CONVERGENCE ENABLED

IPC4100 Release 1.0

Installation and Operation Guide

STANDARD 365-095-33577 Revision x.1

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IPC4100 51.0 Installation and Operation Guide

STANDARD Revision x.1

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Revision History

Revision	Description	Revision Date
1.0	Initial Release	June 2018

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Important safety considerations

- Read these instructions.
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water. The apparatus shall not be exposed to dripping or splashing and no objects filled with liquids, such as vases, shall be placed on the apparatus.
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer.
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as the power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

 WARNING - To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

The apparatus requires careful handling to avoid potential damage to its internal components which can lead to the loss of recorded data. Be sure to follow these requirements during transportation and installation.

During transportation to the subscriber home

- Transport the IPC4100 in its shipping box or an equally padded container.
- Do not expose the terminal to rain or moisture.

During installation

- Do not place the IPC4100 in an enclosed area where the cooling vents are blocked or impede the flow of air through the ventilation openings.
- Install the IPC4100 so that its position does not interfere with its proper ventilation. For example, do not place the IPC4100 on a bed, sofa, rug, or similar surface that could block the ventilation openings.
- Install the IPC4100 away from heat sources such as radiators, heat registers and stoves. Installation of the IPC4100 near consumer electronics devices, such as stereo receiver/amplifiers and televisions, is permitted as long as the air surrounding the IPC4100 does not exceed 40º C (104º F).
- Place the IPC4100 on a flat surface not prone to vibration or impact.
- Do not install the IPC4100 in an area where condensation occurs.
- To prevent the temporary loss of guide data and cause a temporarily non-responding IPC4100, do not plug the AC power cord into a switched power outlet.
- To avoid shock and vibration damage to internal components do not move the IPC4100 while it is plugged in.

FCC compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CAUTION: Changes or modifications not expressly approved by ARRIS for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC declaration of conformity

ARRIS Enterprises, LLC., 3871 Lakefield Drive, Suwanee, GA 30024, declares that the IPC4100 set-tops comply with 47 CFR Parts 2 and 15 of the FCC rules as a Class B digital device.

Product features

This manual provides instructions for system operator personnel to install the ARRIS IPC4100 High Definition set-top. This unit includes a high-end processor, expanded memory, and enhanced graphics to support digital, on-demand, and interactive services. It provides a full complement of interconnection options.

The IPC4100 provides the following advanced functionality:

- Authorization and purchase of on-demand programming
- High-Definition Television (HDTV) and Ultra-High Definition Television (UHDTV) video decoding
- HDTV and UHDTV output through component video (YPbPr) or High-Definition Multimedia Interface® (HDMI®)
- Surround-sound audio through a variety of analog and digital interconnection options
- Live playback and LOD buffering capabilities to pause and time shift live video and seamlessly record for all connected televisions
- Built-in MoCA® 2.0
- 802.11ac Wi-Fi home networking

As with all ARRIS digital set-tops, the hardware features are enabled by core operating and third-party application software.

IPC4100 Standard features

- Industry-standard video, audio, and data outputs
- Supports advanced ultra high-definition 4K video and HEVC and VP8/VP9 decode
- Embedded IP networking over coaxial cable with integrated MoCA 2.0
- Integrated 802.11ac Wi-Fi with 4x4 5GHz
- Wi-Fi security: WPA-PSK WEP-64/128, WPA, WPA2
- Dolby® 5.1 (all Outputs) and Dolby Digital Plus 7.1 digital audio (HDMI only)
- Rear panel USB 2.0 port

Standard data features

- 8 GB flash memory
- 2 GB DRAM
- One rear Universal Serial Bus (USB) 2.0 port
- 10/100 BASE-T Ethernet Port (RJ-45)

Standard Miscellaneous Features

- Messaging capabilities
- Digital diagnostics
- Four-digit, seven-segment LED display

IPC4100 rear panel

The IPC4100 rear panel contains ports and connectors for video, audio, RF cabling, data output, and data interface. Some connectors are not enabled and require application software support.
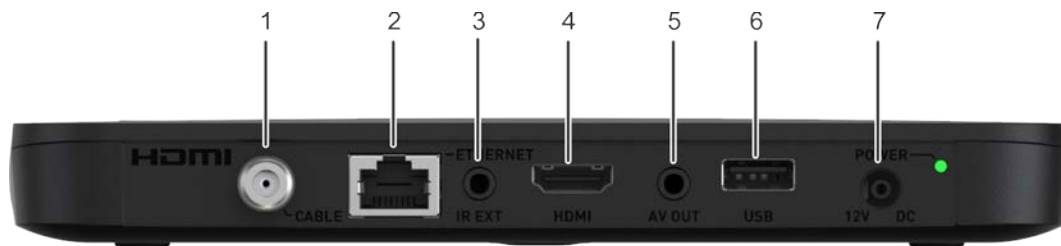
Figure 1: IPC4100 Rear Panel

Port/Connector		Description
1	Cable In	Connects to a coaxial cable that delivers the signal from your service provider
2	Ethernet*	Connects to an Ethernet device
3	Optical Audio*	Connects to the Dolby® Digital 5.1 audio or PCM output on a digital audio device
4	HDMI	Connects to a high-definition TV (HDTV)
5	IR Remote Input	Connects to a remote-control set-top accessory cable
6	USB 2.0	Connects to a high-speed peripheral device
7	12V DC, 1.5A	Connects the power cord to the IPC4100
8	Power LED	Power supply indicator

*This option is dependent upon application setting and availability in content.

IPC4100Front panel

The IPC4100 front panel provides the mechanical Power/Standby button and the LED Clock/Channel number display.

IPC4100 Front Panel

	Component	Description
1	Power Display	Indicates if power is on (green) or off (no light).
2	Reboot	Indicates if gateway is rebooting.

IPC4100 installation overview

This section provides instructions for connecting and configuring the IPC4100 in a multi-television screen household. The IPC4100 supports an auto-provisioning feature that automates many of the tasks required to configure and provision the in-home IP video components.

The installation will include the following series of steps:

■ *Connecting the home router* (page 15)
■ Connecting the RF coaxial cable to the RF connector on each set-top
■ Connecting the A/V connections for each set top to the home theater equipment
■ Performing the Auto-Provisioning procedures from the IPC4100 On-screen menu. See *Understanding auto-provisioning* (page 19).
■ *Optimizing High-Definition (HD) settings* (page 26)

Completing prerequisites

Before you move or change components on the subscriber's entertainment system, do the following:

- Make sure you have all the required tools and equipment.
- Review the installation instructions.
- Check the home coaxial topology.

  - Make sure no cable network or satellite dish is connected.
  - Make sure there are no amplifiers that could interfere with the MoCA network.
  - Determine the numbers and type of splitters used.
  - Verify that the signal at each coaxial outlet you will use is in the range -10 to +10 dBmV.
  - If necessary, replace or move amplifiers or splitters.

- Check the home entertainment system. Determine if you are connecting to one of the following:

  - Standard-Definition analog NTSC TV (supporting RF input)
  - Baseband Composite video
  - High-Definition TV (UDH, HDMI, or DVI)

- Determine if the subscriber has other equipment to be connected to the terminal (Home Theater or A/V receiver, VCR, etc.). Verify that you have the necessary cables and other required items.
- Have the customer specify where the IPC4100 media server should be installed.
- Note: Make sure to install the IPC4100 media server before connecting any other set-tops.
- Write down the MAC address and serial number for each IPC4100 and IP Client set-top box. The labels are located on the bottom of the devices.

eSTB MAC: CC7D37B564F9

Figure 2: Set-Top Box MAC Address

Checking the home coaxial network topology

This procedure assumes you are networking at least one IPC4100 and one or more IP Client STBs. Before you install the IPC4100, do the following:

1. Create a table listing for each of the following:

- Every room where you plan to install a set-top
- The signal levels you measured at the RF cable outlets
- HFC MAC Address located on the label on the bottom of the set-top used in that room

2. Optionally, you can include information such as the set-top type, serial numbers, and anything else you or the service provider considers useful. The following table provides an example of signal levels and MAC addresses.

Room	Cable Outlet Signal Level	Set-top MAC Address	Set-top Type	Serial Number
Router	-2 dBmV	001225xxxxxx	None	
Living Room	-6 dBmV	001225xxxxxx	IPC4100	
Den	-8 dBmV	001225xxxxxx	IPC4100	
Master bedroom	1. -16 dBmV	001225xxxxxx	IPC4100	

2. Use your TV signal tester at the coaxial outlet where you will connect any MoCA set-top box and router. Verify that the signal level of the highest downstream digital channel frequency is between -10 and 10 dBmV. Record your readings in a table similar to Table 6 above. A signal level of +0 dBmV is ideal.

Note: If the signal level is less than -10 dBmV, you must correct the problem before installing the set-top box.

3. If possible, determine whether there are one or more in-line coaxial RF amplifiers. If possible, move the existing amplifier to a position near the point of entry. See Troubleshooting for more information.

4. If possible, determine how many splitters, and what kind, are in use. An older splitter, such as an old eight-way splitter, may have unacceptably high throughput loss. Replace any splitter cascades having a loss of 18 dB or more.

5. If the signal level at one or more coaxial outputs remains unacceptably low, the power loss may be caused by long coaxial cable runs using cable of insufficient quality. For example, a 330 ft (100 m) cable can reduce the power by 20 to 27 dB, depending on the cable quality. This results in a very low power level at the outlet of about -5 to -10 dBmV or lower. This loss, combined with loss from a splitter, causes marginal MoCA network performance.

6. If you make any changes to the network, repeat steps 1 and 2.

Caution: Be sure all connections are properly secured. Poor F-connector fittings or poor grounding can cause ingress.

Determining the video connection option

Use the following guidelines to determine the best video connection for the subscriber's home entertainment system. To determine the available video inputs on the TV, check the manual supplied with the TV or the TV itself.

The IPC4100 offers the following video outputs:

Connection Type	TV Type	Description
HDMI	HDTV and SDTV	■ HDMI offers higher quality HD video than component video. ■ HDMI provides both video and audio connections. If you use HDMI, no separate audio connection to the TV is required. ■ HDMI is compatible with DVI. If the TV has a DVI input, you can use an HDMI-to-DVI converter cable or adapter to connect to the IPC4100 HDMI connector. If DVI is used, a separate audio connection to the TV will be needed.
Video (Composite)	SDTV only	Use the composite video output (video) connection on the TV.

Connecting audio

When connecting to a home theater receiver, depending on its inputs, you can use the following IPC4100 audio outputs:

Connection Type	Description
Digital audio optical (S/PDIF)	If the receiver supports it, use the digital audio optical (S/PDIF) audio output to deliver Dolby Digital audio to a Dolby Digital home theater receiver. Audio is available via HDMI and no further audio connection is required.
Baseband Audio L and R	If the audio receiver does not support Dolby Digital, use the baseband audio l and r outputs to connect to the audio receiver.

In most cases, the optical S/PDIF or coaxial digital RCA output offers better audio quality and support for 5.1 Surround Sound. The cabling diagrams show sample audio/video (A/V) connections to an audio receiver, where the receiver functions as an A/V router.

When connecting to an audio receiver, reference its installation instructions for directions on connecting to baseband and digital (S/PDIF) audio ports.

Note: The VCR and TV receive their A/V signals from the currently selected input device on the audio receiver. This is important when the subscriber has another A/V device such as a DVD player, a secondary VCR, a CD player, or other electronic component. We recommend connecting the TV to the monitor output so on-screen menus for the receiver can be displayed. In many cases, the receivers themselves have interactive on-screen menus.

Connecting the home router

To connect the home router:

1. Connect the Ethernet cable you routed from the ONT to the WAN Ethernet port on the home router.
2. Make sure the router is powered ON.
3. Enable Dynamic Host Configuration Protocol (DHCP) on the router. Follow the instructions provided with the router.

Connecting homes with multiple existing cable drops

Some customer premises may have multiple coaxial inputs from one or more taps, typically entering different locations in the home. For the PON, it is practical to have one connection only per customer premises. You must use a splitter and cabling to connect any additional drops to the ONT. The routing will depend on the layout of the home and customer preference.

Connecting the home router – embedded MoCA ONT

To connect the home router:

1. Connect the coaxial cable you routed from the ONT to the coax/MoCA port on the home router.
2. Make sure the router is powered ON.
3. Enable Dynamic Host Configuration Protocol (DHCP) on the router. Follow the instructions provided with the router.

Reviewing the IPC4100 installation steps

1. Determine if you are connecting to one of the following:

   a. High-Definition TV or monitor - Use the HDMI output. No other video connection supports HDTV.
   If the TV has no HDMI input but does have a DVI input, connect a DVI-to-HDMI adapter or cable to the HDMI out connector on the IPC4100 set-top and the DVI-HDTV connector on your TV.

   b. Standard-Definition TV - Connect the composite video connector using a composite (RCA phono) cable.

2. Determine if you are connecting the audio to a home theater receiver or directly to the TV:

   a. For an HDMI video connection, no additional audio connections to the TV are required.

   b. For a DVI video connection, additional audio connections to the TV are required.

   c. If the receiver or TV has a digital audio (S/PDIF) input, use the Optical Audio (S/PDIF) output. Otherwise, use the baseband left and right audio outputs.

