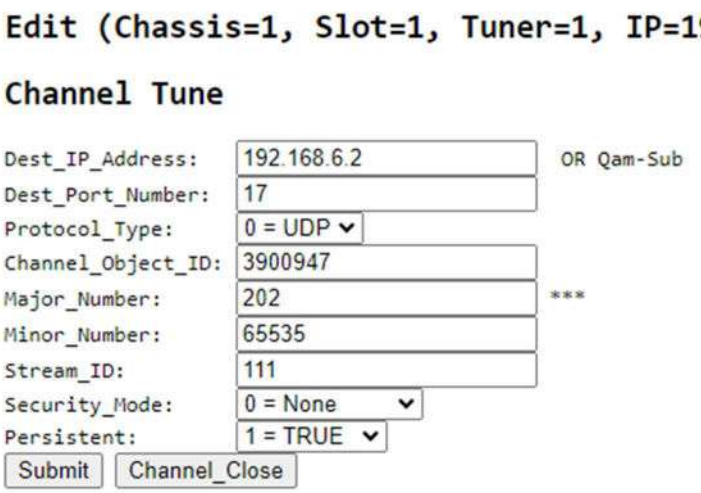
Channels entered in this screen will tune to HD programming. This can be helpful when tuning local channels not easily identified as High Definition.

## 10.8 ADVANCED EDIT

To access the Advanced Edit section, click the advanced edit hyperlink at the bottom of the Channel tune screen.
There are multiple settings and information available in this section.

Advanced Tune

The Advanced Tune page can be used to change the main tuning parameters of a channel. Additional parameters can be accessed by clicking the Advanced Edit hyperlink at the bottom of the Basic Tune screen, which navigates to the Advanced Tune screen.




Information identifying the chassis / slot / tuner and card IP address currently being addressed is displayed at the top of the page below the command links.

Chassis, Slot, Tuner — This value shows the Chassis number of the COM400, the COM400 slot and the COM51 tuner that holds the COM51 card you are currently tuning.

IP — This field shows the COM51 IP address.

Most of the configurations in the advanced edit page are redundant to settings on the Overview page of the COM51 UI. A detailed description of each advanced tuning field on the Advanced Edit page follows:

Dest_IP_Address and Port # — This field allows manual entry of the IP address of the device you wish to stream video content to (e.g., an edge QAM). COM51 will stream to any valid unicast or multicast address.

Protocol_Type — This field is used to control whether the COM51 streams the data in UDP or RTP packet structures. The default value is UDP.

Channel_Object_ID — This field is the data that COM51 uses for tuning purposes.
It will be automatically filled in when a valid DIRECTV channel number is entered into the "Major_Number" field.


Before the card has been successfully tuned, the default value is 0.

Major / Minor number

The major number is the DIRECTV channel number you tune to on a typical DIRECTV tuner. The default value is 0.


The Minor_Number field is automatically filled in by the COM51 card, with a default value of 65535.
If the DIRECTV channel has a minor channel number, then the Minor_Number value must be entered.
Many DIRECTV channels have both high-definition and standard-definition channels with the same Major and Minor numbers. COM51 will default to the high-definition channels when tuned from this field.
To set the standard-definition channels instead, add 100000 to the Minor_Number. In most cases, this would cause the Minor_Number to be 165535 if the standard-definition channel is desired.

| High-definition Minor_Number (default) | Standard-definition Minor_Number (adc |
|---|---|
| Minor_Number: 65535 | Minor_Number: 165535 |

Stream_ID

This field is optional and allows a unique identifier to be applied to every video stream produced by the COM3000 system. The allowable values for this field are any whole number between 1 and 65535. This field is to be left as default for normal operation.

Stream_ID Values

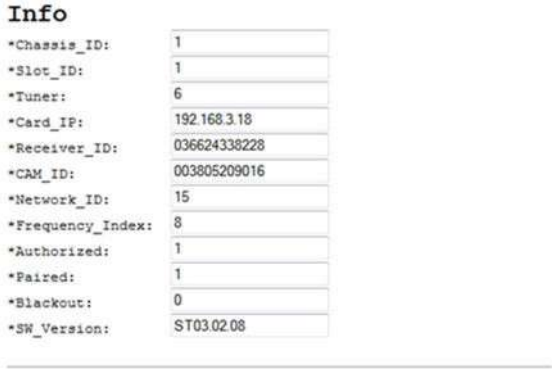
There are some special values a user can enter in the Stream_Id field which enable specific operations. If you are not sure of the functions, contact Vantiva Support.

| | |
|---|---|
| 3333 | Don't block video if no ECM received |
| 9001 | Set the program number to the channel number |
| 33002 | Choose the 2nd audio track |
| 33003 | Choose the 3rd audio track |
| 33004 | Choose the 4th audio track |
| 50009 | Don't retune if missing Marker Object for 60 seconds |
| 50055 | Don't stop video if bad Marker Object |
| 54001 | Disable secondary audio programs |

Security_Mode

Should be set from COM51 Overview tab

| | |
|---|---|
| Informational Status | The Info section, shown below provides a view of many key indicators to the operation of the COM51 card.<br>A concise index to the characteristics of each individual COM51 card according to its status and user-defined settings. |



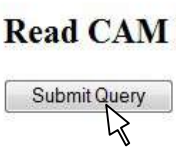

Following is a brief explanation of each field shown above:

| | |
|---|---|
| Chassis_ID | This field represents which COM400 chassis the card resides in when there are multiple chassis in the system. |
| Slot_ID | This field identifies the card's location within a chassis, numbered 1 through 6. |
| Tuner | This field identifies the tuner's location on the COM51 card (1 through 23). |
| Card_IP | Field shows the IP address of the COM51 card. |
| Receiver ID | Reports the Receiver ID, or RID. This value is the first of two parameters required to obtain authorization on the DIRECTV network. |
| CAM_ID | Reports the CAM ID. This value is the second of the two parameters required to obtain authorization on the DIRECTV network. |
| Network_ID | This field displays the DIRECTV network of the currently tuned channel. This number correlates to a specific satellite and can be used in conjunction with the Frequency Index field below to determine what satellite and transponder the tuner is using for the channel tuned |
| Frequency_Index | This field reports the frequency index as reported in the DIRECTV guide data. |

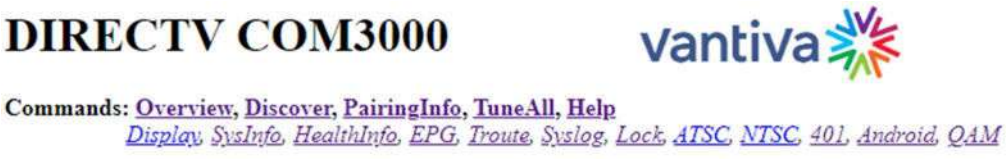
The table below details the Network ID numbers and corresponding satellite.

