

# COM3000 TROUBLESHOOTING MANUAL

COM400/COM421/COM51/COM50/QAM4



## TABLE OF CONTENTS

<b>1</b>	<b>Introduction .....</b>	<b>4</b>
<b>2</b>	<b>Basic Troubleshooting steps .....</b>	<b>4</b>
2.1	Satellite Signal Input .....	4
2.2	Activation.....	5
2.3	System Software Versions.....	6
2.4	COM51 Licensing.....	7
2.5	Tuner / Setup Issues .....	8
2.6	Reboot.....	8
2.7	COM51 reset button.....	8
<b>3</b>	<b>COM51 Syslog.....</b>	<b>9</b>
3.1	Software Updates .....	9
3.2	Activation Issues .....	10
3.3	Signal Issues .....	10
3.4	Syslog Server Setup.....	11
<b>4</b>	<b>Troubleshooting Specific Scenarios .....</b>	<b>14</b>
4.1	COM51 Card not Visible in Chassis .....	14
4.2	Reset COM400 PORTS.....	14
4.3	COM51 Card Discovery Issues .....	15
4.4	IPTV Debugging Tips.....	15
4.5	QAM Output Strength / Quality.....	16
4.6	QAM Log.....	16
<b>5</b>	<b>Preventing Pro:Idiom Key Loss.....</b>	<b>17</b>
<b>6</b>	<b>Transcoder Operations .....</b>	<b>17</b>
6.1	SD Analog Transcoders .....	17
6.2	MPEG4 to MPEG2 Transcoders .....	17
<b>7</b>	<b>Receiverless HD.....</b>	<b>18</b>
<b>8</b>	<b>Legacy Equipment.....</b>	<b>18</b>
<b>9</b>	<b>Definitions .....</b>	<b>19</b>

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# 1 INTRODUCTION

This document is intended as a job aid for troubleshooting Vantiva COM3000 systems. It is assumed that the reader has experience with COM systems and understands the operations of COM equipment.

## 2 BASIC TROUBLESHOOTING STEPS

Troubleshooting is most often an exercise in the process of elimination. Regardless of the symptoms the basics should always be checked before proceeding to more complicated procedures.

Let us review some of the most basic, and most common causes of problems.

### 2.1 SATELLITE SIGNAL INPUT

Before troubleshooting the COM3000 verify satellite signal at the COM51 input signal passes EIV+ check on the DIRECTV AIM meter. Remove the cable from the COM51 input and test the signal quality that is going into the COM51. Do not assume that because the signal passes test at the LNB or ground block that it is good at the COM51 input.

The COM51 Overview page will also report Signal to Noise (SNR) and Signal strength for the channel tuned.

Tuner	Security	Channel	Mode	Major.Minor / IP:Port	Virt	Bitrate	SNR	Strength
1	Pro:Idiom	4 WTTV	QAM	23 . 1	2-0	5.9 Mbps	15	-27
2	Pro:Idiom	6 WRTV	QAM	23 . 2	4-0	4.7 Mbps	15	-28
3	Pro:Idiom	8 WISH	QAM	23 . 3	9-0	5.4 Mbps	15	-28
4	Pro:Idiom	13 WTHR	QAM	24 . 1	12-0	7.7 Mbps	15	-27
5	Pro:Idiom	23 WNDY	QAM	24 . 2	14-0	6.5 Mbps	15	-28
6	Pro:Idiom	30 WTIU	QAM	24 . 3	NA	5.4 Mbps	15	-27
7	Pro:Idiom	59 WXIN	QAM	25 . 1	NA	3.2 Mbps	15	-27
8	Pro:Idiom	202 CNNHD	QAM	25 . 2	NA	4.5 Mbps	12	-27

SNR should always report >10. SNR between 8-10 are highlighted as a yellow warning that there is a potential problem. SNR < 8 are highlighted in red, indication that the channel is not working.

When properly attenuated the signal strength should report between -30 and -40 dBm.

## 2.2 ACTIVATION

Verify all channels are activated, and the account is in good standing with DIRECTV. The activation status of channels can be checked via two methods from the COM51 interface.