3. Locate the cabling diagram(s) that best match your planned configuration.

4. Connect the audio and video cables as shown in the diagram you are using.

5. Determine if you are connecting to a data device. For installation details, refer to the instructions included with the data device.

6. Connect the FiOS TV In terminal to the coaxial cable wall outlet.

7. Perform the operational check for the remote control. See *Performing remote control operational check* (page 19).

8. Optimize the high-definition settings. See *Optimizing the High Definition Settings* (page 26).

Connecting a High-Definition TV (HDTV) for video

Do the following for the best possible HDTV video quality:

1. If the TV has an HDMI input, connect it to the HDMI output on the IPC4100.
2. If the TV has a DVI input, connect it to the HDMI output on the IPC4100 using an HDMI-to-DVI converter cable or adapter.

Figure 3: High-Definition TV (HDTV) for Video Connection

Note: Because HDMI provides both video and audio output, no additional audio connections to the TV are required.

Connecting an HDTV and an A/V receiver for video

Note: If the A/V receiver includes an HDMI input and output, the IPC4100 HDMI output can be connected directly to the A/V receiver's input and the A/V receiver's HDMI output directly to the TV. Because HDMI provides both video and audio output, no additional audio connections to the A/V Receiver and TV are required.
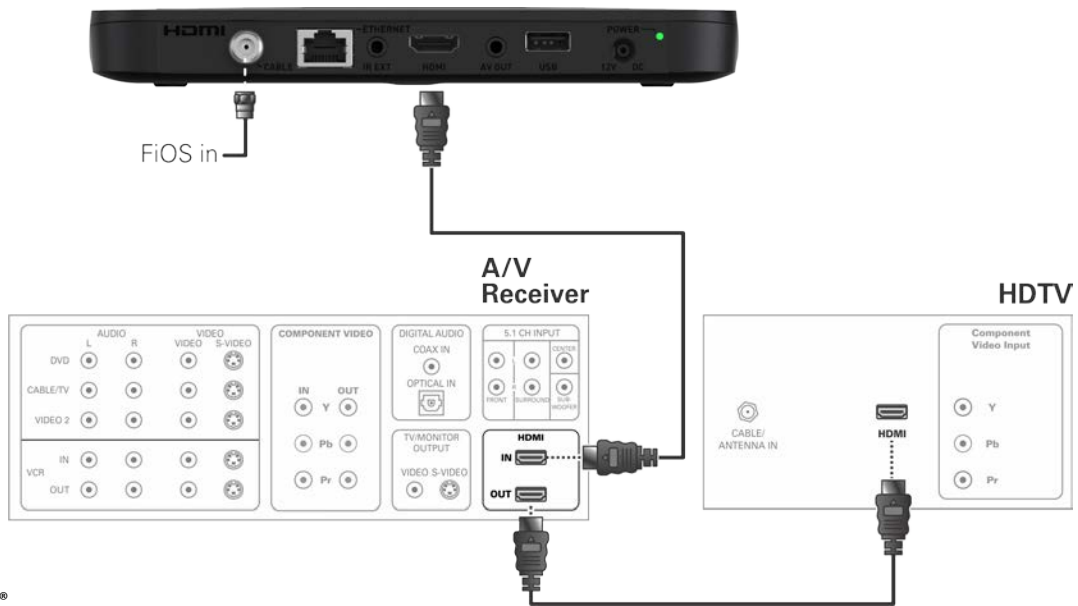
Figure 4: High-Definition TV (HDTV) and an A/V Receiver for Video Connection

Performing remote control operational check

The operational check tests communication with the remote control.

Table 1. Remote Control Test

Feature	Testing Procedure
Power ON	Press Power on the remote control to turn ON the IPC4100.
Channel Selection	Scan through the channels using the Channel + or - keys. Tune to several channels by entering the channel number using the numeric keys.
Volume Control	Press Volume + or - on the remote control to increase the volume to its upper limit, lowest level, and to a comfortable level. Press mute to turn the sound off. Press mute again to restore the sound.

If the IPC4100 does not operate properly, see Troubleshooting for more information.

Understanding auto-provisioning

The auto-provisioning process will streamline the set-top installation and provide informative diagnostics that will assist you in resolving issues as they are detected. After the IPC4100 and IP Client set-tops are connected to the home network and the IPC4100 is powered ON, an automatic pre-health check is performed to identify any potential connection problems. The IPC4100 will conduct a series of self-tests to verify proper network connectivity and signal levels.

During the activation process, the system health and status are monitored and displayed on the IPC4100 Onscreen menu. Instructions are provided to help resolve any problems discovered during the activation process. If you encounter any additional problems during the automated health check, see Troubleshooting for more information.

Note: The IPC4100 must be provisioned first in order to properly prepare the IPC1100 for activation.

After the registration process, the software download process will begin. A progress indicator on the IPC4100 will show the appropriate steps for the following processes:

- Server Connection
- Software Server Identification
- Software Download

Starting the auto-provisioning process

▶ *To start the auto-provisioning process:*

1. Plug the power cord on the IPC4100 into an electrical wall outlet.
2. Do NOT power ON the IPC4100 set-top(s) until after the network and TV connections are completed.
3. Press OK on the IPC4100 remote control when the Verizon Welcome screen displays.
4. Note: If Prok, PrOK, or PrOH appears on the IPC4100 front panel LED display, press the OK button on the IPC4100 top panel or hand-held remote.
5. The Verizon Welcome-Start Activation screen displays and the IPC4100 automatically starts performing a series of self-tests.
6. Press A on the IPC4100 remote control to navigate to the first detailed auto-provisioning screen.

Note: If a problem is detected during the connectivity check, follow the on screen instructions to correct the issue.

7. Upon completion of the software download, the device will send a message to the management server which will start the network activation process.
8. After the health check and any necessary corrective steps, the IPC4100 will register with the Verizon provisioning server and production management servers.
9. If any problems are encountered with these steps, follow the onscreen instructions to rectify the problem.
10. The management server will set the IPC4100 to active and instruct it to reboot. After rebooting, the Verizon FiOS TV will start up. The IPC4100 is now ready for service.

Reviewing sample IPC4100 self-test screens

Note: The screens provided in this section are intended for illustrative purposes only. They are a sampling of the screens you may see during the auto-provisioning process. In some cases, the actual data may differ from the examples provided.
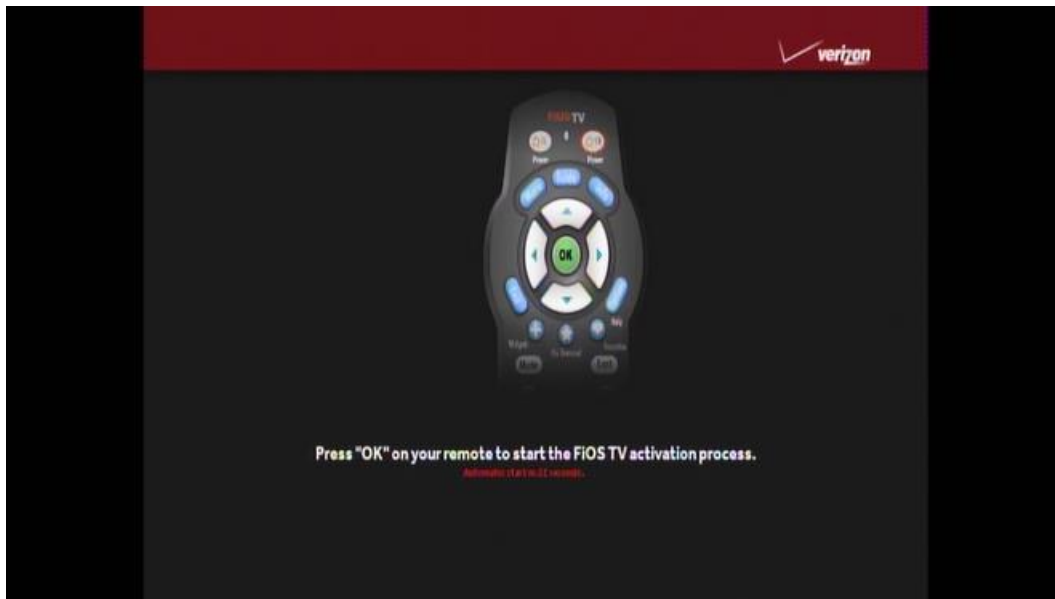
Figure 5: Welcome screen
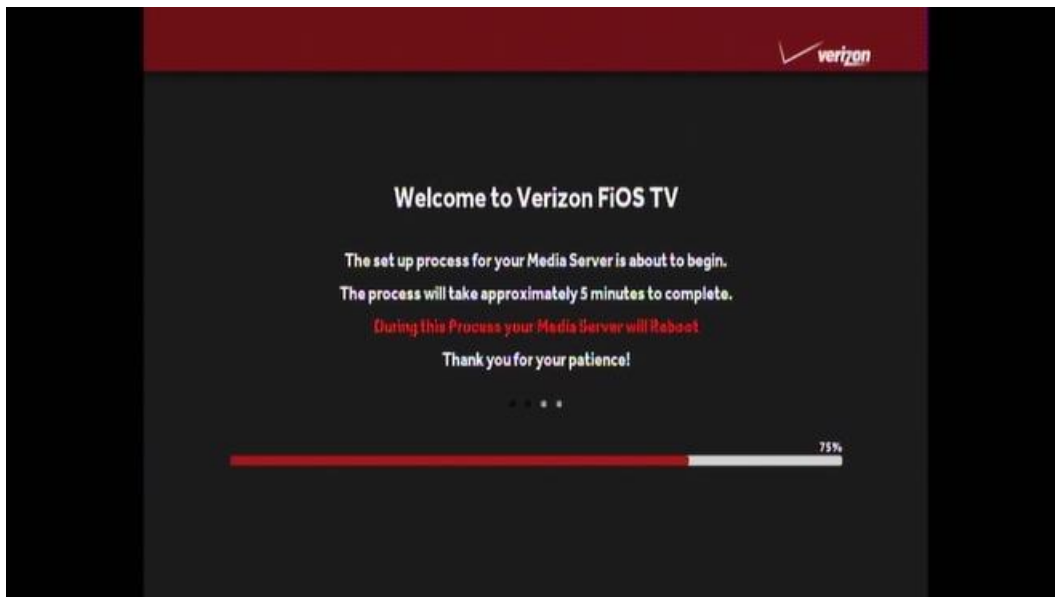
Figure 6: Welcome-Start Activation screen
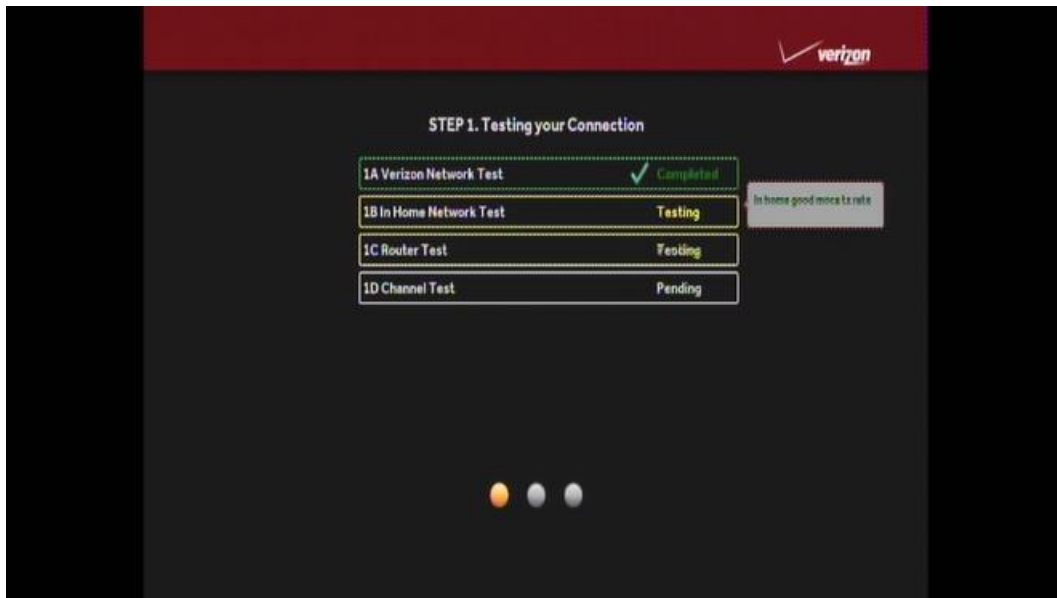
Figure 7: Step 1:-Coax Connection test screen
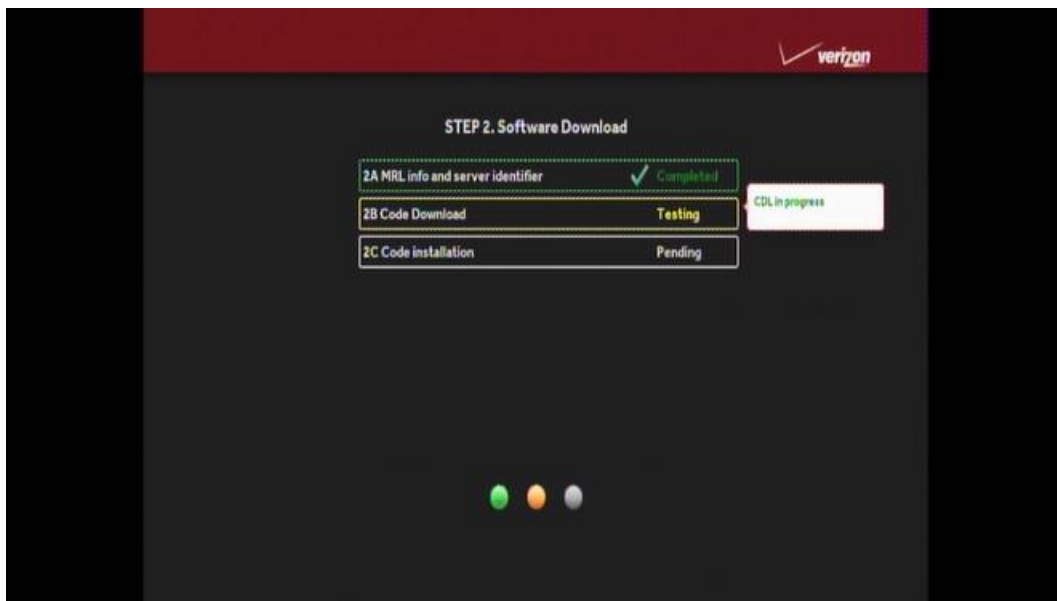
Figure 8: Step 2: Software Download test screen
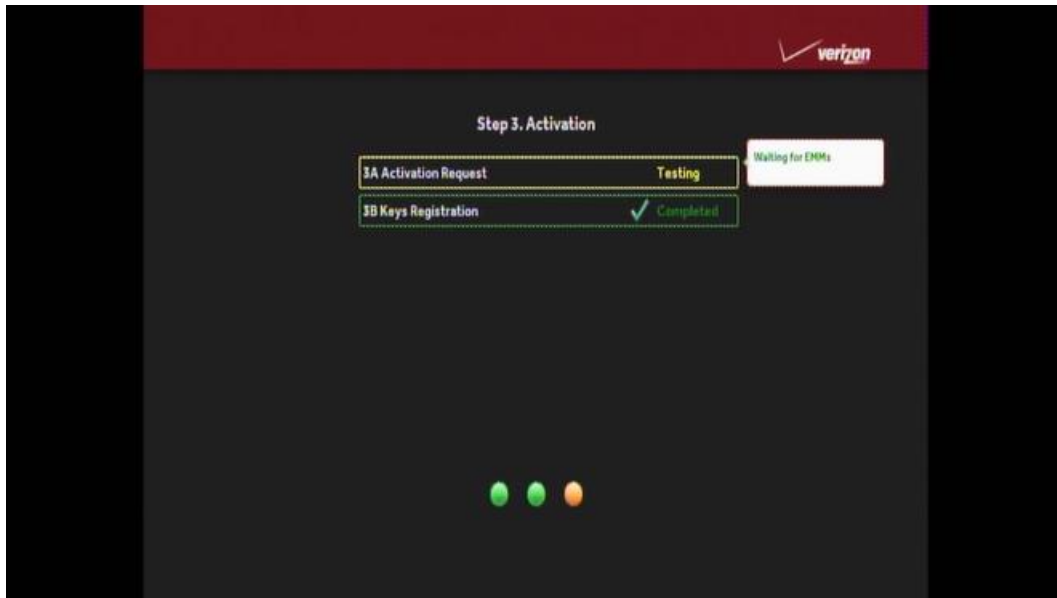
Figure 9: Step 3: Activation screen