| Network_ ID | Satellite | Control |
|---|---|---|
| 0 | 101L | 18V DC |
| 0 | 101R | 13V DC |
| 2 | 110 | 22 kHz on |
| 3 | 119 | 22 kHz on (same cable as 110) |
| 10 | 99B(c) | DC (B-band) (s = spot beam; c = conus = |
| 11 | 99A (s) | DC (A-band) |
| 12 | 99 | Reverse Band |
| 13 | 103 | Reverse Band |
| 14 | 103A (s) | DiSEqc with 22 kHz |
| 15 | 103B (c) | 103B(c) DiSEqc with 22 kHz (enable B-band |

| | |
|---|---|
| Authorized | This field provides feedback on whether the card has been authorized within the DIRECTV network. The card needs to be paired and authorized to receive DIRECTV programming. A value of '1' means that the card has been successfully authorized; '0' means that it has not yet been authorized or has lost its authorization. |
| Paired | This field provides feedback on whether the smart card has been successfully paired with the COM51 card. The card needs to be paired and authorized to receive DIRECTV programming. A value of '1' means that the card has been successfully paired; '0' means that it has not yet been paired or has lost its pairing. |
| Blackout | This field can be used to determine whether DIRECTV has issued a blackout of the content on a channel. This is a good thing to investigate if the video suddenly stops playing on any channel, but it is particularly likely to happen with nationally televised sporting events. A value of '0' means that the channel should be functioning properly; '1' means that the programming on the selected channel is not currently available to you. TVs will display a blackout message on screen in the event of a blackout. |
| SW_Version | This field reports the software version that currently resides on the COM51 card. |
| LED Control Feature | This feature gives you the ability to assume control of the PWR LED temporarily. This can help you easily identify a specific card within a chassis if there is ever any doubt about which card you are accessing. The allowed values are:<br>0 = Off<br>1 = On<br>2 = Flashing |
| CAM Log | This section gives you the ability to read the log files generated by any COM51 card's Conditional Access Module (CAM), also known as its smart card. The messages reported here match the ones that may be seen on a normal set-top box and can be used to determine whether the card has been properly authorized and paired. |




Under normal circumstances, an authorized card will produce a short CAM log file with
0 0 0: CARD_INSERTED displayed.




If, however, there are issues with the card's authorization, you will see messages that show error codes:

```
132 4 721: 721 - Service Isn't Authorized {tunerIndex=2} [GMT=Sun Feb 25 01:49:28 201
133 0 0: Can't view [GMT=Sun Feb 25 01:49:28 2018]
134 0 0: Service not authorized [GMT=Sun Feb 25 01:49:28 2018]
135 0 0: Can't view [GMT=Sun Feb 25 01:49:28 2018]
136 0 0: Service not authorized [GMT=Sun Feb 25 01:49:28 2018]
137 0 0: Can't view [GMT=Sun Feb 25 01:53:20 2018]
138 0 0: Service not authorized [GMT=Sun Feb 25 01:53:20 2018]
139 0 0: Can't view [GMT=Sun Feb 25 01:53:20 2018]
140 0 0: Service not authorized [GMT=Sun Feb 25 01:53:20 2018]
```

The 3-digit values starting with a "7" are the DIRECTV support extension numbers associated with the error condition.

| | |
|---|---|
| Reset | This function allows you to initiate software reset on the COM51 card.<br>Activating this feature is equivalent to pushing the recessed reset button on the face of the COM51 card and has a similar effect as pressing the small reset button on a traditional set-top box. |
| File Transfer | See Pairing info |

| | |
|---|---|
| User Configuration | This section gives you the ability to customize select features of the COM51 cards to better suit your application.<br>Change IP settings the card<br>Control and configure Syslog server<br>Enter IP address of NTSC-8 and Tuner Count<br><br>Following is a brief explanation of each field shown above: |
| IP Config | This field allows for one of 3 methods of IP address assignments to be chosen.<br>0 = Default - In this mode the IP address is assigned to the card based on the chassis ID and slot the card is currently in. The formula for this address is 192.168.3.[1 + (chassis ID X 16) + slot number].<br>In the default IP mode, the Base_IP and the Gateway fields are ignored. The Subnet field is also ignored but the Subnet mask is set to 255.255.0.0 and is applied.<br><br>1 = DHCP_Persistent - In this mode all IP address information Base_IP, Subnet and Gateway are taken from the DHCP lease that the DHCP server issues to the card and is stored in non-volatile memory.<br>4 = Fixed - In this mode the user sets the Base_IP, Subnet and Gateway fields. All fields MUST be set. A Gateway MUST be defined regardless of it being there or not for this mode. Once you set the card IP you must reboot the card.<br>8 = No Change - This setting does not actually represent a separate mode, but rather acts to tell the COM51 card to continue whatever mode it is currently using. |
| Base_IP | In the Default mode this field will display the IP address of the card. In the DHCP_Persistent mode this field will display the last address stored in non-volatile memory. In the Fixed mode this field is where you would enter the IP address you wish to assign to that card. |
| Subnet | This field allows you to give a subnet mask of your choosing to the COM51 card.<br>This field is only applied in the Fixed mode. |
| Gateway | This field allows you to set a default gateway of your choosing for the COM51 card.<br>This field is only applied in the Fixed mode and must be set when using that mode. |
| Time-to-Live | Time to Live field in IP protocol header. |
| Log_IP | This field allows you to direct the COM51 card to send its log files to an external destination automatically. (See section 18 Syslog Server Setup)<br>This is especially useful for monitoring the health of the system over an extended period.<br>After entering the IP address of the destination, the log files will start being forwarded to this address after a short delay.<br>You may then run a system-logging utility like TFTP32 on the destination computer to capture this information. Once the Log IP is set you must reboot the card. |
| Log_Level | This field allows you to define the level of detail that will be captured in the resulting log files.<br>Due to the complexity of this setting, it is strongly advised that it be left blank unless someone from support has asked to change the value. |
| NTSC-8_IP | Enter the IP address of a NTSC-8 to be fed from this COM51 card. |

NTSC-8_tunercount — COM51 cards will stream 1-23 tuners to NTSC-8.
Enter the number of tuners you are using for NTSC-8s. One COM51 card will stream 23 channels and a program guide to NTCS-8. (see NTSC-8 integrators manual)

Note: Blonder Tounge NTCS devices require a dash prefix (-XX) for tuner count.