CAM log is accessible from the COM51 Pairing info page by clicking on the CAM\_ID hyperlink. Remember that CAMLOG and SYSLOG information displays only for the COM51 card you are logged into. Using the hyperlinks in the Pairing Info tab logs you into each individual COM51 card.

### DIRECTV COM3000



Commands: [Overview](#), [Discover](#), [PairingInfo](#), [TuneAll](#), [Help](#)

[Display](#), [SysInfo](#), [HealthInfo](#), [EPG](#), [Troute](#), [Syslog](#), [Lock](#), [ATSC](#), [NTSC](#), [40L](#), [Android](#), [QAM](#)

Chassis	Slot	CardIP	RID	CAM_ID	Serial_Number	Authorized	Paired	SW_Version	Up_Time	Upgrade
		<a href="#">192.168.3.18</a>	023374938688	<a href="#">003371461975</a>			1	ST04.02.33	0d:5h	<input type="checkbox"/>
		<a href="#">192.168.4.21</a>	023379672258	<a href="#">003375366832</a>			1	ST04.02.33	0d:5h	<input type="checkbox"/>

SYS LOG

CAM LOG

The expected response is shown below:

```
CAM log from 192.168.3.18: Refresh Clear\_CAM\_Log
```

```
0 0 0: CARD_INSERTED
```

```
Done.
```

```
To convert GMT to local time subtract timezone offset:
Pacific=8; Mountain=7; Central=6; Eastern=5
Add an hour if daylight savings time is in effect.
```

Unauthorized channels are tuned to the COM51 result in a 7XX error code:

```
CAM log from 192.168.3.18: Refresh Clear\_CAM\_Log
```

```
0 0 0: CARD_INSERTED
```

```
1 0 0: Can't view [GMT=Tue Jan 2 21:40:11 2024]
```

```
2 4 721: 721 - Service Isn't Authorized {tunerIndex=0} [GMT=Tue Jan 2 21:40:11 2024]
```

```
3 0 0: Service not authorized [GMT=Tue Jan 2 21:40:11 2024]
```

The COM51 Syslog will also provide details on unauthorized channels. Syslog can be accessed by clicking the SYSLOG tab or clicking on the CARD IP address in the SYSINFO tab.

Conditional Access problem as shown below:

```
Jan 2 16:42:52 COM51 user.err syslog: a: No packets(0,161)
```

```
Jan 2 16:42:57 COM51 user.warn syslog: a: _STREAM_Process(): Conditional Access problem!
```

Jan 2 16:43:02 COM51 user.warn syslog: a: \_STREAM\_Process(): Conditional Access problem!

Jan 2 16:43:03 COM51 user.err syslog: a: No packets(0, 171)

In addition to the Conditional Access message the syslog will report the tuner that is attempting to play unauthorized content. The numbers in parentheses below indicate the tuner number and a counter. Tuner count is zero based, however the tuners are shown in the Overview and Discover screens starting with 1. The entry below indicates tuner 1 is tuned to an unauthorized channel.

No packets(0, 171)

HD/SD Authorizations

DIRECTV has authorization codes for programming, and separate codes for high definition. If a program plays in SD but not HD it is possible that the HD codes are not properly activated on the account.

## 2.3 SYSTEM SOFTWARE VERSIONS

Before troubleshooting verify all components of the COM3000 are running current software. Software version displays are shown below:

### COM51 Pairing Info Page

## 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	<a href="#">192.168.3.18</a>	023374938688	<a href="#">003371461975</a>	2097362414	1	1	ST04.02.33	0d:6h	<input type="checkbox"/>
	2	<a href="#">192.168.4.21</a>	023379672258	<a href="#">003375366832</a>	2097370165	1	1	ST04.02.33	0d:6h	<input type="checkbox"/>

### QAM TAB

## Control

```
chassisId = 1, hwVersion = 3.1, swVersion = 1.4.24, tempC = 53
MAC = 48:1b:40:57:bb:6a, licenseCount = 48
```