Activation Complete screen (1of 2)

Activation Complete screen (2 of 2)

Accessing the Basic User Interface (BUI)

The BUI contains front panel diagnostics and user settings. The BUI allows you to retrieve diagnostics without having to power OFF the application.

▶ *To view diagnostics:*

1. Method 1 - Press and hold the D key on the IR remote control for five seconds and then release the key to display the BUI Main Menu.
   a. Select Diagnostics to navigate to the onscreen diagnostics.
   b. Select User Settings to navigate to the high-definition video User Settings menu.
2. Method 2 – Power ON the IPC4100 and then immediately press the Select key (or OK key) on the IR remote control twice.

BUI MAIN MENU
01 Diagnostics
02 User Settings
03 PlayAssure
04 Exit

Figure 10:   Basic User Interface (BUI) Main Menu

Note: The PlayAssure diagnostics are not available once the IPC4100 is booted up. Please refer to the PlayAssure Client Installation and Operation Manual for more information.

Optimizing High-Definition (HD) settings

This section describes how to optimize the SD and HD video settings and closed captioning based on subscriber preferences.

Do the following before changing the output settings:

1. Connect the IPC4100 to the other home entertainment devices.

2. Plug the power cord on the IPC4100 into an electrical wall outlet.

3. Check that the IPC4100 has successfully completed the auto-provisioning process and has connectivity to the IPC1100 set-top(s) through the home network.

4. Turn ON the TV.

Note: For an HDMI connection, check that the TV is ON and that HDMI is selected as the input before adjusting the settings. ARRIS recommends using certified Standard (or "category 1") HDMI cables for 1080i or 720p resolutions. A certified high-speed (or "category 2") HDMI cable is recommended for resolutions of 1080p.

There are two methods for accessing the User Setting menu to optimize the output settings:

* Use the BUI menu. See *Accessing the Basic User Interface (BUI)* (page 25) for more information.
* Power OFF the IPC4100 and immediately press the Select key and then press the Menu key on the remote control.

If the TV is ON, the on-screen menu will display the user settings that you can configure.

USER SETTINGS

TV TYPE	16:9
HDMI/YPbPr OUTPUT	1080p60
4:3 STRETCH	OFF
VIDEO SHARPNESS	3
ADDITIONAL HDMI SETTINGS >>>	
CLOSED CAPTION	DISABLED
ADDITIONAL CLOSED CAPTION SETTINGS >>>	
PREF AUDIO LANG	ENGLISH
DESCRIPTIVE VIDEO SERVICE	OFF
RESTORE ALL DEFAULTS	

MENU VERSION 2.6

Figure 11:   User Settings Screen

5. Use the remote control or the cursor keys on the front panel to navigate the on-screen menus:

   - Press the p and q keys to highlight the setting you wish to change.
   - Press the u key to select an option.
   - To exit the setting and move to another setting, press the p or q key.
   - To exit the menu and save your settings, press the Power or Menu key.

6. If the User Setting screen does not display on the HDTV screen, the TV may not support the default video output setting. Use the front panel display to adjust the settings as described in There is no video on the TV screen in the *Troubleshooting* (page 84) section.

Settings	Description
TV Type	Allows you to specify the style of television connected to the set-top. Options include 16:9, 4:3 LETTERBOX, and 4:3 PAN SCAN. By default, the 16:9 option is selected. The options are used as follows: ■ 16:9 designates that a widescreen television is connected to the set-top. ■ 4:3 LETTERBOX designates that a standard screen television is connected to the RCM set-top and that widescreen programs should be scaled to fit the screen with black bars above and below the picture. ■ 4:3 PAN SCAN designates that a standard screen television is connected to the RCM set-top and that widescreen programs should be cropped so that the picture fills the entire screen.
HDMI/YPbPr OUTPUT	Allows you to specify the video output format of the RCM set-top for all content or for all 1080p, 1080i, and 2160p. Options include: ■ 1080p24 — The RCM set-top will present programs in the High-Definition 1080p24 format (1920 x 1080 pixels). ■ 1080p30 — The RCM set-top will present programs in the High-Definition 1080p30 format (1920 x 1080 pixels). ■ 1080p60 — The RCM set-top will present programs in the High-Definition 1080p60 format (1920 x 1080 pixels). ■ 1080i — Default option: The RCM set-top will present programs in the High-Definition 1080i format (1920 x 1080 pixels). ■ 2160p24 — The RCM set-top will present programs in the High-Definition 2160p24 format (3840 x 2160 pixels). ■ 2160p30 — The RCM set-top will present programs in the High-Definition 2160p30 format (3840 x 2160 pixels). ■ 2160p60 — The RCM set-top will present programs in the High-Definition 2160p60 format (3840 x 2160 pixels). Some televisions may only support certain video formats. Please consult your

Settings	Description
	television's user manual for more information on format compatibility.
	The RCM set-top can detect when the HDMI connection is in use. If you are not using the HDMI connection on the RCM set-top, the HDMI/YPbPr Output setting will display as YPbPr Output in the User Settings Menu.
4:3 Stretch	■ On — The RCM set-top will automatically stretch all standard-definition programs to a wide screen aspect ratio and present the video in the format designated by the HDMI/YPbPr Output setting. Note that the Stretch option is only available when the TV Type setting is 16:9. ■ Off — Default option: The RCM set-top will create a wide screen version of a standard-definition program by adding black bars to the left and the right of the picture and present the video in the format designated by the HDMI/YPbPr Output setting.
Video Sharpness	Controls the sharpness adjustment for the video. The sharpness range is from 1 (softest) to 5 (sharpest). The default is 3.
Closed Caption	Enables or disables closed captions. The front panel display indicates the status of the closed captions. Available options: Enabled or Disabled (default)
Pref Audio Lang	Allows selection of a preferred audio language.
Descriptive Video Service	Enables Descriptive Video Service (DVS), if available in the content.
Restore All Defaults	Resets all the User Setting configurable parameters to their default values.

Viewing additional HDMI settings

The Additional HDMI Settings menu is used to configure advanced options that affect the operation of the IPC4100 with HDMI and DVI display devices. Adjustable options include:

■ Display mode
■ Color Space
■ Audio Output mode
■ Lip Sync
■ Lip Sync Delay

◼ 1080p24 Pass-Through

The Additional HDMI Settings menu screen is illustrated and defined below:

```
ADDITIONAL HDMI SETTINGS

NOTE: CHANGING THESE VALUES MAY RESULT
IN LOSS OF AUDIO AND/OR VIDEO

HDMI/DVI Mode              HDMI
Color Space               YCbCr 4:4:4
Audio Output              Auto
Lip Sync                  Auto
Lip Sync Delay            0

1080p24 Pass-Through      Off

RETURN TO MAIN PAGE >>>

RESTORE AUTOMATIC SETTINGS
```
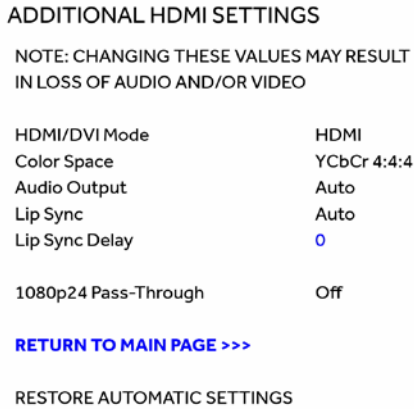
Figure 12:   Additional HDMI Settings Screen

Table 12 – Additional HDMI Settings Fields

Field	Description
Additional HDMI Settings	The Additional HDMI Settings option is available whenever an HDMI connection is in place.
	Selecting this option will present a new menu screen with settings specific to the HDMI connection, for example DVI/HDMI mode, Color Space, Audio Output, and Lip Sync settings.
HDMI/DVI Mode	The HDMI/DVI Mode setting allows you to optimize the HDMI output to work with both DVI-equipped televisions and HDMI-equipped televisions.
	By default, this option is set to HDMI. The options are used as follows:
	HDMI — The IPC4100 is optimized to work with an HDMI television or home theater receiver.
	DVI — The IPC4100 is optimized to work with a DVI television or display device (connected via an HDMI-to-DVI adapter).
Color Space	The Color Space setting allows you to adjust the color space used by the IPC4100 to generate the video signals on the HDMI output. By default, this option is set to YCC 4:4:4. The options are used as follows:
	YCC 4:4:4 — The IPC4100 will generate video signals within the YCC color space.
	RGB — The IPC4100 will generate video signals within the RGB color

Field	Description
	space.
	Note: Adjusting these settings could result in a loss of video. Only a professional installer or someone with a good working knowledge of the color spaces supported by the TV should change this setting.
Audio Output	The Audio Output setting allows you to specify the digital audio format delivered over the HDMI output by the IPC4100.
	The options are used as follows:
	Auto (default) —The IPC4100 will provide the digital audio format specified by the connected device (TV or home theater receiver) when that device was first connected to the IPC4100.
	L-PCM — The IPC4100 will provide all audio in the Linear Pulse Code Modulation digital audio format. The L-PCM format is widely supported by most HDMI televisions and home theater receivers.
	Pass-Through — The IPC4100 will provide the same digital audio format on the HDMI output as is provided with the program being viewed at that time. For example, if the program has a Dolby Digital soundtrack, the IPC4100 will pass the Dolby Digital audio to the HDMI output. This option is most useful when connecting the IPC4100 to a home theater receiver that has HDMI switching capability.
	Note: Adjusting these settings could result in a loss of audio. Only a professional installer or someone with a good working knowledge of the digital audio formats supported by the TV and/or home theater receiver should change this setting.
Lip Sync	The Lip Sync setting allows you to adjust the amount of time the audio signal is delayed with respect to the video signal on the HDMI output. Some HDMI televisions and home theater receivers add an extra delay to the video signal during processing which can produce an effect where the audio noticeably "leads" the video.
	By default, this option is set to Auto. The options are used as follows:
	Auto — The IPC4100 will automatically delay the audio signal on the HDMI output by the amount of time requested by the connected HDMI device.
	Manual — The IPC4100 will delay the audio signal on the HDMI output by the amount of time selected for the Lip Sync Delay setting.
	Off — The IPC4100 will not delay the audio signal on the HDMI output.
Lip Sync Delay	The Lip Sync Delay setting is only available when the Lip Sync option has been set to Manual. The Lip Sync Delay setting can be adjusted between 0 milliseconds (msec) and 500 milliseconds in 50 millisecond increments.