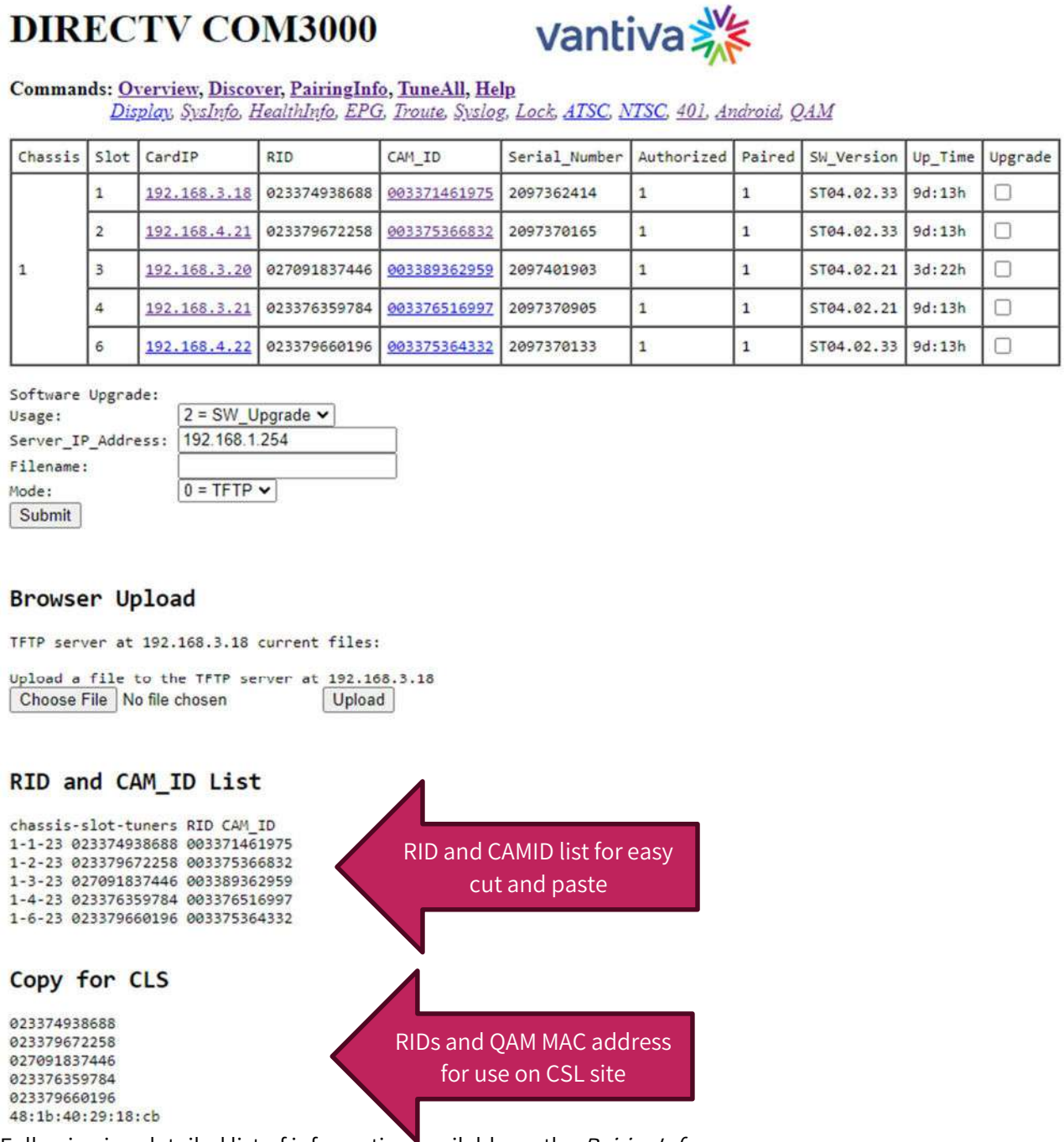
UtilConfig — This field is for development purposes only and should be left blank unless you have been asked to modify the value by someone from technical support.

Misc Get/Set — This function is used for multiple purposes. Entries are case sensitive.

| Name | Value | Description |
|---|---|---|
| siteKey | 64 bit hex | Pro:Idiom mobile key (write only value) |
| random | | Displays a random 64 bit site key |
| factoryReset | 1 | Resets COM51 to factory settings. All feature and tuner licenses are lost |
| ping | Enter IP address | Result in syslog<br>COM51 user.warn syslog: a: server=(192.168.10.2)<br>COM51 user.warn syslog: a: 192.168.10.2 is alive! |
| tunerCount | | Displays licensed tuner count |
| bitrate | 0-22 | Returns bitrate of specified tuner index |
| blackout | 0-22 | Reports blackout by tuner index |
| ccErrors | 0-22 | Reports CC errors by tuner index |
| keyIndex | | Manufacturer index for VP transcode = 1<br>Blonder Tongue = 2 |
| mms | | Mediatune MMS license count |
| updateBitrate | | UCW4026MCS Software update Mbps |
| updateCount | | UCW4026MCS software Update Iterations |
| HoursEvents | set to 1 to activate<br>0 to remove | Enables hidden fields in the EPG tab to set HoursEvents and HoursDetails |
| videoTimeout | | 255 no video signal message (blue screen) set to 250 disables screen |
| igmpQuery | 1 | Sets COM51 to be IGMP querier when Flextune is enabled. |
| Title | 1 | Adds text to the COM51 header.<br>DIRECTV COM3000 AP LAB vantiva |
| help | | Shows all available commands |

## 10.9 PAIRING INFO

By clicking the PairingInfo hyperlink at the top of any COM3000 web interface page, you can quickly evaluate the authorization status of all cards in the system.
In the example below all cards are activated and paired
This page also provides direct access to a card's internal syslog and CAM log and the ability to upgrade multiple cards.
These can be reached by clicking the hyperlinks that represent the card's IP address and CAM_ID.