## COM400

<b>Maintenance</b> <ul style="list-style-type: none"> <li>▪ Restart Device</li> <li>▪ Factory Defaults</li> <li>▼ <b>Software</b> <ul style="list-style-type: none"> <li>▪ Upload</li> <li>▪ Image Select</li> </ul> </li> </ul>	<h3>Software Image Selection</h3> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #ADD8E6;"> <th colspan="2"></th> <th style="text-align: right;">Active Image</th> </tr> </thead> <tbody> <tr> <td style="background-color: #ADD8E6;"><b>Image</b></td> <td style="background-color: #ADD8E6;">COM400_ST01.00.02.bin</td> <td></td> </tr> <tr> <td style="background-color: #ADD8E6;"><b>Version</b></td> <td colspan="2">WebStaXdev-build by mukul.b@skymexico 2019-09-27T17:03:50+05:30 Config:web_sparx</td> </tr> <tr> <td style="background-color: #ADD8E6;"><b>Date</b></td> <td colspan="2">2019-09-27T17:03:50+05:30</td> </tr> </tbody> </table>			Active Image	<b>Image</b>	COM400_ST01.00.02.bin		<b>Version</b>	WebStaXdev-build by mukul.b@skymexico 2019-09-27T17:03:50+05:30 Config:web_sparx		<b>Date</b>	2019-09-27T17:03:50+05:30	
		Active Image											
<b>Image</b>	COM400_ST01.00.02.bin												
<b>Version</b>	WebStaXdev-build by mukul.b@skymexico 2019-09-27T17:03:50+05:30 Config:web_sparx												
<b>Date</b>	2019-09-27T17:03:50+05:30												

Software can be from the Vantiva website or acquired from your distributor.

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

Instructions for updating software can be found in the COM3000 Integrator’s Installation Manual.

## 2.4 COM51 LICENSING

Verify the COM51 is licensed for the services being delivered in the SYSINFO tab of the COM51.

Clear HD = RLHD+

IP = No QAM in chassis

MT= Mediatune

Transcode = Transcode Security enabled

- Key Index 1 = Video Propulsion
- Key Index 2 = Blonder Tongue

Contact your distributor for support.

**Commands:** [Overview](#), [Discover](#), [PairingInfo](#), [TuneAll](#), [Help](#)  
[Display](#), [SysInfo](#), [HealthInfo](#), [EPG](#), [Troute](#), [Syslog](#), [Lock](#), [ATSC](#), [NTSC](#), [401](#), [Android](#), [QAM](#)

Chassis	Slot	CardIP	EPG	MAC_Address	Tuners	Features
1	1	192.168.3.18		b4:2a:0e:5a:40:44	23/23	ClearHD MT IP HD StreamOut ClearGuide Monitored mms=35
1	2	192.168.4.21		60:3d:26:9f:3b:2a	23/23	ClearHD MT IP HD Transcode StreamOut ClearGuide Monitored mms=35 keyIndex=2

Tuner Licensing (Pre COM51D)

Tuner column = licensed tuners/SWiM channels present



## 2.5 TUNER / SETUP ISSUES

Verify there are no tuners with duplicated destinations (QAM or Multicast)

Verify there is not a duplicated EPG running another COM card. This can cause the guide not to play as well as PSIP problems.

External encoders may introduce secondary PSIP information and overlap in RF or IP settings.

When troubleshooting disconnect all external sources.

Verify COM system performance.

Reconnect one device at a time verifying performance after each device is connected.

## 2.6 REBOOT

On rare occasions a system will malfunction due to a glitch in operational software. This can be caused by electrical conditions such as a power surge. If you have verified all the steps above a power down / power up may clear the problem. There is nothing wrong with powering down the system, waiting a couple of minutes and reapplying power.

## 2.7 COM51 RESET BUTTON

Shown below is the COM51 reset button, accessed via a small hole in the front of the card below the DIRECTV logo.



The button serves three purposes:

1. Momentarily depressing the button results in a COM51 reset, like a power cycle or a software reset.
2. Depressing the reset button for 30 seconds will result in a factory reset.
  - All settings will revert to factory defaults.
  - IP address will revert to default for chassis / slot.
  - License files will revert to HD + Streamout.
3. Holding the reset button for 60 seconds will result in a factory reset and force a recovery to download an image from an external TFTP server. Server must run on a PC with an IP of 192.168.1.254. File should be the latest COM51 software with the filename changed to "COM51.bin". Contact your distributor or Vantiva support before proceeding.