Field	Description
	If the Lip Sync option has been set to either Auto or Off, this option will be disabled and no longer selectable in the menu.
	Use this option to adjust the HDMI audio delay if you notice that the video image routinely seems to be "behind" the audio soundtrack when using your HDMI device.
1080p24 Pass-Through	Enables the pass through of 1080p24 content directly to the TV.
Return To Main Page	Use this option to return to the User Settings Menu main screen.
Restore Automatic Settings	Use this option to restore all of the settings on this screen (HDMI/DVI Mode, Color Space, Audio Output, and Lip Sync) to their default value.
	You can also use this option if audio and/or video has been lost after adjusting these settings from their default values.

Additional Closed Caption settings

The Additional Closed Caption Settings menu is used to adjust the various display options for closed caption legibility. Customizable options include font size, font style, font color, and font opacity. You may also select to view different closed caption services if these are included within the broadcast program.

Figure 13: Additional Closed Caption Settings Screen

Table 2. Additional Closed Caption Settings Fields

Field	Description
Service Selection	Sets the service used by the IPC4100 to render (draw) the closed captions:
Analog	This setting affects closed captions for digital standard definition services.
	Available options:
	CC1 (default), CC2, CC3, CC4, T1, T2, T3, or T4
Digital	This setting affects closed captions for digital enhanced definition and high definition services. Available options: ■ Primary Language (default) ■ Secondary Language ■ 3, 4, 5, or 6
Font Size	Sets the font size for closed captions. Available options: ■ Auto (default) ■ Standard ■ Large ■ Small
Font Style	Sets the font style for closed captions. Available options: ■ Auto (default) ■ Mono Serif ■ Proportion Serif ■ Mono No Serif ■ Proportion No Serif ■ Casual ■ Cursive ■ Small
Font Color	Sets the font color. Available options: ■ Auto (default) ■ White ■ Black ■ Red ■ Green ■ Blue ■ Yellow ■ Magenta ■ Cyan

Field	Description
Font Opacity	Sets the font opacity. Available options: ■ Auto (default) ■ Transparent ■ Translucent ■ Solid ■ Flashing
Font Edge Type	Sets the edge appearance. Available options: Auto None Raised Depressed Uniform Left Shadowed Right Shadowed
Font Edge Color	Sets the edge color. Available options: Auto (Default) White Black Red Green Blue Yellow Magenta Cyan
Background Color	Sets the background color for closed captions. Available options: Auto (Default) White Black Red Green Blue Yellow Magenta Cyan
Background Opacity	Sets the background opacity for closed captions. Available options: Auto (default)

Field	Description
	Transparent
	Translucent
	Solid
Window Color	Sets the window color for closed captions. Available options:
	Auto (Default)
	White
	Black
	Red
	Green
	Blue
	Yellow
	Magenta
	Cyan
Window Opacity	Sets the window opacity for closed captions. Available options:
	Auto (default)
	Transparent
	Translucent
	Solid
	Flashing
Control Mode	Sets the closed caption settings. Available options:
	Auto (default)
	User
Return to Main Page	Selecting this option will return you to the User Setting screen.
Restore Closed Caption Defaults	To reset all of the Additional Closed Caption settings to their default values:
	Select this option and press the ► key.

Graphics Overlaying the Video

The IPC4100 can generate graphics that overlay the video programming or fill the entire television screen. Common examples include on screen menus (such as the User Setting menu), closed captions, and IPG. The IPC4100 overlays these graphics whenever you open a menu, enable closed captions, or scroll through a program grid.

On screen graphics are available for all IPC4100 video outputs.

Diagnostics are displayed on the IPC4100 front panel display. You can access, control, and navigate through the diagnostic screens using the IPC4100 front panel controls or remote control. The diagnostics confirm proper installation, including the following:

- Checking error states and signal integrity
- Identifying the cable terminal on the network
- Verifying communications with the headend

The following information applies to the diagnostics outlined in this section:

- All indicators are in decimal notation, unless noted otherwise.
- All signal level and quality indicators use a 1% to 100% scale, unless noted otherwise.

Note: All sample displays used in this manual are for illustrative purposes only. The actual data may differ from the examples provided.

Configuring Diagnostics

To access the diagnostics:

1. Make sure the IPC4100 is powered ON.
2. Choose either method below to access the Diagnostics screen:

   • BUI menu
   Press and hold the D key on the IR remote control for seven seconds and then release the key to display the BUI Main Menu. Select 01 Diagnostics on the BUI main menu.

   • Enter Diagnostics directly
   Press Power and then immediately press **OK** on the remote control twice to open the Diagnostics main menu. This method will power OFF the application and is not recommended if diagnostic information is needed for video or session status.

The Diagnostics main menu will display and d01 will appear in the IPC4100 display panel window.

d0 Navigating the Diagnostics menu

Diagnostics
01 General Status >
02 Address / Security >
03 Code and Download Menu >
04 Channel and Session Menu >
05 Audio / Video Status >
06 Memory and CPU Status >
07 Interface / Port / User Setting >
08 Connected Home Menu >
09 Purchase / Poll / Upstream Status >
10 In Band Status Menu >
11 OOB Status >
12 Hard Drive Status >
13 Keypad / LED >
14 DRM Info >
15 OTT Session History >

Figure 14:   Diagnostics Main Menu

Use the following keys on the remote control or IPC4100 front panel to navigate the Diagnostics menus:

1. Press channel ▲   channel ▼   cursor ▲, or cursor ▼   to select **d01** through **15**.

2. Press **cursor** ◀, **cursor** ▶, **Select**, or **Enter** to execute the selected diagnostic.
3. Select **E** from the main menu or press **Power** to exit.

d01 Viewing General Status

This diagnostic displays system status information on the front panel. The information is updated each time the diagnostic is displayed.

Environment   Error

E 00
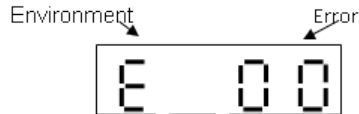
Diag -> General Status

Error:	E00
Platform ID:	0x0341
Chip Set:	BCM74491C1
Family ID (HW):	0x002d
Family ID (SW):	0x004c
Model ID:	0x90f0
Settop Local Time:	Mon Apr 23 2018 12:54:38 GMT-0400 (EDT)
DST Active:	Yes
Standard Time Offset:	GMT-0500
DST Entry Time:	Sun Mar 11 2018 03:00:00 GMT-0400 (EDT)
DST Exit Time:	Sun Nov 04 2018 02:00:00 GMT-0500 (EST)
Total Run Time:	0 Days 00 Hrs 54 Mins
% Standby Time:	0
% Low Power Time:	0
Version Number:	KA25.01.07.04Alder.620435
Encryption Algorithm:	CONFORMING_CSA
Channel Map Present:	True

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Diag -> General Status   ^^^ Scroll Up ^^^

Power State:	On
Provisioning Status:	N/A
Provisioning Errors:	-1
Provisioning Error and Description:	NOT SET
Provisioning Error Corrective Action:	NOT SET
SSL Device ID:	00003BAEBCD2
DTCP Device ID:	FF802D7E58
Config File Version:	N/A
Boot Inform Window:	90
Type of Last Successful Inform:	4 VALUE CHANGE
Time of Last Successful Inform:	Tue Feb 06 2018 15:35:31 GMT-0500 (EST)
Type of Last Failed Inform:	1 BOOT,2 PERIODIC,4 VALUE CHANGE
Time of Last Failed Inform:	Mon Apr 23 2018 14:17:14 GMT-0400 (EDT)
Failed Inform Count:	14
Connected:	True

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Diag -> General Status   ^^^ Scroll Up ^^^
Activation Status: True
Location State Code: N/A
County Subdivision: N/A
County Code: N/A
Reset Information >>

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Table 3. General Status Fields

Field	Description
Error	If multiple errors occur, the last recorded error is displayed. ■ EP00 - No error ■ EP01 - Not connected ■ EP03 - DRAM error ■ EP04 - SRAM error ■ EP07 - ROM verification failure ■ EP08 - RAM test failure ■ EP09 - Battery test failure ■ EP11 - Invalid unit address ■ EP12 - Power on self-test failure ■ EP14 - GITV startup failure ■ EP15 - TSI structure corrupt ■ EP18 - Driver initialization failure
Platform ID	A unique, 16-bit hexadecimal number that identifies the platform image (also called the ROM ID).
Chip Set	Identifies the Chip set used by the hardware
Family ID (HW)	The manufacturer and product family (in hexadecimal).
Family ID (SW)	
Model ID	The model (in hexadecimal).
Settop Local Time	The local time configured by the system
DST Active	Indicates Daylight Savings Time

Field	Description
STD Time Offset	Time zone based on standard time offset from GMT
DST Entry Time	Indicates entry of Daylight Savings Time and if DST is currently active
DST Exit Time	Indicates exit of Daylight Savings Time and if DST is currently active
Total Run Time	The number of hours and minutes since the product last rebooted.
% Standby Time	
% Low Power Time	
Version Number	Software version of the platform code
Encryption Algorithm	Indicates secure processor decrypt scheme, for example: CSA – Connect Scrambler algorithm DES – Data Encryption Standard
Channel Map Present	Indicates if the product is configured with a Channel Map.
Power State	Indicates logical power state of product, for example, On or Standby
Provisioning Status	Indicates the Status of auto-provisioning in descriptive text
Provisioning Errors	Indicates any error codes provided by the auto-provisioning process
Provisioning Error and Description	Indicates any auto-provisioning error in descriptive text
Provisioning Error Corrective Action	Indicates the corrective action associated with any auto-provisioning error in descriptive text
SSL Device ID	Indicates the Device ID used in SSL
DTCP Device ID	Indicates the DTCP Device ID
Config File Version	Indicates the version number of the configuration file used to provision the product.
Boot Inform Window	Indicates the time window configured for the TR-069 inform delay.
Type of Last Successful Inform	
Time of Last Successful Inform	
Type of Last Failed Inform	
Time of last Failed Inform	

Field	Description
Connected	An operations connect or disconnect message determines if the product is True or False.
Activation Status	Indicates the Activation Status as provisioned by the headend as True or False (may be VMS or Client Activation Status, depending upon the product).
Location State Code	
County Subdivision	
County Code	
Reset Information	

d02 Unit Address / Security

This diagnostic displays the unit address of the M-Card (cable card), if inserted in the M-Card™ DEVICE ONLY slot.

Diag -> Address / Security

CableCARD Inserted:	Yes
Unit Address:	000-00988-22200-058
Serial Number:	M11636TL7772

MAC Addresses Installed

MAC-Address 2 (Unused):	bc:64:4b:83:ed:bc
MAC-Address 4:	00:00:00:00:00:00
MAC-Address 5 (MoCA):	bc:64:4b:83:ed:bf
MAC-Address 6:	bc:64:4b:83:ed:be
HUID:	00003BAEBCD2
Netflix ESN:	BELVIPTMW=FFFF6A20085F
Netflix Installation Date:	Sat Mar 04 2017 06:35:39 GMT-0500 (EST)
Netflix NRDP:	
Netflix Partner Firmware Version:	KA25.01.07.04Alder.620435

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Separable Security   ^^^ Scroll Up ^^^

Card Interface:	GOOD
CableCard ID:	000-098-822-200-6
Host ID:	067-541-082-417-0
Data ID:	226-776-658-32
Validation:	Valid
Pairing Method:	MMI
Provider Phone #:	1-888-897-7499

Cable Card

Object Name:	MCblCard
Object Ver:	06.25
Manufacturer:	0x0000
HW Version:	0554050004
Boot Version:	04.03
2nd Version:	Not Available
Serial Number:	MT1636TQ6462
MAC Address:	34 1f e4 f2 e8 31

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The front panel displays the unit address of the device when the Address/Security screen is displayed, if the device supports a unit address. See the following examples:

```
1 2 3 -
4 5 6 7
8 - 9 0
1 2 3
- 4 5 6
```
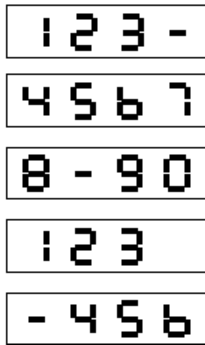
Table 4. Unit Address Fields

Field	Description
Address/Security	
CableCard Inserted	■ YES — CableCard is inserted ■ NO — CableCard is not inserted
Unit Address	A unique decimal number that indicates the unit address of the CableCard.
Serial Number	Displayed on the Unit Address Diagnostic screen.
MAC Addresses Installed	
MAC Addresses	The MAC addresses are stored in protected flash and displayed in hexadecimal.
HUD	Heads Up Display ID
Netflix ESN	The Electronic Serial Number (ESN) used to identify the device to Netflix.
Netflix Installation Date	
Netflix NRDP	The Netflix Ready Device Platform (NRDP) number used for Netflix integration.
Netflix Partner Firmware Version	
Separable Security	
CARD Interface	CableCARD Interface is a status indication of the interface between the RCM and CableCARD. It will indicate 'Good' if no errors were detected, 'Error' if there is a problem detected with establishing the CableCARD interface, or 'Unsupported CARD' if the inserted CableCARD is not an M-CARD.
CableCard ID	The unique identifier provided by the CableCARD.
Host ID	The unique identifier in the RCM Device Certificate.