DIRECTV COM3000

Commands: Overview, Discover, PairingInfo, TuneAll, Help
Display, SysInfo, HealthInfo, EPG, Troute, Syslog, Lock, ATSC, NTSC, 401, Android, QAM

| Chassis | Slot | CardIP | RID | CAM_ID | Serial_Number | Authorized | Paired | SW_Version | Up_Time | Upgrade |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 192.168.3.18 | 023374938688 | 003371461975 | 2097362414 | 1 | 1 | ST04.02.33 | 9d:13h | ☐ |
| | 2 | 192.168.4.21 | 023379672258 | 003375366832 | 2097370165 | 1 | 1 | ST04.02.33 | 9d:13h | ☐ |
| | 3 | 192.168.3.20 | 027091837446 | 003389362959 | 2097401903 | 1 | 1 | ST04.02.21 | 3d:22h | ☐ |
| | 4 | 192.168.3.21 | 023376359784 | 003376516997 | 2097370905 | 1 | 1 | ST04.02.21 | 9d:13h | ☐ |
| | 6 | 192.168.4.22 | 023379660196 | 003375364332 | 2097370133 | 1 | 1 | ST04.02.33 | 9d:13h | ☐ |

Software Upgrade:
Usage: 2 = SW_Upgrade
Server_IP_Address: 192.168.1.254
Filename:
Mode: 0 = TFTP
Submit

Browser Upload

TFTP server at 192.168.3.18 current files:

Upload a file to the TFTP server at 192.168.3.18
Choose File No file chosen Upload

RID and CAM_ID List

chassis-slot-tuners RID CAM_ID
1-1-23 023374938688 003371461975
1-2-23 023379672258 003375366832
1-3-23 027091837446 003389362959
1-4-23 023376359784 003376516997
1-6-23 023379660196 003375364332

RID and CAMID list for easy cut and paste

Copy for CLS

023374938688
023379672258
027091837446
023376359784
023379660196
48:1b:40:29:18:cb

RIDs and QAM MAC address for use on CSL site

Following is a detailed list of information available on the *PairingInfo* page.

| | |
|---|---|
| Chassis | This field reports a unique identifier for the chassis. In systems that contain multiple chassis, this can be used to identify each card in the system. |
| CardIP | This field shows the IP address of the COM51 card that resides in the chassis and slot combination to its left. If you want to know the DHCP IP address, use the URL: **http://192.168.3.18/cgi-bin/webcmd?screen=ifconfig** |
| RID | This field is also a link to see the Syslog for that card.<br>This field reports the DIRECTV Receiver ID, or RID. This value is the first of two parameters required to obtain an authorization on the DIRECTV network. |
| CAM_ID | This field reports the DIRECTV CAM ID. This value is the second parameter required to obtain authorization on the DIRECTV network.<br>You can click on the hyperlink in this column to be taken directly to that card's CAM Log (see Section 6.2.4 for more information on reading a card's CAM log). |
| Serial_Number | This field contains the unique electronic serial number of the board assigned at the time of manufacture. |
| Authorized | This field reports whether the COM51 card's CAM has been authorized.<br>A value of '1' indicates that the card has been authorized, thereby enabling the card to receive DIRECTV programming.<br>A value of '0' indicates that the card has not been authorized. |
| Paired | This field reports the pairing status of the CAM card.<br>To be capable of receiving an authorization to the DIRECTV network, the RID and CAM data must first be paired.<br>If this has not happened, then the card cannot be authorized until the pairing is resolved.<br>A value of '1' indicates that the RID and CAM are successfully paired; a value of '0' indicates that they are not. |
| SW_Version | This field reports the software version that currently resides on the COM51 card. |
| Up_Time | This field gives an indication of how much time has elapsed since the card was last rebooted or powered up. |
| Upgrade | By checking this box for a specific card, you can upgrade multiple cards at a time. |


Following is a brief description of the relevant fields on this page:

| | |
|---|---|
| Usage | This field allows you to select which type of file transfer you wish to undertake for a specific card. The available options are shown below:<br>0 = Set_Log_IP – This option allows you to identify the IP address to which you wish to send COM51 logging for monitoring by a syslog utility.<br>1= MT – Installs Mediatune.<br>2= SW_Upgrade – Installs updated COM51 software.<br>3= Log – This option allows you to copy a COM51 card's syslog to a PC.<br>4= License – This option allows you to load various software licenses to enable new modes and features in the COM51. One example might be upgrading the COM51A to HD mode or enabling other features originally locked by the manufacturer.<br>7 = KeyRenewal – This option will send a Pro:Idiom key renewal to any TV tuned to a RF channel on the card selected.<br>Note: Options 5 AND 6 are not available to users and are for development purposes only. |
| Server_IP Address | This field gives the IP address of the server from which Filename: will be uploaded. When doing a Mode 2 upgrade, this field can be the address of another COM51 card to which a SW update has already been uploaded. |
| Filename | The name of the SW update binary or license file to upload. |
| Browser Upload | To eliminate the need for a 3rd party TFTP server, COM51 acts as a TFTP server for other cards in the system.<br>The Choose File and Upload buttons are used to find and upload the desired file(s) from the browser. |

## 10.10 ELECTRONIC PROGRAM GUIDE (EPG)

For this manual, the following instructions are based on COM51 software version ST.04.02.45. The EPG tap plays multiple roles in different system configurations.

**PSIP**

The EPG can also be used to convert the DIRECTV guide information into PSIP guide information that is supported by most televisions.

PSIP permits the channel number to be remapped, and the channel name to be displayed, the current time displayed, and the current and next program titles displayed.

To generate PSIP guide information, the last two numbers for each channel must list the QAM20 / QAM4 chassis number and QAM20 / QAM4 destination port number. This information is automatically filled in when EpgLoad is clicked.It is possible to add non- DIRECTV channels to the EPG. This is done by adding an entry where instead of a DIRECTV channel number, the capital letter 'N' appears followed by the channel name, and program information separated by underscore characters.

EPG Entry Examples

| | |
|---|---|
| 3-0 202-65535-hd 1 17 | DIRECTV Ch 202 playing on QAM 1 port 17 will be mapped to channel 3-0 |
| 10-0 NLobby_The_Lobby_Channel 1 129 | External source sent to QAM4 port 129. Mapped to play on channel 10 |
| 10-0 NHotel_Hotel_Information -10 1 | External source is modulated outside of the COM system and combined into the RF network. External modulation is not recommended. Viewing programming not modulated by the COM system will result in loss of guide data from the COM system. |

| | |
|---|---|
| EPG QAM EpgLoad example. | Edited EPG with Mapped QAM channels.<br>Channel guide on QAM1:20 mapped to channel 2.<br>Externally modulated channel on 10-1 mapped to Ch 8. |
| 202-0 202-65535-hd 1 17<br>206-0 206-65535-hd 1 18<br>209-0 209-65535-hd 1 19<br>212-0 212-65535-hd 1 33<br>218-0 218-65535-hd 1 34 | 2-0 NGuide_Channel Guide 1 20<br>3-0 202-65535-hd 1 17<br>4-0 206-65535-hd 1 18<br>5-0 209-65535-hd 1 19<br>6-0 212-65535-hd 1 33<br>7-0 218-65535-hd 1 34<br>8-0 NHotel_Hotel_Information -10 1 |
| | |
| AEP boxes will receive EPG as an XML file and set up guide and channel designations. There is no way to "map" IPTV channels from EPG for non AEP devices. Programming information must be loaded onto these devices via proprietary methods. However, guide information can be displayed on a set IP stream. | |