### 3 COM51 SYSLOG

The system log file for the COM3000 system records messages related to the performance of the card. Much of the data in the logs is not relevant to basic troubleshooting.

To guide a system operator through the log entry interpretation Vantiva has changed key log entry errors to red font.

If you are experiencing problems with the COM3000 system a quick check of the SYSLOG can alert you to problems. Contact your distributor or Vantiva support for further assistance.

The information shown below is the result of clicking the Syslog hyperlink at the top of any COM3000 web interface page.

Note that the syslog will only show the last 500 lines of messages from the card you are currently logged into.

This is an example of a normal syslog. There are two programs tuned on this COM51, the syslog reports MOcount for two tuners and 0 for the tuners with no programming

### COM3000



Commands: [Overview](#), [Discover](#), [PairingInfo](#), [TuneAll](#), [Help](#)  
[Display](#), [SysInfo](#), [HealthInfo](#), [EPG](#), [Troute](#), [Mt](#), [Syslog](#), [Lock](#), [ATSC](#), [NTSC](#), [40I](#), [Android](#), [QAM](#)

```

Syslog:
Mar  8 02:41:12 COM51 user.notice syslog: a: MOcount(13866,13864,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0)
Mar  8 02:42:13 COM51 user.notice syslog: a: MOcount(13866,13864,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0)
Mar  8 02:43:14 COM51 user.notice syslog: a: MOcount(13866,13864,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0)
Mar  8 02:44:16 COM51 user.notice syslog: a: MOcount(13866,13864,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0)
Mar  8 02:45:17 COM51 user.notice syslog: a: MOcount(13866,13864,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0)
Mar  8 02:46:18 COM51 user.notice syslog: a: MOcount(13866,13864,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0)
Mar  8 02:47:19 COM51 user.notice syslog: a: MOcount(13866,13864,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0)
Mar  8 02:48:20 COM51 user.notice syslog: a: MOcount(13866,13864,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0)

```

#### 3.1 SOFTWARE UPDATES

This entry show the COM51 reached out for a software update. The COM51 was running current software, and no update was done. (Automatic SW updates are active only on COM51 running AEP.) DIRECTV controls remote SW updates.

```

Checking for SW update (https://comrest.com.dtvcommce.com/api/tchcom/v2/com/update?rid=027091837446&sw=ST04.02.45&code=1,
checkCount=11605
SW Upgrade Reply=(updateRid=NONE )
no update

```

## 3.2 ACTIVATION ISSUES

Entry below shows an activation problem. The 722 tells us the card activation has expired.

```
v: <<<<<<<<<<<<<<<<< 722 - Service Expired >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
v: <<<<<<<<<<<<<<<<< Can't view >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
: SoapServiceEventMessageAdd: num[10] ext[722] text[722 - Service Expired {tunerIndex=0} [GMT=Fri Mar 8 15:22:30 2024]]
: SoapServiceEventMessageAdd: num[0] ext[0] text[Can't view [GMT=Fri Mar 8 15:22:30 2024]]
v: <<<<<<<<<<<<<<<<< Service not authorized >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
: SoapServiceEventMessageAdd: num[0] ext[0] text[Service not authorized [GMT=Fri Mar 8 15:22:30 2024]]
v: <<<<<<<<<<<<<<<<< Can't view >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
```

{tunerIndex=0} references tuner 1 on the COM51. The count is zero based, 0=1, 1=2 etc

Entry below indicates the COM51 is not steaming packets due to a Conditional Access Problem.

```
Mar 8 10:22:27 COM51 user.err syslog: a: No packets(0, 1)
Mar 8 10:22:31 COM51 user.warn syslog: a: _STREAM_Process(): Conditional Access problem!
```

Conditional Access problems are indicative of activation issues.

