

# HITS Install Guide 1:1 IRD Configuration

Installation Guide

Revision B — February 17, 2021

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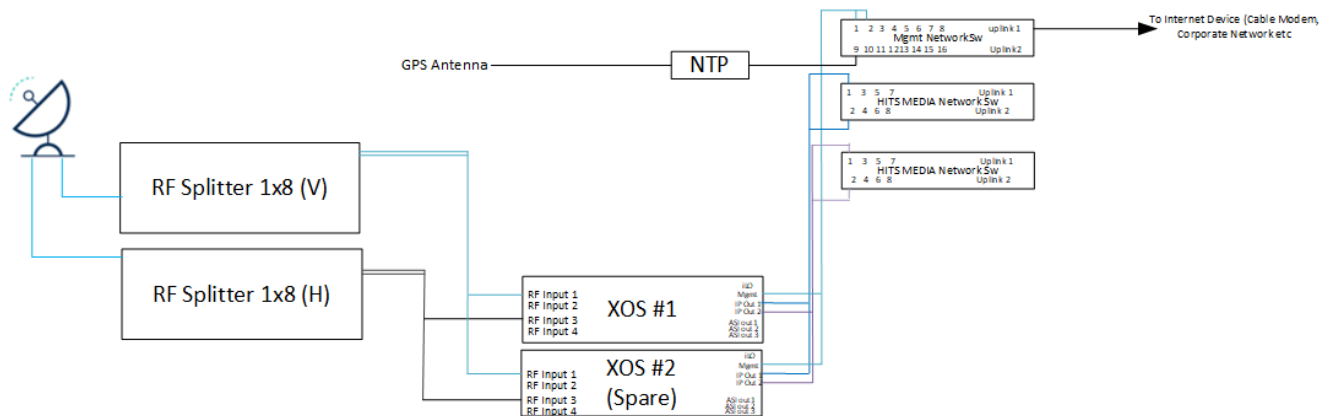
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## Abbreviations (1:1)

The followings are abbreviations used in this document:

Term	Definition
A/V	Audio and video
BOM	Bill of material
CFE	Customer-furnished equipment
CFI	Customer-furnished information
COTS	Commercial Off the Shelf
DMS	Distribution management system
HITS	Headend in the sky
HD	High definition
HP	Hewlett Packard
HVAC	High-voltage and air conditioning
IRD	Integrated receiver-decoder (XOS)
XOS	Harmonic Transcoder / Receiver (IRD)
OTA	Over-the-Air
NTP	Network Time Protocol (system reference clock)
SAMS	Subscriber authorization management system
SD	Standard definition

## System diagram - 1:1 IRD configuration



## IP addressing 1:1 IRD configuration

**Network Addressing – Note these are private IP addresses that can be used on an isolated Network.**

**You may want to consult with your IT Department if they prefer you use different IP addresses for this system.**

### Network

Network	Mask	Gateway	VLAN ID	Type	DNS
Management	/24	192.168.100.1	1	Static	8.8.8.8, 8.8.4.4
Egress network	/24	172.10.100.1	100	Static	N/A
WAN	/24	Customer defined	Customer defined	DHCP, static, or bridge	

### Devices

Device name	Serial number	iLO IP address	Management IP address	Egress IP address	Mux 1 Output Multicast IP/ Port #	Mux 2 Output Multicast IP/ Port #	Mux 3 Output Multicast IP/ Port #
XOS-IRD01		192.168.100.111	192.168.100.11	172.10.100.11			
XOS-SPARE		192.168.100.112	192.168.100.12	172.10.100.12			
NTP			192.168.100.100				

Device name	Serial number	iLO IP address	Management IP address	Egress IP address	Mux 1 Output Multicast IP/Port #	Mux 2 Output Multicast IP/Port #	Mux 3 Output Multicast IP/Port #
Remote Computer (CFE)			192.168.100.200				

**Login information**

Device	IP address	User name	Password
Management switch		cisco	cisco
Data switch 1			Customer defined
Data switch 2			Customer defined
NTP server			Public
Remote PC (CFE)			
XOS IRD iLO		Administrator	(see unit tag)
XOS IRD https:		hitsoperator	hitsaffiliate

## Proposed rack elevation 1:1 IRD configuration

The rack layout is dependent on individual site requirements. A recommended rack elevation of HITS Downlink system is shown below. A cabling harness is provided based on this rack elevation.