| | |
|---|---|
| EPG IP EpgLoad example. (guide.xml for AEP system) | Edited EPG with Mapped IPTV multicast address.<br>Channel guide on 239.100.10.50:5000 mapped to channel 2. (non AEP)<br>Hotel IP stream on 239.100.10.51:5000 mapped to Ch 8<br>AEP guide.xml<br>IPTV informational only |
| 202-0 202-65535-hd 239.100.10.1 5000<br>206-0 206-65535-hd 239.100.10.2 5000<br>209-0 209-65535-hd 239.100.10.3 5000<br>212-0 212-65535-hd 239.100.10.4 5000<br>218-0 218-65535-hd 239.100.10.5 5000 | 2-0 NGuide_Channel_Guide 239.100.10.50 5000<br>3-0 202-65535-hd 239.100.10.1 5000<br>4-0 206-65535-hd 239.100.10.2 5000<br>5-0 209-65535-hd 239.100.10.3 5000<br>6-0 212-65535-hd 239.100.10.4 5000<br>7-0 218-65535-hd 239.100.10.5 5000<br>8-0 NHotel_HotelInfo 239.100.10.51 5000 |

Each channel in the EPG is comprised of a still image and it can take up to 10 seconds to produce the image for every channel being offered when the EPG is first loaded. For example, a location offering a list of 18 channels can expect to wait up to 3 minutes for a first-time EPG configuration.

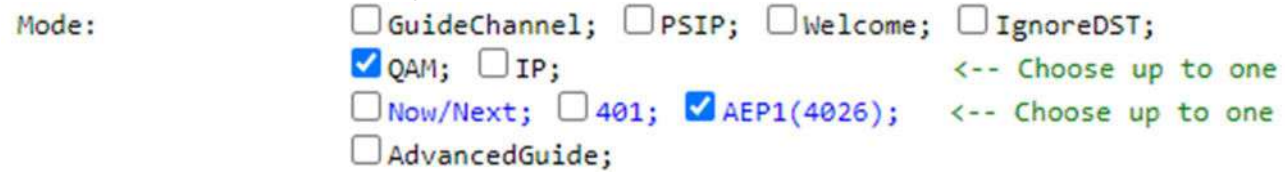
Due to the combination of the auto-scroll programming and the constant addition of new channels, you can expect the EPG to exhibit some odd behavior during the initial image creation. It may appear to skip around at random, but it can be expected to settle back into a normal operational state once it has finished generating all the necessary images.

## 10.11 EPG FOR ADVANCED ENTERTAINMENT PLATFORM (AEP)

AEP2 (UCW4060MCS) requires a different EPG configuration from AEP1 (UCW4026MCS).

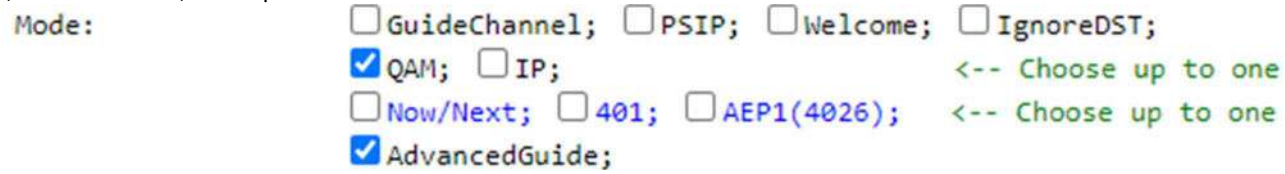
**AEP1**

On the COM5x EPG tab, checking the "AEP1 (4026);" box in the Mode field will create the required guide file for AEP1 (UCW4026MCS) set top boxes.



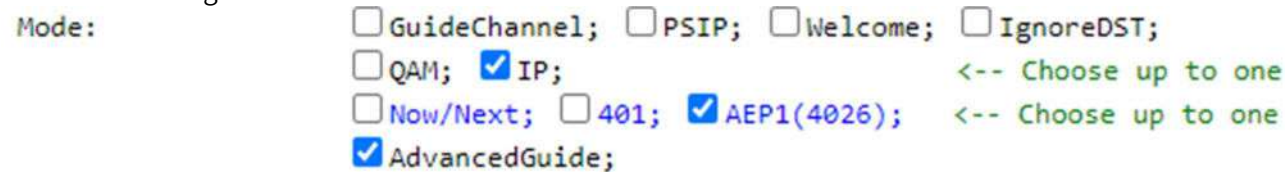

**AEP2**

Checking the "AdvancedGuide;" box in the Mode field will create the required guide file for AEP2 (UCW4060MCS) set top boxes.




**Systems with both AEP1 and AEP2**

Currently, mixing both AEP1 (UCW4026MCS) and AEP2 (UCW4060MCS) boxes in an installation is only supported on IP systems. For IP distribution, both "AEP1(4026);" and "AdvancedGuide;" may be selected on a single COM51x card.




Do not select both "AEP1(4026);" and "AdvancedGuide;" options on any combination of cards for QAM distribution! Future support for installations with QAM distribution and both AEP1 and AEP2 set top boxes is anticipated. An updated tech tip will be issued when support is available.

**Systems with both IP and QAM Distribution**

**AEP1**

For AEP1 systems utilizing both IP and QAM distribution, use one COM51 card to setup AEP1 IP EPG and a separate COM51 card to setup AEP1 QAM EPG.

On one card:

```
Mode:   [ ] GuideChannel; [ ] PSIP; [ ] Welcome; [ ] IgnoreDST;
        [ ] QAM; [x] IP;                          <-- Choose up to one
        [ ] Now/Next; [ ] 401; [x] AEP1(4026);    <-- Choose up to one
        [ ] AdvancedGuide;
```

On another card:

```
Mode:   [ ] GuideChannel; [ ] PSIP; [ ] Welcome; [ ] IgnoreDST;
        [x] QAM; [ ] IP;                          <-- Choose up to one
        [ ] Now/Next; [ ] 401; [x] AEP1(4026);    <-- Choose up to one
        [ ] AdvancedGuide;
```

**AEP2**

For AEP2 systems utilizing both IP and QAM distribution, use one COM5x card to setup AdvancedGuide IP EPG and a separate COM5x card to setup AdvancedGuide QAM EPG.