## 3.3 SIGNAL ISSUES

Syslog entry below is caused by a failure to communicate with the SWiM

```
Jul 14 16:34:20 buildroot user.err syslog: a: _SWiM_ReadFtm(): RF-MICRO poll timeout!
Jul 14 16:34:20 buildroot user.err syslog: a: _SWiM_GetResponse(): SWiM_ReadFtm() failed
Jul 14 16:34:20 buildroot user.err syslog: a: _SWiM_GetMyResponse(): SWiM_GetResponse(0) failed
Jul 14 16:34:20 buildroot user.err syslog: a: SWiM_PingStatus(): SWiM_GetMyResponse() failed
Jul 14 16:34:20 buildroot user.warn syslog: a: _STREAM_SwiMCheckStatus(): swiMStatus = 0x2!
Jul 14 16:34:20 buildroot user.err syslog: s: SoapSwiMError(): !!! SWiM error !!!
Jul 14 16:34:20 buildroot user.notice syslog: a: SWiM_Tick(): NAD bit cleared
Jul 14 16:34:21 buildroot user.notice syslog: a: _SWiM_ProcessResponse(): SWiM connection restored
```

CC Errors.

CC is an abbreviation for Continuity Count. CC errors tell us packets in the transport stream were dropped. The syslog entries below show CC errors on tuners 1 (index=0) tuner 2 (index=1) and 15 (index=14). The CC total is how many packets have dropped over a given time. Occasional CC error reports with low CCtotals are usually not a concern. A bird landing on the LNB could create a temporary condition causing a few dropped packets.

```
a: CC errors index=1 CCTotal=2
a: CC errors index=14 CCTotal=3
a: CC errors index=0 CCTotal=3
```

However regular CC error entries are indicative of an RF problem with the satellite feed.

When CC errors reach a threshold, the tuner will report the following:

**syslog: a: No packets(14, 51)**

Tuner 15 is receiving no packets

**syslog: a: >>> Tuner(13) Lost Lock <<<**

Tuner 14 has lost lock with the Satellite

No Packets and Lost Lock messages indicate a loss of satellite signal.

### 3.4 SYSLOG SERVER SETUP

The COM51 card syslog retains 500 lines of text for review in troubleshooting. Old entries are deleted as new entries are added. To preserve syslogs for a longer period for troubleshooting a syslog server may be set up on a local PC.

There are multiple syslog programs available. For this exercise we are using TFTP32.

Tftpd32 is a free program you can download at [http://tftpd32.jounin.net/tftpd32\\_download.html](http://tftpd32.jounin.net/tftpd32_download.html). You may have used this program in the past to upgrade software on COM24 cards.

Below are the steps to create a syslog server:

Download and install Tftpd32.

Enter the IP address of your PC in the COM51 card. (PC network card must be set to the same subnet as the COM51 system. In this example we are using the default 192.168.3.XXX network settings.


Below is the result of an IPCONFIG command line request showing the network settings:

```
C:\Windows\System32>ipconfig

Windows IP Configuration

Ethernet adapter Local Area Connection 2:

    Connection-specific DNS Suffix . . : 
    IPv4 Address. . . . . : 192.168.3.108
    Subnet Mask . . . . . : 255.255.0.0
    Default Gateway . . . . . : 192.168.3.1
```



From the Advanced Edit page scroll to the User Config section:

### User Config

**WARNING: Changing the settings in this section may cause the card to be unable to communicate. Please record all settings for future reference.**

IP_Config:	0 = Default
Base_IP:	
Subnet:	
Gateway:	
DNS_IP:	
Time_To_Live:	3
Log_IP:	192.168.3.108
Log_Level:	
NTSC8_IP:	
UtilConfig:	

Recommended: 255.255.0.0. Warning: You may lose communication with the card.

0 - debug; 1 - verbose; 2 - info; 3 - warn; 4 - error)

Submit

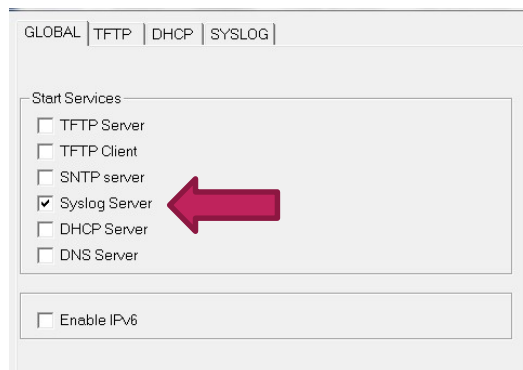


Enter the IP address of your PC in the “Log\_IP” field. Leave the “Log\_Level” field blank. Repeat this step for each card you want to capture logs from.