rack	RU	POS	HITS 1+1		Walls	Depth
70.00	40	AP	PDU-Primary			
68.25	39	AO	PDU-Backup			
66.50	38	AM	1x8 RF Splitter-Vertical		3	0.03
64.75	37	AM	1x8 RF Splitter-Horizontal		3	0.03
63.00	36	AL	NTP100		7.5	0.07
61.25	35	AK	Mgmt Switch		30	0.25
59.50	34	AJ				
57.75	33	AH	Media Switch		240	2.18
56.00	32	AG	Media Switch		240	2.18
54.25	31	AF				
52.50	30	AE	NOS Server		500	4.17
50.75	29	AD	NOS Server (Spare)		500	4.17
49.00	28	AC				
47.25	27	AB				
45.50	26	AA				
43.75	25	Z				
42.00	24	Y				
40.25	23	X				
38.50	22	W				
36.75	21	V				
35.00	20	U				
33.25	19	T				
31.50	18	S				
29.75	17	R				
28.00	16	Q				
26.25	15	P				
24.50	14	O				
22.75	13	N				
21.00	12	M				
19.25	11	L				
17.50	10	K				
15.75	9	J				
14.00	8	H				
12.25	7	G				
10.50	6	F				
8.75	5	E				
7.00	4	D				
5.25	3	C				
3.50	2	B				
1.75	1	A				
					1523.5	13.08
AC PDU (20amp) - Dual PS					120v	13.08
						2

## Power requirements 1:1 IRD configuration

Device	Plugs (ea)	Nominal (W)	Current (A)	Quantity	Total watts	Total amps
Harmonic XOS 7060 with RF card (IRD)	2	500.0	4.17	2	1000	8.34
NTP-100	1	7.5	0.07	1	1	0.07
Cisco RV345 VPN Router with 16 Gigabit Ethernet (GbE) Ports plus Dual WAN	1	30.0	0.25	1	30	.25
Cisco 250 Series SG250X-24	1	195.0	1.63	2	390	3.26
Quintech 8-Way Active Splitter LS082150A1FVA000	1	3.0	0.03	2	6.0	0.06
Tripplite PDU (20Amp)	2					


### Rack units required

Device	Required RUs	Total watts	Total amps
Equipment	7	1426	11.91
Blank panels	2		
Total	9		

## Step 1 - Equipment installation 1:1 IRD configuration


To use the pre-fabricated wiring harness supplied, which is based on the proposed rack elevation, install the equipment based on the following steps. You can deviate from this layout, but the pre-fabricated harness may require adjustment.

1. Install the 2 PDUs at the top of the open space in the rack.


 The PDUs can be installed in the front or in the rear of the rack if you have back mounting posts.

If your rack already has PDUs or AC strips you can use those.

2. Install the two RF splitters below the PDUs.
3. Install the NTP clock device just below the two RF splitters.
4. Mount the brackets to the Cisco Management switch and install the Cisco Management switch below the NTP clock device.

 The management switch and the data switches can also be mounting facing to the rear.

5. Skip a rack unit in the rack elevation.
6. Mount the brackets to the Cisco GbE data switches and install in the rack according to the above rack elevations.
7. Skip a rack unit in the rack elevation.
8. Install the IRD slide rails into the rack as indicated in the HP rails document included in the box.

 When installing the IRD on the slides, make sure to have two people perform the task due to the weight of the IRD.

## Wirelist 1:1 IRD configuration

Cable	Source	Port	Destination	Port	Cable	Cable label source	Cable label destination
101	MNG-SW	P1	XOS-IRD #1	GBE1	101	MNG-SW P1	XOS-IRD #1 GBE1
102	MNG-SW	P2	XOS-IRD SPARE	GBE1	102	MNG-SW P2	XOS-IRD #2 GBE1
109	MNG-SW	P9	NTP	GBE1	109	MNG-SW P9	NTP GBE1
201	VID-SW1	P1	XOS-IRD #1	GBE3	201	VID-SW1 P1	XOS-IRD #1 GBE3
202	VID-SW1	P2	XOS-IRD SPARE	GBE3	202	VID-SW1 P2	XOS-IRD #2 GBE3

<b>Cable</b>	<b>Source</b>	<b>Port</b>	<b>Destination</b>	<b>Port</b>	<b>Cable</b>	<b>Cable label source</b>	<b>Cable label destination</b>
301	VID-SW2	P1	XOS-IRD #1	GBE4	301	VID-SW2 P1	XOS-IRD #1 GBE4
302	VID-SW2	P2	XOS-IRD SPARE	GBE4	302	VID-SW2 P2	XOS-IRD #2 GBE4
401	V-SPLIT	P1	XOS-IRD #1	RF-1	401	V-SPLIT P1	XOS-IRD #1 RF-1
402	V-SPLIT	P2	XOS-IRD SPARE	RF-1	402	V-SPLIT P2	XOS-IRD #2 RF-1
501	H-SPLIT	P1	XOS-IRD #1	RF-3	501	H-SPLIT P1	XOS-IRD #1 RF-3
502	H-SPLIT	P2	XOS-IRD SPARE	RF-3	502	H-SPLIT P2	XOS-IRD #2 RF-3

## Step 2 - System cabling 1:1 IRD configuration

Harmonic provides two wiring harnesses based on the number of IRDs provided.