Field	Description
Data ID	A value generated by the CableCARD for the Pairing report.
Validation	■ UKNOWN if a Validation message was not received by the product ■ VALID or INVALID as set by the Host Validation Message received from the headend ■ BINDING if the CableCARD is busy with the binding authentication process ■ NOT BOUND if Card validation status in not bound for CableCARD reasons ■ HOST CERTIFICATE INVALID if the status is not bound because the Host Certificate was invalid ■ HOST SIGN FAILED if status is not bound because of failure to verify Host's SIGN ■ AUTH KEY FAILED if status is not bound because of failure to match AuthKey from the Host Device ■ FAILED if binding failed for other reasons
Pairing Method	Set to 'MMI' or 'Reportback' as received by a message from the headend, or set to 'Unknown' if the headend message was not received.
Provider Phone #	Phone Number of the Provider as configured at the headend.

Cable Card

Object Name	Code object name executing on the CableCARD.
Object Ver.	Code object version executing on the CableCARD.
Manufacturer	CableCARD manufacturer.
HW Version	Version number provided by the CableCARD.
Boot Version	Version number provided by the CableCARD.
2nd Version	Version number provided by the CableCARD.
Serial Number	The CableCARD Serial Number provided by the CableCARD.
MAC Address	The CableCARD MAC Address provided by the CableCARD.

d03 Code and Download Menu

This diagnostic includes information about the firmware loaded in flash memory and all non-volatile code objects that are installed on the RCM.

Diag -> Code and Download

Campaign Download Status:	MRL Error
Campaign Version:	1.1.1
Campaign Name:	
Campaign ID:	
% of objects in Campaign Downloaded:	0
Additional Download Information >>	
MRL:	MasterXML.xml
Additional MRL Information >>	
Number of Objects in Campaign:	19
Object Download Information >>	
M-Card DL Information >>	
Host Object List >>	

Diag -> Code and Download -> Additional Download Information

Group ID:	1
Region ID:	N/A
Primary Server Download Path:	Unicast
Secondary Server Download Path:	Multicast
Code Installation May Start Time:	Tue Jan 01 1901 00:00:00 GMT-0500 (EST)
Code Installation Must Start Time:	Tue Jan 01 1901 00:00:00 GMT-0500 (EST)
Code Installation Start Time:	Mon Apr 23 2018 11:58:04 GMT-0400 (EDT)
Code Installation End Time:	Mon Apr 23 2018 12:01:45 GMT-0400 (EDT)
Code Installation Status:	Completed
Number of Software Objects:	19
Campaign Download Status:	MRL Error
Campaign Version:	1.1.1
Campaign Name:	
Campaign ID:	

Card Download

MCard Download Channel:	Not Available
MCard DL PID:	Not Available
MCard DL Segment Count:	Not Available
MCard DL Status:	Reserved
MCard DL Error:	Not Available
MCard Object Name:	Not Available
MCard Object Version:	Not Available

Diag -> Code and Download -> Host Object Table

Number of Objects Running:	19
Object Name:	kreatv-bi-alder_KA25.01.07.04Alder.620435_bcm15_vmsp2_signed.bin
Object Version:	25.01.07.04
Object Size:	74206056 Bytes
Status:	Executing
Object Name:	vms-webservice_17.9KA25.00.05.03Alder.616599_bcm15.iip
Object Version:	17.9
Object Size:	189872 Bytes
Status:	Executing
Object Name:	vms-do-offline-img_23.05KA25.01.06.02Alder.618199_bcm15.iip
Object Version:	23.05
Object Size:	12576 Bytes
Status:	Executing

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If a download is in progress, the completion percentage for the current download will display on the IPC4100 front display panel.

Download Percent complete, from 0 to 100%
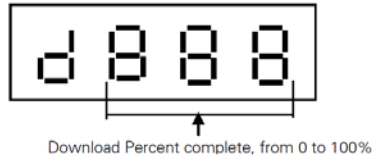
Table 5. Code Modules – Host Download Information Fields

Field	Description
Campaign Download Status	Available download status options of the campaign: ■ MRL Downloading ■ (Code Name) Downloading ■ Download Complete ■ No New Campaign
Campaign Version	Version of the software object loaded / downloading onto the set-top, expressed as major-minor 'x.y.z' version number.
Campaign Name	
Campaign ID	
% of objects in Campaign Download	

Field	Description
Group ID	Identifies the product configured Group.
Region ID	Identifies the product configured Region.
Primary Server Download Path	Available primary method for Code download options: ■ Multicast ■ Unicast ■ N/A
Secondary Server Download Path	Available secondary method for Code download options: ■ Multicast ■ Unicast ■ Undefined ■ N/A
Code Installation May Start Time	Configured time from the MRL when the product may start to download.
Code Installation Must Start Time	Time from the MRL when the product must start to download.
Code Installation	Date and time (local time) when the code installation was started.

Field	Description
Start Time	
Code Installation End Time	Date and time (local time) when the code installation was complete.
Code Installation Status	■ Pending ■ In progress ■ Completed ■ Failed ■ Idle Failure status indicates two attempts for installation of the successfully downloaded campaign have failed.
Number of Software Objects	Number of software objects loaded on the set-top including the objects being currently downloaded.
Campaign Download Status	Available download status options of the campaign: ■ MRL Downloading ■ (Code Name) Downloading ■ Download Complete ■ No New Campaign
Campaign Version	Version of the software object loaded / downloading onto the set-top, expressed as major-minor 'x.y.z' version number.
Campaign Name	
Campaign ID	

Table 6. Code Modules – MRL Information Fields

Field	Description
MRL XML File Name	MRL file name, if available
MRL Multicast IP Address	Multicast address required for MRL file download. This parameter is optional if the MRL gets downloaded via IP unicast method.
MRL Multicast Destination Port	Destination port parameter for the MRL file download. This parameter is optional if the MRL gets downloaded via the IP unicast method
MRL Source IP Address	Source IP address of the server. For multicast, this server is responsible for Multicasting the MRL file. For unicast, the STB downloads the MRL file from this server.

Field	Description
MRL PID	PID of the MRL file in the DSMCC carousel, if available.
MRL Url	Web address for accessing the MRL file.
MRL IPMC Join Interval	Interval (in minutes) for the product to join the MRL Multicast address for downloading the MRL file, if available.
Next MRL IPMC Join Time	Scheduled data and time when the product is expected joined the MRL multicast, if available.
Last Successful MRL IPMC Join Time	Time when the product last successfully joined the MRL multicast, if available.
MRL Error	Indicates the error (DLxx format), if any, that occurred during the download: ■ DL00 - No-error ■ DL21 - Invalid MRL source ■ DL22 - Unable to join MRL multicast ■ DL23 - Failed to authenticate MRL file ■ DL24 - Invalid MRL file ■ DL25 - Unable to parse MRL ■ DL26 - MRL without matching target type ■ DL27 - MRL missing campaign for target type
MRL Download Trigger	Allows you to select an immediate MRL Unicast or Multicast download. From the MRL Information screen, press the INFO key on the remote to enable a trigger for an immediate MRL download including any associated code object download. Once the trigger is enabled, use the right/left arrow keys to select the download method: Multicast, Unicast, or No Trigger to cancel. Press OK to activate the trigger. Note: The No Trigger option disables the MRL Download Trigger.

Table 7. Code Modules – Card Download Fields

Field	Description
MCard Download Channel	Download channel configured for the M-Card Object
MCard DL PID	Download PID detected for the M-Card Object
MCard DL Segment Count	Download segment count, if M-Card object is in the process of downloading.
MCard DL Status	Download status from M-Card:

Field	Description
	■ 0x00 Idle
	■ 0x01 WaitDLPID
	■ 0x02 WaitSeg0
	■ 0x03 Loading
	■ 0x04 AuthStor
	■ 0x05 WaitEnabl
	■ 0x06 WaitReset
MCard DL Error	■ 0x00 None
	■ 0x01 Segment 0 timeout
	■ 0x02 Header CRC error
	■ 0x03 Image CRC error
	■ 0x04 Image authentication error
	■ 0x05 Flashing error
	■ 0x06 Object enable timeout
	■ 0x07 Done and waiting for reset
	■ 0x08 Wrong image version
	■ 0x09 Host busy
	■ 0x0A Host did not find download PID
MCard Object Name	M-Card object name of the object being downloaded.
MCard Object Version	M-Card object version of the object being downloaded.

Note: Additional Host Object Table pages will display as the number of software objects increases.

Table 8. Code Modules – Host Object Table Fields

Field	Description
Object Name	Name of the software object loaded or downloading onto the set-top.
Object Version	Version of the software object loaded / downloading onto the set-top.
Object Size	Indicates the object size.
Status	Status of the object download, expressed as a text string, which may include: ■ Available ■ Download-in-progress ■ Download-Completed

Field	Description
	■ Download-Paused
	■ Authenticating
	■ Activation-Pending
	■ Installing
	■ Executing
	■ Executing-but-Deletion-Pending
	■ Error
	■ Other

Table 9. Code Modules – Host Object Table Fields

Field	Description
Associated DL Errors	Indicates the error, if any, that occurred during the download:
	■ DL00 - No-error
	■ DL01 - Object incompatible with the target STB
	■ DL02 - The object cannot be found
	■ DL03 - Reserved
	■ DL04 - Reserved
	■ DL05 - Reserved
	■ DL06 - The object fails validation / authentication
	■ DL07 - Storage capacity exceeded
	■ DL08 - Reserved
	■ DL11 - Download timed out
	■ DL12 - Unable to join the multicast group
	■ DL13 - Low memory
	■ DL14 - Invalid object format
	■ DL15 - Unsupported object type
	■ DL16 - Unable to reach unicast URL
	■ DL17 - Unable to resolve unicast URL
	■ DL18 - File does not exist
	■ DL19- Cannot access file
	■ DL31 - Could not flash
Download Server IP Address	IP address of the server from which the object is downloaded. In the case of Multicast, it represents the Source IP.
Current DL Server Type	Type of download server currently being used:
	■ Multicast
	■ Unicast
	■ N/A

Field	Description
Number of Bytes Downloaded	Indicator of the download progress provides the current value of the number of bytes received
Download Start Time	Date and time (local time) when the object download started.
Download Complete Time	Date and time (local time) when the object download completed
CDL % Complete	Indicator of download progress provides the current percent complete of the object download.
Multicast IP	The Multicast address required for the object download. Meaningful, only if the object is downloaded via IP multicast.
Multicast Destination Port	Multicast Destination port for the object download. Meaningful, only if the object is downloaded via IP multicast
Object PID	PID for the object in the DSMCC carousel; Note: The number of objects will increase the number of pages displayed, as necessary.

d04 Channel and Session Menu

This diagnostic displays current channels and services entering the home, including screens for Current Channel Status. Six screens will display for the six IB tuners and a seventh screen will display for the IP stream.

The following screens illustrate information for IB tuner 1, IB Tuner 2, and IP Stream:

Diag -> Channel and Session Status -> Digital Channels Acquired

Stream Name:	CNBC+ HD
IB Tuner:	TUNER1
Stream Status:	Locked and Acquired
Virtual Channel Number:	602
ECM Data Present:	True
Encrypt Mode:	ENC
Preview:	Not available
Purchasable:	Not available
Purchased:	Not available
EPOCH Num:	0x6
Authorization Reason:	0x12
Received CCI:	00
Received CCI Source:	DEFAULT_CCI
APS:	00
CIT:	0
DRM Valid:	0

Diag -> Channel and Session Status -> IGMP Parameters

Operating Mode of IGMP:	V3
Transport Error Count:	0
Current Filter List:	1005e000001,1005e000001,1005e7ffffa,1005e400001
Number Of Groups Joined:	3
Current Group Joined:	1
Join Time:	0:00000000
Mapped MAC address:	100C0E8
Current Group Joined:	6
Join Time:	0:00000000
Mapped MAC address:	FAFFFFEF
Current Group Joined:	1
Join Time:	0:00000000
Mapped MAC address:	10000E0

Diag -> Channel and Session Status -> Transcoder Parameters

Transcoder SW Version:	1.00.00
Transcode 4K Input Video?:	False
Transcoder In Low Power?:	False
Transcoder Error State:	Unknown
Count of Recoverable Errors:	0
Last Transcoder Session Failure Time:	Tue Jan 01 1901 00:00:00 GMT-0500 (EST)

Diag -> Channel and Session Status -> Recording Session

1 Recording Sessions

Source URL:	atsc://fr201000000.256.663?tuner_id=0
Session ID:	2
Session Types:	Recorder + Consumer
Transcoding Status:	No Transcoding
Record Type:	CIRCULAR RECORDING
Recorder Progress:	3596
Session Status:	Recording
Asset ID:	a_N9iBGz_LNa4z6

Table 10.   Channel and Session Fields

Field	Description
Digital Channels Acquired	
Stream Name	
IB Tuner	Indicates the source of the current channel being reported: ■ Tuner 1 ■ Tuner 2 ■ Tuner 3 ■ Tuner 4 ■ Tuner 5 ■ Tuner 6 ■ IP Stream
Stream Status	■
Virtual Channel Number	Indicates the Virtual Channel Number of the service acquired by that tuner.
The following information displays for each IB Tuner ID:	
ECM Data Present	Indicates if an Entitlement Control Message is detected for the acquired digital QAM service.
Service Encrypt Mode	Indicates if the of the service acquired by that tuner is encrypted. Values include: UNE - Unencrypted CLR - Clear ENC - Encrypted FWK - Fixed Working Key FPK – Fixed Program Key
Preview	Indicates whether the current program is in Preview mode
Purchasable	Indicates that the current program is available to be purchased for viewing
Purchased	Indicates that the current program was already purchased for viewing
EPOCH Num	Indicates the Identifier of the IPPV EPOCH.
Authorization Reason	The service authorization reason is displayed in hexadecimal format.