Reboot the COM51 card(s).

Create a directory named “syslog” in the root of the C drive. (c:\syslog)

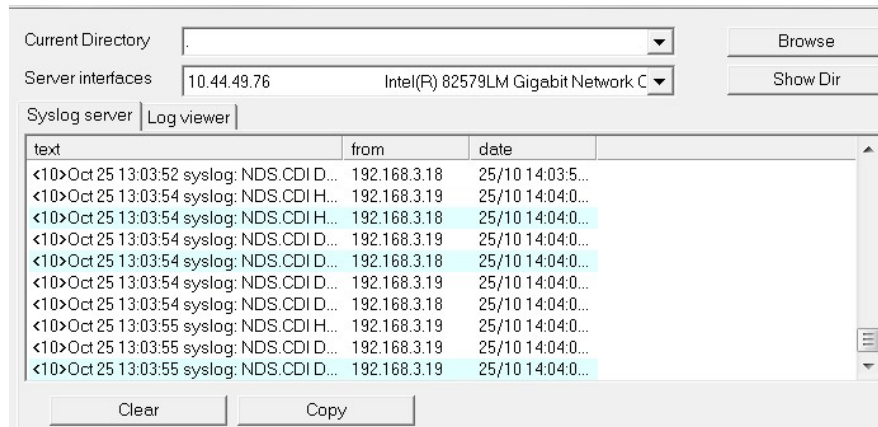
Open the Tftpd32 program and click on the GLOBAL settings. Select Syslog Server, uncheck other boxes. Click OK.



In the TFTP settings menu go to SYSLOG check the “Save syslog messages” box and enter the file location in the “To file” field: Click OK



From the TFTP main screen select the “Syslog Server” tab. You will see the syslog information displayed in the text box, designated by the IP address of the card in the “from” column.



Open the syslog.txt file you created and verify the log information is populating the file.



The syslog files will grow large quickly especially if you are logging several COM51 cards simultaneously. You may want to archive the files every couple of hours.

To archive the files:

Stop the Tftpd program.

Change the name of the syslog.txt file to something you can refer to later such as 1025\_1600syslog.txt. In this case I used the date and time

Restart the Tftpd server and verify the new syslog file is populating.

Name	Date modified	Type	Size
 1025_1600syslog.txt	10/25/2016 2:21 PM	Text Document	470 KB
 syslog.txt	10/25/2016 2:23 PM	Text Document	15 KB

## 4 TROUBLESHOOTING SPECIFIC SENARIOS

### 4.1 COM51 CARD NOT VISIBLE IN CHASSIS

Example:

The system has three COM51 cards, one of which is not visible in the interface. Channels tuned to this card are missing.

### 4.2 RESET COM400 PORTS.

#### Port Configuration

Port	Link	Speed	
		Current	Configured
*			<>
1	●	1Gfdx	Auto
2	●	Down	Auto
3	●	1Gfdx	Auto
4	●	1Gfdx	Auto
5	●	1Gfdx	Auto
6	●	1Gfdx	Auto
7	●	Down	Auto
8	●	2.5Gfdx	Auto
9	●	2.5Gfdx	2.5Gbps FDX
10	●	1Gfdx	Auto
11	●	Down	Auto

Save Reset

Navigate to COM400 Port Configuration page.  
(Configuration > Ports)

Verify Link is green for the COM400 slots containing COM51 cards.  
If one of the lights is red and speed shows “down” resetting the port may resolve the issue.

From the Configured column change the settings from Auto to Disabled and click Save.

Then reenable to port to auto, and again click save.