One one card:

```
Mode:   [ ] GuideChannel; [ ] PSIP; [ ] Welcome; [ ] IgnoreDST;
        [ ] QAM; [x] IP;                          <-- Choose up to one
        [ ] Now/Next; [ ] 401; [ ] AEP1(4026);    <-- Choose up to one
        [x] AdvancedGuide;
```

On another card:

```
Mode:   [ ] GuideChannel; [ ] PSIP; [ ] Welcome; [ ] IgnoreDST;
        [x] QAM; [ ] IP;                          <-- Choose up to one
        [ ] Now/Next; [ ] 401; [ ] AEP1(4026);    <-- Choose up to one
        [x] AdvancedGuide;
```

Mixing both AEP1 and AEP2 in systems with both IP and QAM distribution is not currently supported. Future support for this scenario is anticipated. An updated tech tip will be issued when support is available.

## 10.12AUTOTUNE SCHEDULER

**Overview**

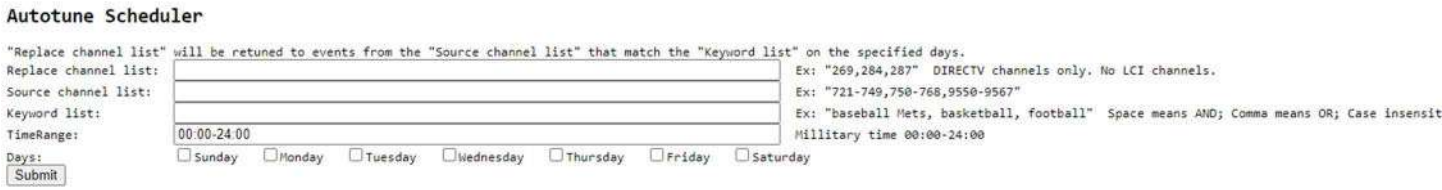
COM51 software version ST04.02.33 provides a more flexible Autotune Scheduler service which automatically tunes set programming channels to event channels based on specified search criteria.

The scheduler will search for event programming based on the following criteria:

| | |
|---|---|
| Program Categories | Program Titles |
| Day of week | Time of day |
| DIRECTV program channel | |

**Scheduler Setup**

Best practice is to run Autotune Scheduler on the first COM51.
Do not run Autotune on multiple COM51 cards.
Once Autotune is set up, make programming changes while logged into the COM51 running Autotune.
If channels in the replace channel list are changed, be sure to update the Autotune Scheduler.
Verify COM51 is running software version 04.02.33 or later.
Verify customer account is active for channels to be autotuned.
The DIRECTV document "**2023 Sports Offerings for DIRECTV for BUSINESS Customers**" provides the source channel list needed for different sports packages.
Navigate to the EPG tab, at the bottom of the page you will find the Autotune Scheduler section as shown below:



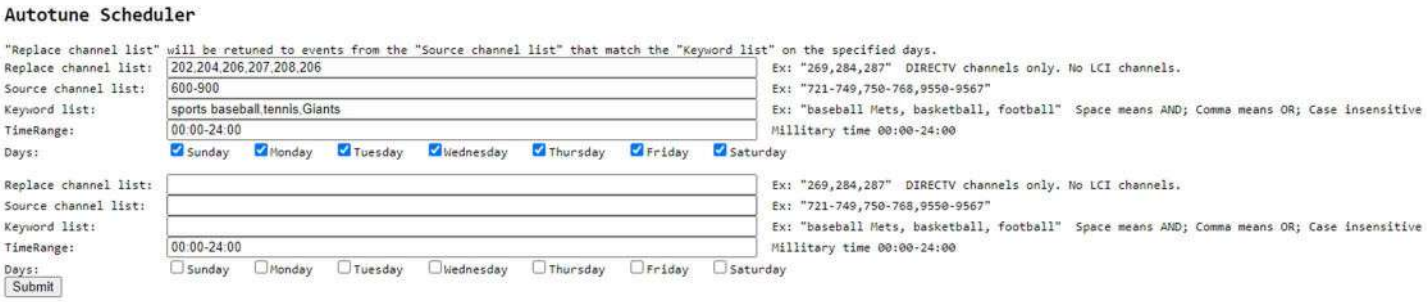

**Scheduler Fields**

| | |
|---|---|
| Replace channel List | Input DIRECTV channel numbers for the channels to be replaced by autotuned programing.<br>Channel must be currently tuned on a COM51 tuner.<br>Must be a DIRECTV channel, LCI channels will not work.<br>The first matching program found will tune to the first available channel listed in the, "Replace channel list:".<br>This may be set to a single channel or multiple channels (separated by commas)<br>Each group will support up to 20 "replace channel" selections. |
| Source Channel list | These channels are searched once a minute for keyword matches. This may be set to a single channel or a channel range. |

| | |
|---|---|
| Keyword list | Search criteria is based on APG guide data programming titles and categories.<br>Search criteria with multiple keywords can be set to "AND" or "OR"<br>Keywords separated by a space request an "AND" search.<br>"Baseball Cubs" searches for programming tagged as Baseball and Cubs<br><br>Keywords separated by a comma requests an "OR" search.<br>"Baseball, Cubs" searches for programming tagged as Baseball or Cubs<br><br>Keyword search can be both "AND" and "OR".<br>"Baseball Cubs, Baseball Mets, Football" searches for ("Baseball" AND "Cubs") OR ("Baseball" AND "Mets") OR ("Football")<br><br>Categories are listed later in this document.<br><br>The keywords are not case sensitive. |
| TimeRange | Select time to run search in local military time 00:00 – 24:00.<br>Outside of the TimeRange, channels will be restored.<br>Time range must extend through the end of the scheduled programming.<br>Recommend not modifying this field unless necessary. |
| Days | Select days to conduct search. |

**Multiple Scheduling Instances**

COM 51 can schedule up to 10 processing instances.
When one instance is submitted a second blank will open. If an additional instance is not needed, leave the last one blank.




**Retune**

Programming will tune back to the originally set channel if a low bitrate is seen for five minutes on the event channel, or 30 minutes after the event ends.
Auto-tuning to an unauthorized channel will be detected after five minutes of low bitrate.

EPG / Guide.XML channel and programming information will remain set to the original channel and will not display the scheduled programming information.

**Recommended Practice**

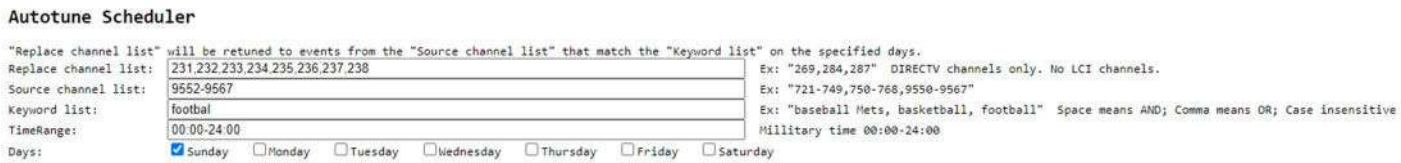
There are two different modes to use the Autotune Scheduler:
Set the list once at the beginning of the season. Use broad keywords like "baseball" or "football". Set a schedule to tighten filtering. This is an effective way to see all the sports programming from a special DIRECTV sports package.