Field	Description
Received CCI	Copy control information:
	00 - Copy free
	01 - No more copies
	10 - Copy once
	11 - Never copy
	N/A - Value is invalid or cannot be retrieved
Received CCI Source	
APS	Analog Protection System;
	00 – No Macrovision
	11 – Type 3 Macrovision
	N/A - Value is invalid or cannot be retrieved
CIT	The constrained image trigger as delivered in the PRK or the Set DRM API:
	0 – Not set
	1 – Set
	N/A - Value is invalid or cannot be retrieved
DRM Valid	
IGMP Parameters	
Operating Mode of IGMP	
Transport Error Count	
Current Filter List	
Number of Groups Joined	
Current Group Joined	
Job Time	
Mapped MAC addresses	
Transcoder Parameters	
Transcoder SW version	
Transcoder 4K Input Video?	

Field	Description
Transcoder in Low Power?	True (low power) or False
Transcoder Error State	
Count of Recoverable Errors	
Last Transcoder Sessions Failure Time	
Recording Session	
Recording Sessions	
Session URL	
Session ID	
Session Types	
Session Status	
Asset ID	

d07 Audio / Video Status

This diagnostic displays the Audio / Video status. The information is updated each time this diagnostic is displayed.

```
Diag -> Audio Video Status
SPDIF:                          AC3
Low Frequency Effect:           0
Dolby Volume:                   Not Available
Captions:                       False, N/A
Descriptive Video Service Status:  Disabled
Detected DVS Languages:         Not Detected
Audio Mode:                     STEREO
Audio Mute / Video Mute:        True / False
Audio Lock / Video Lock:        True / True
Audio Decode Error Count:       0
Video Decode Error Count:       0
Output Control:                 Disabled
Analog Output Format:           NTSC
Digital Output Format:          1920 x 1080p_60
Input Source:                   DVR
Input Format:                   16:9 1920x1080 29
3DTV Mode:                      Auto
3DTV Format:                    2D
```

Table 11.   Audio / Video Status Fields

Field	Description
SPDIF	Indicates S/PDIF Mode as set by application software.
	■ N/A - Audio S/PDIF mode is not applicable
	■ IEC958PCM - PCM audio selected
	■ DD - Dolby Digital
	■ For Dolby Digital selection, the following speaker selection is set:
	■ 1/0 right front or left front
	■ 2/0 right front and left front
	■ 3/0 right front and left front and center
	■ 2/1 right front and left front and (right rear or left rear)
	■ 3/1 right front and left front and center and (right rear or left rear)
	■ 2/2 right front and left front and right rear and left rear
	■ 3/2 right front and left front and center and right rear and left rear
Low Frequency Effect	
Dolby Volume	
Captions	
Descriptive Video Service Status	
Directed DVS Languages	
Audio Mode	Indicates the Audio mode of the incoming digital service. Valid values:
	■ N/A - the audio mode is not applicable to the currently tuned stream
	■ Mono - Audio mode is monophonic
	■ Stereo - Audio mode is stereo
	■ Surround - Audio mode is surround sound
	■ 5.1 - Audio mode is Dolby Digital 5.1 surround sound
	■ 7.1 - Audio mode is Dolby Digital 7.1

Field	Description
Audio Mute / Video Mute	Indicates if any of the audio or video outputs have been muted by the software, for example, selectable output control.
Input Source	■ Input source for the audio and video, for example, IB Tuner.
Audio Mode	Indicates the Audio mode of the incoming digital service. Valid values: ■ N/A - the audio mode is not applicable to the currently tuned stream ■ Mono - Audio mode is monophonic ■ Stereo - Audio mode is stereo ■ Surround - Audio mode is surround sound ■ 5.1 - Audio mode is Dolby Digital 5.1 surround sound ■ 7.1 - Audio mode is Dolby Digital 7.1
Audio Lock / Video Lock	
Audio Decode Error Count	
Video Decode Error Count	
Output Control	
Analog Output Format	
Digital Output Format	
Input Source	
Input Format	Includes the aspect ratio (4:3 or 16:9), the screen pixel size (nnnnXnnnn), pixel display (i for interlaced, p for progressive), and frames per second (24, 25, 30, 60).
3D TV Mode	
3D TV Format	

Figure 15:

d06 Memory and CPU Status

This diagnostic displays the IPC4100 series memory configuration. The information is updated when the diagnostic is displayed.

Note: The Memory Configuration table will increase and scroll to multiple pages depending on the number of processes detected.

```
Diag -> Memory and CPU Usage
Total CPU Load:                        1 %
RAM Memory Total:                      4294967296 Bytes
RAM Memory Free:                       2077229056 Bytes
Flash Memory Used by Application:      18432333 Bytes
Flash Memory Used by Platform:        734008 Bytes
Persistent Logging In Progress:       Yes - Internal Hard Drive

Flash EraseBlocks Information
Erase Blocks Size:                     516096 Bytes
Available Erase Blocks:                1536
Bad Erase Blocks:                      0
Max Erase Counter / Threshold:         56 / 10000
Mean Erase Counter / Threshold:        N/A / 5000
Total Erase Blocks:                    1536


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```

Table 12.   Memory Configuration Fields

Field	Description
Total Memory	The allocated system RAM in MB
Memory Free	The size of free RAM memory expressed in megabytes (MB)
Total CPU Load	Total process load on the CPU
%CPU Per Process	Average CPU load percentage per process. Note: Scroll down for additional processes.

d07 Interface / Port Status

The Interface Status diagnostic displays when running in KreaTV.

```
Diag -> Interface / Port / User Setting
HDMI
    Mode:                          HDMI
    Color Space:                   YCC
    Device Connected:              Yes
    Video Xmission:                Muted
    HDCP Enabled:                  No
    Output Format:                 1920 x 1080p_60
    Aspect Ratio:                  16:9
    HDMI Audio Output / Rate:      PCM-2CH / 48 kHz




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```

```
User Setting                                          ^ ^ ^ Scroll Up ^ ^ ^
    TV Type:                       16:9
    Output Type:                   1080i
    1080p Passthrough Enabled:     Off
    Closed Caption Enabled:        Yes
    CC Analog Service Selection:   CC3
    CC Digital Service Selection:  D1
Detection of 3DTV Primary Formats
    Side by Side:                  No
    Top Bottom:                    No
    Other:                         Yes


    HDMI Audio Output:             PCM
    HDMI Audio Rate:               48 kHz




Page 2 of 2
```

Table 13.   Interface/Port Status -DVI/HDMI Fields (Page 1 of 2)

Field	Description
DVI / HDMI	
Mode	Indicates the connector mode: DVI or HDMI
Color Space	Indicates the color space used over the HDMI connection: YCC or RGB
Device Connected	■ Indicates whether a device is connected to the HDMI

Field	Description
	port: Yes or No.
Video Xmission	Video transmission — Indicates whether the IPC4100 is transmitting video over the HDMI port
HDCP Enabled	Indicates whether the IPC4100 is using HDCP to encrypt video transmitted over the HDMI link — Yes or No. If the Video Xmission status is Not Active, the HDCP Enabled status is No
output Format	Indicates the timing format of the video sent through HDMI: ■ 1920 x 1080p — 1920 pixels wide by 1080 pixels high, progressive ■ 1920 x 1080i — 1920 pixels wide by 1080 pixels high, interlaced ■ 1280 x 720p — 1280 pixels wide by 720 pixels high, progressive ■ 720 x 480p — 720 pixels wide by 480 pixels high, progressive ■ 720 x 480i — 720 pixels wide by 480 pixels high, interlaced ■ 640 x 480p — 640 pixels wide by 480 pixels high, progressive
Aspect Ratio	Indicates the aspect ratio of the video sent through HDMI: 4:3 or 16:9.
EDID DATA	Indicates the video timing formats that were read from the Extended Display Identification Data (EDID) register for the connected device. In particular, the detailed timing description blocks. The list displays a selection of common formats that the TV or repeater supports that have been read by the Product. If the Product cannot read any formats, EDID Data is blank. An asterisk (*) after the aspect ratio indicates the Product supports the format.

Table 14.   User Setting Fields (Page 2 of 2)

Field	Description
TV Type	Indicates how the style of television connected to the product was set (16:9 or 4:3) and the preferred content control method (for example, Letterbox, pan and scan, undistorted) ■ 16:9 designates that a widescreen television is connected to the set-top. ■ 4:3 LETTERBOX designates that a standard screen

Field	Description
	television is connected to the RCM set-top and that widescreen programs should be scaled to fit the screen with black bars above and below the picture.
	■ 4:3 PAN SCAN designates that a standard screen television is connected to the RCM set-top and that widescreen programs should be cropped so that the picture fills the entire screen.
Output Type	Displays the video output format of the RCM set-top for all content (when the 4:3 override setting is OFF) or for all 480p, 720p, and 1080i content (when the 4:3 override is used).
	Possible options:
	■ 1080p60 — High-Definition 1080p, 60 fps format (1920 x 1080 pixels).
	■ 1080i — (Default option) High-Definition 1080i format (1920 x 1080 pixels).
	■ 720p — High-Definition 720p format (1280 x 720 pixels)
	■ 480p — Enhanced-Definition 480p format (720 x 480 pixels).
	■ 480i —Standard-Definition 480i format (720 x 480 pixels).
1080p Passthrough Enabled	Shows whether the passthrough of 1080p2 is turned On or Off.
Closed Caption Enabled	Indicates if closed captions is turned ON or OFF. The front panel display indicates the status of the closed captions.
	Possible options: Yes or No (default)
CC Analog Service Selection	Shows the analog service used for closed captions.
	Possible options: CC1 (default), CC2, CC3, CC4, T1, T2, T3, or T4
CC Digital Service Selection	Shows the digital service used for closed captions:
	■ D1 - PRIMARY LANGUAGE (default)
	■ D2 - SECONDARY LANGUAGE
	■ D3, D4, D5, or D6
Detection of 3DTV Primary Formats	Indicates if the 3D video timing formats are read from the Extended Display Identification Data (EDID) register for the connected device.
Side by Side	Indicates if 3D 'Side by Side was detected: Yes or No
Top Bottom	Indicates if 3D 'Top Bottom' was detected: Yes or No

Field	Description
Other	Used for 2D for other formats in the EDID register: Yes or No
HDMI Audio Output	Indicates the format of the audio: ■ PCM ■ DD ■ AAC
HDMI Audio Rate	Indicates the audio rate, for example: ■ 32 kHz ■ 44.1 kHz ■ 48 kHz ■ 96 kHz

d8 Connected Home

Elements included in the Connected Home system will appear in the status. This diagnostic displays the MoCA network status.

Table 15.   Connected Home Fields

Field	Description
Network Link Type	Describes the link type: MoCA, Ethernet, or None The value is set to None to indicate that a connection is not established yet.
LAN MAC Address	MAC address assigned to the Local Area Network

Field	Description
MoCA Link Status	The status of the MoCA link. TRUE - Active FALSE – Inactive
MoCA Connectivity Loss Count	Number of times MoCA connectivity was lost since last boot.
Ethernet Link Status	The status of the Ethernet link. TRUE - Active FALSE – Inactive
Ethernet Connectivity Loss Count	Number of times Ethernet connectivity was lost since the last boot.
Additional Information	Selectable information screens for the following menu items: MoCA Node Network MoCA Phy Rates MoCA Power and Attenuation Level MoCA Packet Counts MoCA QoS Ethernet H/W Configuration Registered Client List DHCP Link Status LAN and QoS

MoCA Node Network

Table 16.   Connected Home – MoCA node network fields

Field	Description
RF Frequency	Displays the frequency of the MoCA RF channel in use by the set-top: 1125 to 1225MHz
RF Password	This parameter indicates the MoCA RF Password if MoCA privacy has been enabled. If MoCA privacy is not enabled, the parameter indicates N/A or the default (99999999988888888).
Number of Nodes in Network	Total number of nodes (i.e., devices) residing on the MoCA network.
Number of Nodes Connected to the Local Device	Total number of MoCA nodes/devices connected to the local node.
Local MoCA Node ID	Assigned MoCA node ID of the set top. MoCA node ID will range from 0-7 for devices in the MoCA 1.0 network MoCA node ID will range from 0-15 for devices in the MoCA 1.1 or 2.0 network
Total devices in network	A list of the MoCA devices in the network and for each node, the Node ID, the MOCA MAC address, and an indication of which one is the network coordinator. Node ID: MoCA-assigned node ID associated with the connected device. The NodeID ranges from 0-7 for devices in the MoCA 1.0 network.