#### COM400 Port assignments

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		



## 4.3 COM51 CARD DISCOVERY ISSUES

If you have problems with COM51 card discovery the following changes may help:

If you have a QAM system with no multicast video packets you can disable IGMP snooping via: Configuration->IPMC->IGMP Snooping->Basic Configuration->Snooping Enabled=UNCHECKED->Save. This permits MDNS discovery packets to be set to all ports

If you have a IP system, enable IGMP querier election in your external managed Ethernet switch. This causes the MDNS IGMP join requests to be re-issued after every IGMP querier packet

If an external network switch is running IGMP version 3 it can cause discover problems in the COM system. Symptoms being each COM51 card is accessible at its own IP address but cannot be seen by other cards in the chassis. However, once discovered the COM cards will remember each other's IP address. This can be resolved in two ways:

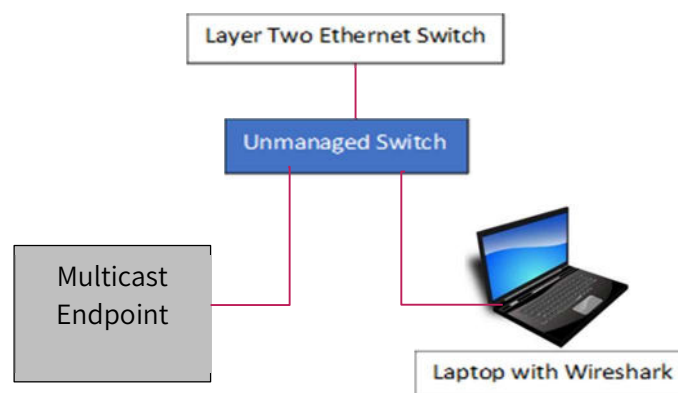
1. Set network switches to IGMP version 2.
2. Disable IGMP snooping in the COM400 long enough for the COM51 cards to discover each other. Then reenable all IGMP

## 4.4 IPTV DEBUGGING TIPS

A few basic tools are helpful in debugging any IP multicast network:

Inexpensive managed Ethernet switch with known working settings. This will provide a “known good” switch configuration and function as a point of demarcation when troubleshooting.

Unmanaged Ethernet switch. This can be placed between the IDF switch and the IP receiver. A PC running Wireshark connected to the unmanaged Ethernet switch will capture all the network traffic between the switch and the IP receiver. This can also be accomplished by “mirroring” a port on the network switch.





## 4.5 QAM OUTPUT STRENGTH / QUALITY

Use a test TV and field strength meter to evaluate picture quality directly from the COM3000 QAM output.

Signal from the QAM will need to be attenuated to correct level to input to a TV (-5-+10dBmV).

A known good setback box is a good troubleshooting tool to verify picture quality.

### BCM\_Rfmicro Error

If the COM51 syslog contains multiple BCM\_Rfmicro errors, then there is not enough attenuation between the COM51 and SWiM. Attenuation should be added between the SWiM and the COM51. The error indicates that the COM51 did not receive the expected SWiM protocol messages from the SWiM. This may cause SWiM registration errors. DIRECTV recommends a DRE pass through tap.

## 4.6 QAM LOG

Each time the qamLog is read, several capital 'C' characters are appended to the end of the log. To determine if the QAM4 is functioning properly click the qamLog button a few times with several seconds between presses. Ideally the qamLog will show 'CCCCCCCC' at the end of the log as shown below.

### EdgeQAM Modulator

Getting log

OK

```
OKtemp=45 temp=46 temp=45 CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCtemp=46 temp=45 CCCCCCCCCCCCCtemp=46 PM
T00 P00 CCCc00 PAT PMT01 P01 c01 PAT CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCC
```

A lower case 'c' followed by two numbers indicates a continuity counter error which indicates missing packets. Add one to the first number to determine the QAM carrier.

Add one to the second number to determine the program number.

For example, 'c12' indicates that the second QAM carrier, third program has missing packets.

A 'P##' indicates a PCR time continuity with the two numbers meaning the same as above. Many errors often indicate that two different video sources are being sent to the same UDP port.

## 5 PREVENTING PRO:IDIOM KEY LOSS

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There are two mechanisms which may cause Pro:Idiom key loss in some commercial television sets: Unapproved mapping or remapping of PIDs.

If external video sources are using PIDs normally reserved for Pro:Idiom key PIDs the TV may lose its ability to decrypt Pro:Idiom channels.

High quality Edge QAM modulator will relocate the Pro:Idiom key PID to a protected range.

Separate off-air and external video sources from Pro:Idiom channels.