Use tight filtering like "baseball Mets" or "baseball Reds". This may be needed if the source channel list includes "baseball programming" that you don't want.

It is important to note the wide searches such a "baseball" may cause a channel to change and not change back if "baseball" programing is playing within the search criteria. Try to be as specific as possible. If a wide keyword is used a smaller Source channel should be used.

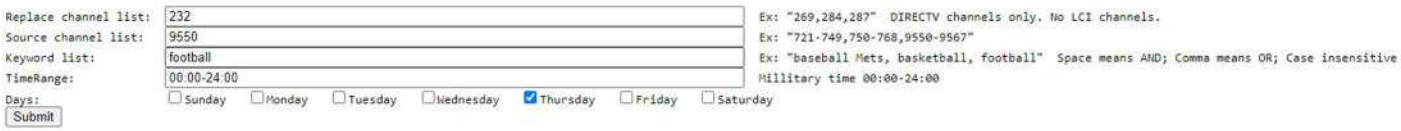
**Programming Examples**


Replace channels 231,232,233,234,235,236,237,238 with NFL Sunday Ticket games on channels 9552-9567.




Note: No time frame is used. This allows games to play until completed and a low bitrate logo appears.


Replace the Cooking Channel (232) with Thursday Night Football (9550).



Shortcuts

The table below contains settings for popular scheduled programming:

| | |
|---|---|
| For "NFL SUNDAY TICKET":<br>Source channel list: "9552-9567"<br>Keyword list: "football"<br>Days: "Sunday" | For "NFL REDZONE":<br>Source channel list: "9551" OR "9551-9567"<br>Keyword list: "football"<br>Days: "Sunday" |
| For "Thursday Night Football":<br>Source channel list: "9550" OR "9550-9567" OR "9550,9552-9567"<br>Keyword list: "football"<br>Days: "Thursday" OR "Thursday and Sunday" | For "NFL NETWORK":<br>Source channel list: "212" OR "212,9550-9567"<br>Keyword list: "football"<br>Days: "All" |
| For "All Football"<br>Source channel list: "212,9550-9567"<br>Keyword list: "football"<br>Days: "All" | For "NBA LEAGUE PASS":<br>Source channel list: "750-768"<br>Keyword list: "basketball"<br>Days: "All" |
| For "MLB":<br>Source list: "721-749"<br>Keyword list: "baseball"<br>Days: "All" | For "All Sports":<br>Source list: "721-749,750-768,212,9550-9567"<br>Keyword list: "baseball, basketball, football"<br>Days: "All" |

# 11 DISTRIBUTION NETWORKS

## 11.1 RF NETWORKS

RF networks need to pass digital signal tests per industry standards. Care should be taken to inspect the system for old crimp style connectors, inferior quality amplifiers, taps and splitters. Wall plate splices and TV jumpers should also be inspected and replaced, as necessary.
Signal levels should be within industry specifications. 0-5dBmV (+/-3dBmV) with >38dB Modulation Error Rate (MER) at the TV.
If you are not experienced with digital RF networks it is recommended you contract a qualified RF system technician to design, install, and troubleshoot the RF plant.

**RF Channel Lineup**

Determine in advance what networks the customer will require on the system and the channel assignments for each.
Assign RF carriers to each network. If possible, start RF channel lineup at Ch. 23 or higher (super-band). This will eliminate possible signal ingress into the RF plant from VHF broadcast signals and keep the property signal out of the aeronautical frequencies in the 126 – 134 MHz range.
The COM3000 can modulate up to three DIRECTV high-definition programs on one 6MHz QAM carrier.
Do not combine higher bandwidth local, sports, and premium channels on the same QAM carrier.
In some markets local channels may exceed 18 Mbps.
It is a recommended best practice to monitor channels for peak bandwidths and not to exceed an average bit rate greater than 35mbps per QAM channel.

## 11.2 IP NETWORKS

IP Networks need to utilize multicast address schemes.
Switches must be enabled for IGMP (Internet Group Management Protocol).
Network Cabling must be installed in accordance with industry standards.
The COM 400 has an internal layer two switch. This switch is for the internal network connecting multiple COM5X cards across the backplane and is not intended to be utilized as a network switch.

**IP Channel Lineup**

Each Tuner / Channel in an IP system must be assigned a multicast IP address.
Multicast address start with 224.– 239. as the first octet of the IP address.

**XXX.0.0.XXX and XXX.128.0.XXX carry multicast control packets and should never be used.**

# 12 EXTERNAL VIDEO SOURCES

The COM3000 can modulate video sources from multiple sources.
Each source needs to be an MPEG2 single program transport IP stream and will require a QAM output carrier assignment.
Care should be taken in combining multiple digital video sources. In some cases, placing non-Pro:Idiom programing adjacent to Pro:Idiom programming in the channel ring could cause Pro:Idiom key loss due to Packet Identifier (PID) overlap.

# 13 MPEG 4 TO MPEG 2 TRANSCODER

The Vantiva COM3000 system outputs MPEG4 content on an MPEG2 transport stream containing the original encoded video stream as available from DIRECTV.
High-definition programming is MPEG4 (H.264) with AC3 audio.
High-definition programming includes Pro:Idiom encryption unless otherwise authorized by DIRECTV and properly licensed for operation.
All end points on the property must be capable of receiving and decrypting MPEG4, Pro:Idiom encrypted signal.
DIRECTV approved transcoders are available to transcode native MPEG4 signal to MPEG2.
Use of transcoders requires DIRECTV approval and COM51 licensing.

DIRECTV has approved the use of the following MPEG2 transcoders. These devices receive encrypted HD programming from the COM system over IP, transcode the signal and send it back to the QAM.

- Video Propulsion
- Blonder-Tongue

The transcoders may output standard definition digital signal or MPEG2 HD streams.

A license key for transcoding will be required. This feature license file is available from your Vantiva distributor at no charge but requires DIRECTV approval.

NOTE: For accurate bit rates to display Blonder Tongue Transcoders should use port assignments starting at 20070.

# 14 RECEIVERLESS HD+

Under certain environments DIRECTV will allow HD programming to be broadcast without Pro:Idiom encryption. If approved by DIRECTV the distributor will work with Vantiva to license the COM51 cards to provide clear, unencrypted signal.