Field	Description
	The NodeID ranges from 0-15 for devices in the MoCA 1.1 or 2.0 network
	MoCA MAC Address: MoCA layer MAC address used for the Phy level home network connection.
	Network Coordinator Indication: Shows which node in the MoCA network is acting as the Network Coordinator.

MoCA Tx and Rx Phy rates

Diag -> Connected Home -> MoCA Phy Rates

Node ID	MoCA Version	Tx Phy Rate (Mbps)	Rx Phy Rate (Mbps)
0	2.0	630	633
1	2.0	630	641
2*	2.0	***	***
3	2.0	641	637

Table 17.   Connected Home – MoCA Tx and Rx Phy rates fields

Field	Description
Phy rate table	Table of the Phy rates associated with each node in the MoCA network and any associated warning indications: Bw: Node has a link supporting less than 100 Mbps (the associated BHR RF LED will also blink). Fr: Node received significant packet errors caused by thermal noise or interfering signals. Pw: There is insufficient power at the node. Note: The warning indicators will appear next to the node ID when the condition occurs.

Field	Description
MoCA version	Indicates the MoCA version associated with each MoCA device detected on the corresponding node.
Tx Phy Rate	The physical layer transmit rate of the STB being polled to the connected node (indicated by node ID), expressed in Mbps.
Rx Phy Rate	The physical layer receive rate by the STB being polled from the connected node (indicated by node ID), expressed in Mbps.

MoCA Power and Attenuation Level

Diag -> Connected Home -> MoCA Power and Attenuation Level

Node ID	Tx Atten Level (dB)	MoCA Tx Power (dBm)	MoCA Rx Power (dBm)
0	22	-19	-46
1	14	-11	-46
2*	0	0	0
3	19	-16	-47

Table 18.   Connected Home – MoCA power and attenuation level fields

Field	Description
MoCA Power and Attenuation Level Table	Table of the Attenuation and Power associated with each node in the MoCA network
Tx Attenuation Level	MoCA transmit attenuation level (dB) for each direct link between the local device and each MoCA node on the MoCA network, if available.
MoCA Tx Power	The RF transmit power level at the connected MoCA node expressed in dBm for the link between the connected node and the STB being polled.
MoCA Rx Power	The RF receive power level at the STB being polled expressed in dBm for the link between the

Field	Description
	connected node and the STB being polled.

MoCA RX packet counts

Connected Home – MoCA RX packet count fields

Field	Description
Node ID	ID associated with each node in the MoCA network.
Total RX packet count	MoCA received packet count for each direct link between the local device and each MoCA node on the MoCA network, if available.
Uncorrectable PER	This parameter indicates the fraction of received packets that could not be corrected for the time period within PER Window. The value is expressed in 10-7. For example, the value 5 will represent the PER 5E-7.
Uncorrectable Packet Count	MoCA received uncorrectable packet count for each direct link between the local device and each MoCA node on the MoCA network, if available.

MoCA Short Term Packet Counts

Table 19.   Connected Home – MoCA short term packet count fields

Field	Description
Node ID	ID associated with each node in the MoCA network.
Short Term RX Packet Count	MoCA Short Term received packet count for each direct link between the local device and each MoCA node on the MoCA network, if available.
Current / Max PER Window	Window time in minutes for the Current and Maximum PER calculation. Expected range would be 60 minutes to 240 minutes. Window will be considered as t minutes in the past up to the current time.
Short Term Uncorrectable PER	This parameter indicates the fraction of received packets that could not be corrected for the time period within the current PER Window. The value is expressed in 10-7. For example, the value 5 will represent the PER 5E-7.
Short Term Uncorrectable Packet Count	MoCA received short term uncorrectable packet count for each direct link between the local device and each MoCA node on the MoCA network, if available.

MoCA Priority QoS

Diag -> Connected Home -> MoCA Priority QoS

Traffic Type	Priority LAN	DSCP Mark
Best Effort	N/A	0x00(Class 0)
AV Stream	5	0x28(Class 5)
AV Control	7	0x38(Class 7)

Table 20.   Connected Home – MoCA Priority QoS Fields

Field	Description
MoCA Priority QoS Table	Table of the Traffic Type and associated Priority LAN and DSCP Mark
Traffic Type	Traffic type that is to be tagged.
Priority LAN	The priority code point setting of a particular traffic type as defined by IEEE 802.1p. Possible values: 0-7 N/A indicates Priority is not assigned
DSCP Mark	DSCP value to be used.

Ethernet Hardware Configuration

```
Diag -> Connected Home -> Ethernet HW Configuration
   Ethernet MAC Address:          bc:64:4b:83:ed:bc
   Driver Loaded:                 True
   Flow Control:                  False
   Jumbo Packet:                  False
   Link Speed:                    N/A
   Link Duplex:                   False
```

Table 21.   Connected Home – Ethernet Hardware Configuration Fields

Field	Description
Ethernet MAC Address	MAC Address used for the Ethernet connection.
Driver Loaded	This parameter indicates whether the Ethernet driver is loaded. Possible values: True = Loaded False = Not loaded
Flow Control	This parameter indicates whether flow control has been enabled. Possible values: True = Enabled False = Disabled
Jumbo Packet	This parameter indicates whether Jumbo packets have been enabled. Possible values: True = Enabled False = Disabled
Link Speed	The link speed expressed in Mbps. Possible values: 10, 100 and 1000
Link Duplex	This parameter indicates whether Duplex mode is enabled (after auto negotiation) for the link. Possible values: True = Enabled False = Disabled

Registered client list (IP client)

Diag -> Connected Home -> Registered Client List

Registered SSL Client List	Registered DTCP Client List
00003BAEBCD2	FFAF585E20
000052F0030A	FF680B4827

Table 22.
Connected Home – registered client list fields

Field	Description
Registered SSL client list	Comma-separated list of SSL Device IDs of the registered IP client STBs. An updated list must be supplied when an IP client is added or removed
Registered DTCP client list	Comma-separated list of DTCP IP Device IDs of the registered IP client STBs. An updated list must be supplied when an IP client is added or removed (scroll down the list as the number of registered clients increase).

DHCP link status

Table 23.   Connected Home – DHCP link status fields

Field	Description
IP Address	IP Address of either the Ethernet or MoCA IP device, depending on the link type.
Subnet Mask	Subnet Mask of the device.
IP Address Lease Time	Date and time (local time) when the IP address was assigned by the BHR.
Time Remaining	Time (expressed in seconds) remaining before the IP lease expires.
IP Address Renewal Attempt Count	The number of times the IP Address was attempted for renewal since the last reboot.
IP Address Renewal Success Count	The number of times the IP Address was renewed successfully since the last reboot.
Renew Lease Control	Also known as the DHCP Renew Lease Control. This indicates if the IP Lease will be broken to force the device to reacquire an IP address.
BHR IP Address	IP Address of the BHR from the DHCP interaction.
BHR DNS 1 IP Address	IP Address of the DNS server from the DHCP interaction.
BHR DNS 2 IP Address	IP Address of a second DNS server, if detected from the DHCP interaction.

LAN and QoS

Diag -> Connected Home -> LAN and QoS

Wake On LAN: False
VLAN / QoS Status: True
Ethernet Priority QoS

Traffic Type	Priority LAN	DSCP Mark
Best Effort	N/A	0x00(Class 0)
AV Stream	5	0x28(Class 5)
AV Control	7	0x38(Class 7)

Connected Home – LAN and QoS fields

Field	Description
Wake On LAN	Indicates whether the WOL feature is enabled. Possible values: True = Enabled False = Disabled
Status VLAN/QoS status	Indicates whether VLAN 802.1p status is enabled. Possible values: True = Enabled False = Disabled
Ethernet Priority QoS table	Table of the Traffic Type and associated Priority LAN and DSCP Mark
Traffic Type	Traffic type that is to be tagged.
Priority LAN	Priority code point setting of a particular traffic type as defined by IEEE 802.1p. Possible values: 0-7 N/A indicates Priority is Not Assigned Possible
DSCP Mark	DSCP value to be used.

d09 Purchase / Poll / Upstream Status

This diagnostic displays the status of subscriber event purchases.

Diag -> Purchase/Poll/Upstream Status
Purchase Status

Purchase Balance:	10
Unsent Purchases:	00
Unack Purchases:	00
Last Purchase Poll Seq Num:	17442
Last Purchase Poll Reportback:	N/A

IPPV Status

IPPV Enable:	True
Credit Balance:	15000

Last Poll Status

Prep Command:	N/A
	N/A
Prep ACK:	N/A
	N/A
Poll Request:	N/A
	N/A
Poll ACK:	N/A
	N/A

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Diag -> Purchase/Poll/Upstream Status   ^^^ Scroll Up ^^^
Upstream Status

IP Reportback Configured:	Yes
OOB ID:	10.88.24.14
RADD IP Address:	71.245.239.29

Page 2 of 2

Purchase indicator

```
P.  00
```

ON when IPPV is enabled   Number of unsent purchases
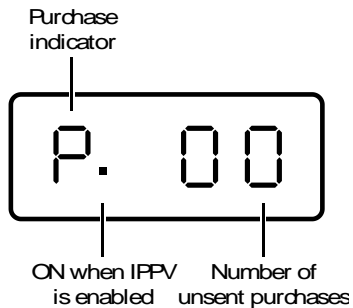
Table 24.   Purchase / Poll Status Fields

Field	Description
Purchases Balance	This value reflects the number of purchases that can be made. It is configured by the headend.
Unsent	The number of purchases in the RCM remaining to be polled. It can be an integer from 0 to 63.
Unack	The number of reports that have not been acknowledged by the controller. It is an integer.
Last Seq Num	The last acknowledged sequence number of a purchase sent by the controller. It is a 16-bit, unsigned hexadecimal number.
Last RB Time	The last time the Product attempted to report back purchases to the controller, in GPS seconds.
IPPV Status	If IPPV is enabled, the IPPV status indicator is ON. If IPPV is disabled, the IPPV status indicator is OFF.
Credit Balance	Credit available for IPPV Purchase.
Last Poll Status:	
Prep Command	"Last Prepare for Poll Command" sequence number and time of the last prepare for poll request command that was sent by the controller. Note that each requesting process maintains an independent sequence of poll requests to uniquely identify the poll responses.
Prep ACK	"Last Prepare for Poll Acknowledge" sequence number and time of the last Report Purchase request sent by the controller.
Poll Request	Sequence number and time of the last send poll buffer command that was sent by the controller.
Poll Acknowledge	Sequence number and time of the last Poll Acknowledge message sent by the controller.

d10 IN BAND Status

This diagnostic displays the in-band status for the last attempted tuned channel. The information is updated every five seconds.

```
Diag -> InBand Status
   Number of Tuners Installed:        6
   Number of Tuners Locked:           1

   Additional Information on Locked Tuners:
   Tuner1 >>                          In Use
   Tuner2                             Not In Use
   Tuner3                             Not In Use
   Tuner4                             Not In Use
   Tuner5                             Not In Use
   Tuner6                             Not In Use
```

Note: Additional information is available for the remaining five tuners on pages 3 thru 12. Scroll down to display for each additional tuner.

```
Diag -> InBand Status -> Tuner 1 Status
   Mode:                        QAM256
   Carrier Lock:                True
   Carrier Loss Lock Count:     0
   Data Detection:              True
   Frequency:                   201 MHz
   SNR Value:                   40.8 dB
   SNR Quality Indicator:       GOOD
   Signal Level / Received Power:  4

   5 Second Error Counts
   Uncorrectable:               0 Blocks
   Correctable:                 0 Bits
   Long Term Error Counts
   Uncorrectable:               0 Blocks
   Correctable:                 0 Bits
   Error Rates
   Uncorrectable:               0
   Correctable:                 0
```

Table 25.   In Band Status Fields (Page 1)

Field	Description
Mode	The values displayed are: ■ 64 QAM — 64 QAM digital channel ■ 256 QAM — 256 QAM digital channel

Field	Description
Carrier Lock	Indicates whether the in-band receiver is locked to the carrier. If a digital carrier is not present, it indicates the carrier is not locked:

Front Panel Indicator	**Description**
L	Carrier locked
U	Carrier unlocked

Field	Description
Carrier Loss Lock Count	Indicates the cumulative number of times the inband tuner has lost lock on the inband frequency since last the tune.
PCR Lock	Indicates whether the in-band receiver is locked to the current program clock reference for a digital video service on the specified tuner. If a digital carrier is not present, it indicates the PCR is not locked.
Data Detection	Indicates whether data is being carried on the in-band stream. The indicators cover all packet processors regardless of the stream they are monitoring:

Front Panel Indicator	**Description**
ON	In-band data detected within last 5 seconds
OFF	In-band data not detected within last 5 seconds

Field	Description
Frequency	This indicates the center frequency that the specified tuner is locked onto. The frequency is displayed in MHz in xxxx.xxx format and ranges from 52.75 to 864 MHz.
SNR Value	When carrier lock has been established, displays an estimate of the carrier signal-to-noise ratio in dB.
SNR Quality Indicator	■ GOOD — Good value ■ FAIR — Marginal signal level, check the signal ■ POOR — Unusable signal ■ INVALID — Invalid SNR value
Signal Level/Received Power	Indicates the number of correctable and uncorrectable digital multiplex errors, up to 9999. It is updated every 5 seconds and reset each time the IPC4100 series is power cycled or another digital multiplex is tuned. The

Field	Description
	maximum value displayed is 9999, even if there were more than 9999 errors.