## 6 TRANSCODER OPERATIONS

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### 6.1 SD ANALOG TRANSCODERS

As DIRECTV migrates away from broadcasting SD content, existing COM systems configured to these channels will need to transition to the corresponding HD channels. However, the HD channels are encrypted and may not be suitable for the current installation. To continue to provide the SD digital channels to the property the encrypted HD content will need to be transcoded back to unencrypted SD.

When using a SD encoder all RF signals come from the transcoders. The COM system sends an IP stream to the Transcoder which changes the signals to standard definition and outputs to the system. Troubleshooting for the COM is limited to verifying the COM is properly set up, retuning channels. Rebooting COM and or Transcoders may resolve some issues. Refer to transcoder manufacturer or your distributor for further support.

### 6.2 MPEG4 TO MPEG2 TRANSCODERS

DIRECTV has approved the use of the following MPEG2 transcoders.

- Video Propulsion
- Blonder-Tongue

These devices receive encrypted HD MPEG4 programming from the COM system over IP, transcodes the signal to MPEG2, and streams it back to the QAM4 in the COM3000 chassis.

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 Technicolor 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.

## 7 RECEIVERLESS HD

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Under certain environments DIRECTV will allow HD programming to be broadcast without Pro:Idiom encryption. The programming is in MPEG4 format which some TVs will not receive. It is advised that you test TVs on site and provide options for set top boxes for televisions that are not capable of processing the MPEG4 signal. Consult with your distributor or DIRECTV area service manager for more information on receiverless HD.

## 8 LEGACY EQUIPMENT

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### **COM51A**

COM51A is a specially configured COM51 card which works only with the Technicolor 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)

### **COM50**

COM50 is a specially built COM card with no ability to encrypt programming with Pro:Idiom. It was intended to be used in RLHD+ systems only.

### **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 Technicolor website.

## 9 DEFINITIONS

Term	Definition
Admin PC	<p>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.</p> <p>This can be accomplished via several methods:            A PC on site, connected to the internet running Team Viewer or a similar remote desktop program. PC will need to be on the same IP subnet as the COM3000 system.            VPN router set up for remote access via a Virtual Private Network</p>
ATSC	<p>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.</p> <p><a href="http://atsc.org/">http://atsc.org/</a></p>
ATSC-8	<p>This is a device previously provided by Technicolor 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.</p>
COM3000	<p>This describes the Technicolor system consisting of a COM400 / 421 chassis, COM51 or cards and QAM20 / QAM4 modulators. Replaced previous product COM2000.</p>
COM51 Receiver Card	<p>Receiver cards for the COM3000 system. Replaced previous product version COM46 / Com46A.</p>
COM400 Chassis	<p>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.</p>
COM421 Chassis QAM20 / QAM4	<p>This device houses 2 COM51s and a QAM. It is intended for smaller installations            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.</p>
SWQAM2	<p>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.</p>
DSWiM 30	<p>DIRECTV SWM. One DSWiM 30 will provide signal to a COM51 card when tuning more than 8 channels.</p>

EAS	Emergency Alert Systems can be interfaced with the COM3000 to stream emergency notifications to all QAM channels. Similar to this a local message can be created and played via a PC and VLC or a ZyCast Media Server. <a href="https://www.fcc.gov/encyclopedia/emergency-alert-system-eas">https://www.fcc.gov/encyclopedia/emergency-alert-system-eas</a>
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. <a href="http://mpeg.chiariglione.org/">http://mpeg.chiariglione.org/</a>
PC/VLC	The COM3000 can accept streaming video from a networked PC running VLC, an open-source video software. <a href="http://www.videolan.org/vlc/index.html">http://www.videolan.org/vlc/index.html</a>
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. <a href="http://www.zenith.com/wp-content/uploads/2013/05/ProIdiom_Overview_2010-10-08.pdf">http://www.zenith.com/wp-content/uploads/2013/05/ProIdiom_Overview_2010-10-08.pdf</a>
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. <a href="http://www.atscforum.org/">http://www.atscforum.org/</a>
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.
Transcription	The process by which the COM 3000 system converts content streaming from DirecTV’s conditional access system to Pro:Idiom encrypted video.