# 15 LEGACY EQUIPMENT

**COM51A**

COM51A is a specially configured COM51 card which works only with the Vantiva NTSC-8 analog modulator.
It will not stream IP video to a QAM or ethernet port.
Only the NTSC-8 will receive video data from a COM51A.
A COM51A is software upgradable to a standard COM51.
Note: When a COM51A is upgraded a COM51, any COM51A tuner licenses will be converted to COM51 tuner licenses (which requires tokens)

**DCI401MCS**

DCI401MCS is a setback box designed to accept Pro:Idiom encrypted QAM channels and output to a TV via HDMI. Documentation for this product is available on the Vantiva website.

# 16 DEFINITIONS

| Term | Definition |
|---|---|
| Admin PC | A PC is required for initial setup and configuration. It is highly recommended to set up remote access to the COM3000 system for monitoring and maintenance post installation.<br>This can be accomplished via several methods:<br>A PC on site, connected to the internet running TeamViewer or a similar remote desktop program. PC will need to be on the same IP subnet as the COM3000 system.<br>VPN router set up for remote access via a Virtual Private Network |
| ATSC | Advanced Television Systems Committee. An international organization developing voluntary standards for digital television. Typically used to describe terrestrial off-air broadcast TV standards. ATSC Tuner describes a TV capable of receiving digital off-air broadcasts.<br>**http://atsc.org/** |
| ATSC-8 | This is a device previously provided by Vantiva to provide ATSC off air television signals to the COM3000. It is configured and controlled through the COM3000 web interface. Depending on configuration it can deliver 8 program channels or 8 complete ATSC8 broadcasts including all sub channels in the carrier. |
| COM3000 | This describes the Vantiva system consisting of a COM400 / 421 chassis, COM51 or cards and QAM20 / QAM4 modulators. Replaced previous product COM2000. |
| COM51 Receiver Card | Receiver cards for the COM3000 system. Replaced previous product version COM46 / Com46A. The COM51D has all 23 video tuners enabled by default. |
| COM400 Chassis | This device houses the COM51 and QAM20 / QAM4 components in a COM3000 system. All video traffic is routed through the two 10 Gigabit and two 1 Gigabit Ethernet (GbE) ports on the front of the chassis and to the QAM20 / QAM4 slots. System management and control can be done by connecting a computer to any of the ethernet ports on the front panel. Replaced previous product version COM360. |
| COM421 Chassis | This device houses 2 COM51s and a QAM. It is intended for smaller installations |
| QAM20 / QAM4 | A circuit board that is installed in the COM400 / 421 Chassis. It converts the COM51's IP-packetized streams to QAM-modulated RF for distribution throughout a property. The board provides up to 16 QAM carriers and is software upgradeable in groups of two QAMS for a maximum of 48 QAM carriers. |
| SWQAM2 | The SWQAM2 is a software key that will enable 2 QAM channels per key on a QAM20 / QAM4 card. By purchasing 3 SWQAM2 keys a QAM20 / QAM4 can be expanded to 12 QAM channels. |
| DSWiM 30 | DIRECTV SWM. One DSWiM 30 will provide signal to a COM51 card when tuning more than 8 channels. |

| | |
|---|---|
| EAS | Emergency Alert Systems can be interfaced with the COM3000 to stream emergency notifications to all QAM channels. A local message can be created and played via a PC and VLC or a ZyCast Media Server. https://www.fcc.gov/encyclopedia/emergency-alert-system-eas |
| Edge QAM | In a typical installation, the COM51 cards will be configured to stream to a QAM20 / QAM4 modulator. |
| GIGe | Gigabit Ethernet High speed Ethernet standard for transmitting data at one gigabit per second. All switches in the GIGe (video) network must be rated to pass this level of traffic. |
| IGMP | Internet Group Management Protocol. Used by Ethernet Switches and end devices to manage multicast video on IP networks. |
| HD | High Definition |
| Hot-swappable | The unit or device this term describes may be added to, removed from, or replaced within the system it is a part of without powering anything down. |
| MPEG | Moving Pictures Experts Group - A working group of ISO/IEC with the mission to develop standards for coded representation of digital audio and video and related data. Most commercial and some residential TVs support MPEG4 standards. All DIRECTV HD signals are MPEG4 contained in an MPEG2 transport stream. Many residential and some older commercial TVs will only support MPEG2 signals. http://mpeg.chiariglione.org/ |
| PC/VLC | The COM3000 can accept streaming video from a networked PC running VLC, an open-source video software. http://www.videolan.org/vlc/index.html |
| PID | Packet Identification A 13-bit field in the header of every 188-byte MPEG2 transport packet. |
| Pro:Idiom | Pro:Idiom is an industry accepted digital rights management encryption technology for video signals broadcast in commercial establishments such as hotels, dormitories, and hospitals. All major programmers have accepted Pro:Idiom as an encryption method to secure programming. Only televisions or set-back boxes with built in Pro:Idiom encryption system decoders will be able to decrypt the signal. http://www.zenith.com/wp-content/uploads/2013/05/ProIdiom_Overview_2010-10-08.pdf |
| Pro:Idiom Mobile | A version of Pro:Idiom which is software based and can be decrypted using an approved and licenses software player. |
| Property Distribution Network | This network, set up and maintained by the system operator or property owner, distributes television signals via RF or IP technology. Traditional analog RF plants often need repairs and upgrades before they pass digital HD programming. RF levels and signal to noise ratios (Modulation Error Rate) should be tested to industry standards. IP |

| | |
|---|---|
| | systems require technicians proficient in IP switch configurations, specifically multicast networks utilizing Internet Group Management Protocols (IGMP). |
| PSIP | Program and System Information Protocol. Signals included in a digital TV signal define the display channel. For example, an off-air channel may be broadcast on UHF Ch 38, but the station call letters are Ch 7. PSIP data instructs the TV to display a virtual channel 7 on the TV rather than the physical channel 38. PSIP data also includes current and future programming information. **http://www.atscforum.org/** |
| Satellite Distribution Network | This network consists of the dish, LNB and associated equipment necessary to provide KA/KU band satellite signals to the COM3000. The COM3000 requires a SWiM signal to each card proportional to the number of tuners desired. It is assumed that installation technicians have adequate expertise and proper test equipment required to install the distribution system to DIRECTV specifications. |
| SD | Standard Definition |
| SWiM Switch | Single Wire Multi-Switch – An DIRECTV module used for the distribution of satellite signals. |
| SWQAM2 | The SWQAM2 is a software key that will add 2 QAM channels per key on a QAM20 / QAM4. |
| System Integrator | The person or company that performs the onsite installation. |
| System Operator | The company or organization that typically holds the "right of entry" and is responsible for installation and all onsite support on a daily basis. |
| Transcryption | The process by which the COM3000 system converts content streaming from DirecTV 's conditional access system to Pro:Idiom encrypted video. |