Table 26.   In Band Status Fields (Page 2)

Field	Description
5 Second Error Counts	Indicates the number of correctable and uncorrectable digital multiplex errors. It is updated every 5 seconds and reset each time the Product is power cycled or another digital multiplex is tuned. The maximum value displayed is 9999, even if there were more than 9999 errors.
Long Term Error Counts	Indicates the number of correctable and uncorrectable digital multiplex errors in the digital multiplex either since the last tune or over the last 24 hours.
Error Rates	Indicates the estimated error rates for Uncorrectable Blocks and Correctable Bits. Rates are displayed as a cumulative calculated value from either the last tune or over the last 10 minutes, whichever interval is shorter.

d11 Out-of-Band (OOB) Status

This diagnostic indicates the out-of-band control channel status. The information is updated every five seconds.

```
Diag -> OOB Status
OOB Status:                      Active
OOB Frequency:                   75.25 MHz
Carrier Lock:                    True
Carrier Lost Lock Count:         N/A
Data:                            True
EMM Data:                        True
SNR:                             25.9 dB GOOD
EMM Provider ID:                 N/A
EMM PID:                         0x1503
Network PID:                     0x0777
Signal Level / Received Power:   20
Hunt Mode:                       Hunted
Last Known Carrier:              75.25 MHz
Manual Frequency:                75.25 MHz
Category Sequence Number:        0x01/02
CSN Last Updated:                Tue Feb 06 2018 16:23:06 GMT-0500 (EST)
```
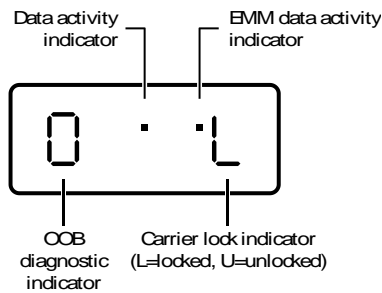

Data activity indicator   EMM data activity indicator

OOB diagnostic indicator   Carrier lock indicator (L=locked, U=unlocked)

Table 27.   Out-of-Band Status Fields

Field	Description
OOB Status	Indicates if the control channel is activated from both head-end connect and ACS activation.
OOB Frequency	Indicates the OOB tuner center frequency, from 70 to 130 MHz.
Carrier Lock	Indicates whether the OOB receiver is locked to the carrier:

Front Panel	Description
L	Carrier locked
U	Carrier unlocked

Carrier Lock Loss	Indicates the cumulative number of times the OOB tuner

Field	Description
Count	has lost lock since the last reboot.
Data	Indicates whether data is being carried by the OOB and EMM traffic, which is tracked separately:

Front Panel	Description
ON	OOB data detected within last 5 seconds
OFF	OOB data not detected within last 5 seconds

Field	Description
EMM Data	Indicates whether EMM data is being carried on the OOB stream:

Front Panel	Description
ON	EMM data detected within last 5 seconds
OFF	EMM data not detected within last 5 seconds

Field	Description
SNR	When carrier lock has been established, displays an estimate of the carrier signal-to-noise ratio in dB, with an explanation: ■ GOOD — Good value ■ FAIR — Marginal signal level, check the signal ■ POOR — Unusable signal ■ INVALID — Invalid SNR value
EMM Provider ID	Displays the conditional access stream for the IPC4100 series, in hexadecimal.
EMM PID	Displays the packet identifier (PID) stream the IPC4100 series tunes to for EMM data, in hexadecimal.
Network PID	Displays the network PID to which the IPC4100 is tuned to receive network messages, in hexadecimal.
Signal Level/Received Power	Indicates the estimated received power for that frequency in dBmV.
Hunt Mode	The hunt mode includes Hunted, None, Round Robin (RR), Search (SRCH), Fixed Frequency (FIX), or EMM Provider ID (EMM).
LKC	The Last Known Carrier is the last valid OOB frequency that receiver has successfully acquired. The carrier value is displayed in MHz and ranges from 70 to 130 MHz, with the specific values of: 75.25, 104.20, 72.75, 92.25, 98.25, 107.25, 107.40, 110.25, 116.25, and 103.75.

Field	Description
	LKC will remain blank during hunting if a valid carrier has not been found, and will be populated once a valid OOB is found.
Man Freq	Only displayed when IPC4100 series is not hunting and the operator presses "menu" button. The operator can then scroll up or down to one of the specific OOB frequencies.

d12 Keypad Status

This diagnostic verifies the functionality of the front panel indicators and the front panel keypad. Each highlighted character corresponds with a front panel key press.

The front panel key presses should also highlight the corresponding character and a front panel indication. Also, a segment on the front panel 7-segment display should illuminate with each press of a front panel key.

```
Keypad Status
   < left Cursor
   > Right Cursor
   U Up Cursor
   D Down Cursor
   I Info Key
   S Select Key
   + Channel Up Key
   - Channel Down Key

   Key Code: 40
   Press Exit button to exit this screen
```

Table 28.   Keypad Status Fields

Field	Description
Key Code	Indicates the key code of a front panel key or an IR Key to press.

d13 DRM Info

PlayReady

Widevine

d14 OTT Session History

This screen displays the diagnostic displays the OTT Session History.

Table 29.   OTT Session History

Field	Description
Active OTT Session Info	
OTT Session Active	Yes No
DRM	Digital Rights Management

Troubleshooting

Troubleshooting guidelines follow. If problems still occur after performing the diagnostics, call your service provider for assistance.

Problem - if this occurs:	Solution - Then do one of the following:
The IPC4100 will not power ON.	■ Verify that the power supply is connected to the VMS and an AC outlet. Then, check to confirm that the POWER indicator light on the rear of the VMS is lit. Unplug the power cord on the VMS from the AC outlet, plug it back in, and then press the POWER button.
	■ If the VMS is connected to a switched outlet on another unit, verify that the unit is powered on. Unplug the power cord from the rear of the VMS, plug it back it in, and then press the POWER button. Use an unswitched outlet, if possible.
	■ Press the POWER button on the VMS front panel instead of the remote control. The batteries in the remote control may be depleted.
	■ The VMS may have received a software update and may not power ON while the new software is being installed. Try again in a few minutes.
The remote control does not work.	■ Verify that the remote control is in STB mode.
	■ Verify that there are no obstructions between the remote control and the VMS. Aim the remote control directly at the VMS front panel, not the TV or VCR.
	■ The angle between the remote control and the VMS may be too large. Stand in front of the VMS and not too far to either side.
	■ Press and release operation keys one at a time, firmly and deliberately.
	■ Try changing channels using the buttons on the VMS front panel.
	■ Check the batteries in the remote control. Install new batteries if needed.

There is no audio when viewing cable channels.	■ Verify that the mute button on the remote control has not been pressed. Press MUTE on the remote control to restore sound.
	■ If the VMS audio output is connected to the TV, verify that the mute button on the TV has not been pressed.
	■ If the VMS audio output is connected to a home theater receiver, verify that the receiver is set to the appropriate input source and the mute button on the receiver has not been pressed.
	■ Verify that you have the correct cables for the audio connections.
	■ Verify that the audio cables are firmly connected between the VMS and the audio playback device (TV, receiver, DVD player, etc.).
There is no audio from the center and/or surround speakers of a home theater receiver connected to the VMS.	■ Not all Dolby Digital programs feature full 5.1 surround sound. In some cases, the programs may only contain left and right stereo audio.
	■ Verify that the S/PDIF cable (coaxial or optical) is firmly connected to the VMS and the home theater receiver.
	■ Verify that the home theater receiver is set to a surround sound audio mode (Dolby Digital, Dolby Pro Logic II, Dolby Pro Logic).
	■ Verify that the receiver is properly configured to work with all connected speakers.

There is no video on the TV screen	■ Verify that the TV is powered on and set to the appropriate input source for the VMS.
	■ Verify that the VMS is powered on and tuned to an authorized cable channel.
	■ Verify that all video cables between the VMS and the TV are firmly connected.
	■ Verify that the coaxial cable feed is firmly connected to the VMS and the wall jack.
	■ If the VMS video output is connected to a home theater unit, verify that the home theater unit is powered on and set to the appropriate input source.
	■ If the VMS video output is connected to a TV through an HDMI connection, power off the TV and then power off the VMS. Wait one second and then power on the devices.
	■ Not all HDTVs can display every output format (1080i, 720p, 480p, or 480i) available on the VMS.

To select a different format:

1. Ensure that your VMS is plugged into a power outlet and is turned off.
2. Ensure the TV is turned on and tuned to the appropriate channel for the set-top
3. Press the MENU key on the front panel. Your settings are displayed on the VMS front panel.
4. Use the ▲ and ▼ keys on the front panel to display the HDMI/YPbPr OUTPUT setting.
5. Press the ► key to cycle through the available output formats until a picture displays on the TV.

| No closed captions display. | ■ Verify on the User Settings menu that closed captions are enabled on the VMS. |
| | ■ Verify that closed captions are enabled on the TV. |

Note: Closed captioning may not be available on the current program.

There are black bars to the right and left of the picture.	■ Widescreen TVs display 4:3 programs in this format unless set to Stretch. Turn on the 4:3 OVERRIDE feature in the User Settings menu. This enables most widescreen TVs to stretch the video to fill the screen (see your TV manual for information about stretching 4:3 video). ■ If the VMS is connected to a widescreen TV, verify that the TV TYPE is set to 16:9 in the User Settings menu. ■ Many HD programs are broadcast in pillar-box format with black bars to the left and right of the picture. These programs are broadcast in 16:9 HD formats, even though the video is not 16:9.
There are black bars above and below the picture.	All 4:3 HDTVs display HD programs in letterbox format (black bars above and below the picture) because of the shape of the display screen. ■ Turn on the 4:3 OVERRIDE feature in the User Settings menu. This enables most standard screen TVs to display a full screen picture when the VMS is tuned to a 4:3 program. ■ Set the TV TYPE to 4:3 Pan-Scan. This enables the VMS to remove the black bars above and below the picture when possible. Some SD programs are broadcast in the letterbox format with black bars above and below the picture. Some widescreen TVs offer a zoom feature that may be able to remove the black bars (see your TV manual for information about zooming 4:3 video).

There are black bars on all four sides of the picture.	This may occur on a 4:3 TV if the 4:3 OVERRIDE setting is OFF. To set 4:3 SD programming to fill the screen, depending on the capabilities of the TV, set 4:3 OVERRIDE to 480i or 480p.
	This may occur on a 16:9 TV if the active video for an SD broadcast is in letterbox format. To confirm, wait for a commercial or look for a graphic, such as a network logo. If the commercial fills the screen from top to bottom, or the graphic appears below the active video, the program is being letterboxed by the broadcaster. You can minimize this by activating the zoom feature on the TV.
	A broadcaster may include black bars on either side of a widescreen broadcast. This is called a "hybrid" aspect ratio and results in a black border surrounding the video on a 4:3 TV. Because this is part of the broadcast, the VMS cannot correct the video. You may be able to minimize the border using the zoom feature on the TV.
Colors do not appear correctly.	Be sure to match up each signal to the same Component (YPbPr) connection on the TV. Otherwise, colors will not appear correctly on your TV.

Definitions, Acronyms and Abbreviations

Table 30.   Definitions, Acronyms and Abbreviations

Acronym	Description
AV	Audio/Video
BUI	Basic User Interface
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name Service
DRAM	Dynamic Random Access Memory
EDID	Extended Display Identification Protocol
FQDN	Fully Qualified Domain Name
HDCP	High-bandwidth Digital Content Protection
HDD	Hard Disk Drive
HDMI	High-Definition Multimedia Interface
ICMP	Internet Control Message Protocol
IB	In-Band
IP	Internet Protocol
IPPV	Impulse Pay Per View
IPTV	Internet Protocol Television
KA	KreaTV Americas
LAN	Local Area Network
LED	Light Emitting Diode
MAC	Media Access Control
MoCA	Multimedia Over Coax Alliance
MRL	Media Resource Locator
NTP	Network Time Protocol
ONT	Optical Network Terminator
OOB	Out of Band

Acronym	Description
PER	Packet Error Ratio
PFD	Protected Flash Data
QAM	Quadrature Amplitude Modulation
rDVR	Remote DVR
SMART	Self-Monitoring, Analysis, and Reporting Technology
STB	Set-top box
TR-069	Technical Report 069
UI	User Interface
URL	Uniform Resource Locator
USB	Universal Serial Bus
UTF	Unicode Transformation Format
RCM	Video Media Server
WAN	Wide Area Network
XML	Xtensible Markup Language

ARRIS Contacts

Technical Services

For technical support on ARRIS products you can contact us by phone or on the web.

By Telephone The Technical Support Center may be reached at:
1-888-944-HELP (4357)

On the Web The Ask ARRIS web site gives you web access to service and support tools. You will need to register using your support contract ID and email address. Ask ARRIS is located at:

http://www.arris.com/support

There you will be able to access:

- Support Contact Information for all products
- Knowledge Base Information (also known as Solutions)
- User Documentation
- Current open support cases
- Ability to create a new support case (for technical support or repair and return)
- Training Webcast

By Email Email addresses for ARRIS products will be provided with your account at Ask ARRIS.

Technical Training

For more information about our Global Knowledge Services Department and the programs we offer, e-mail us at:

training@arris.com

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