One harness provides RF connections from the two RF Splitters to the Primary and Spare XOS IRDs.

The other harness is for the network cabling of the Cisco management Switch and the two Cisco Data Switches to the XOS IRDs.

### RF cabling 1:1 IRD configuration

1. Connect the RF cables to the RF splitters.
  - a. There are 4 RF Cables in the RF Wiring harness for the 1:1 Configuration
    - i. 2 Cables to the Vertical RF Splitters
    - ii. 2 Cables to the Horizontal RF Splitters
  - b. For this 1:1 configuration, each RF splitter (V/H) will have two RF cables connected to it.
2. Install the RF terminators on the ports that are not being used.
3. Connect the RF cables to the IRDs as follows:
  - a. The **VERTICAL POLARIZED FEED** goes from RF Splitter to **RF PORT #1** on each IRD
  - b. The **HORIZONTAL POLARIZED FEED** goes from RF Splitter to **RF PORT #3** on each IRD

### Network cabling 1:1 IRD configuration

The cable bundle for the network cables is made for the network switches when they are mounted in the front of the rack. However, if you decide to rear mount your network switches, the wiring harness still works.

1. Install the network cabling to the IRDs.  
Each IRD will get one management connection and two GbE data connections.
2. Once the cables are connected to the IRDs, feed the bundle of cables up the left side of the rack (facing the back of the rack) and toward the front of the rack.
3. Feed the management cables and the network cables for the primary data switch through the blank space between the management switch and primary data switch.
4. Connect the cables to their appropriate ports on the switches.  
The cables for the backup data switch will be fed through the blank space between the backup data switch and IRD 1.
5. Connect the cables for the backup data switch to their appropriate ports.

If the switches are installed in the rear of the racks do the following:

1. Once the network cables are connected to the IRDs, feed the cable bundle up the left side of the rack and behind the network switches.  
The management cables and the primary network cables come out on the right side of the switches between the management switch and primary data switch.
2. Connect these cables to their appropriate ports on the management and the primary data switch.
3. Feed the backup data network switch cables behind the switch and between the backup data network switch and IRD 1.

4. Connect the network cables to their appropriate data switch port.

## Power cabling 1:1 IRD configuration

Two 20 amp PDUs are supplied by Harmonic for powering the devices. The PDUs can be mounted in the back of the rack or the front of the racks. One top-mounted PDU is the primary PDU and the other is the backup PDU.

1. Connect the vertical RF splitter (P1), management switch (P2), and primary data switch (P3) to the primary PDU.
2. Connect the horizontal RF splitter (P1), NTP-100 (P2), and backup data switch (P3) to the backup PDU.
3. Connect the power cords to the IRDs.
4. Connect the IRD 1 primary power supply to the primary PDU (P4) and IRD 1 backup power supply to the backup PDU (P4).
5. Connect the SPARE IRD primary power supply to the primary PDU (P5) and IRD 2 backup power supply to the backup PDU (P5).

## Step 3 - 1:1 procedure: Cisco RV345 management switch configuration

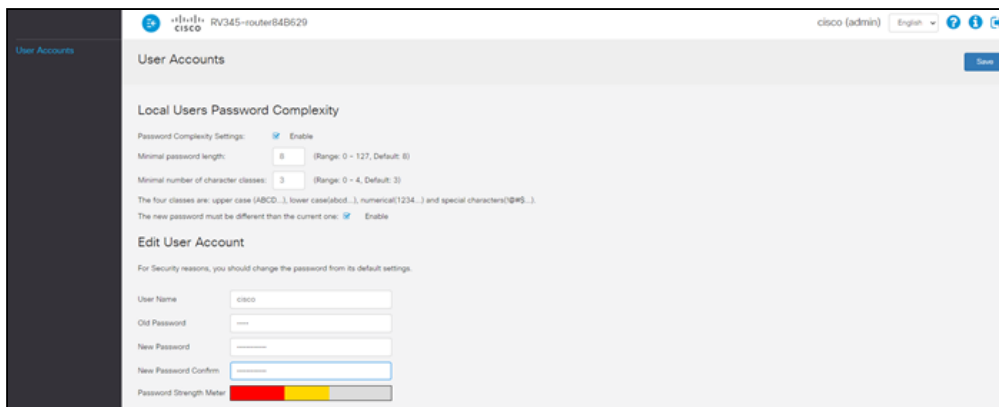
### Management switch purpose and scope (1:1)

The purpose of this document is to provide the configuration procedures needed to configure Cisco RV345 management switch to fit in current affiliates sites network environments for XOS IRD operation, monitoring, and troubleshooting.

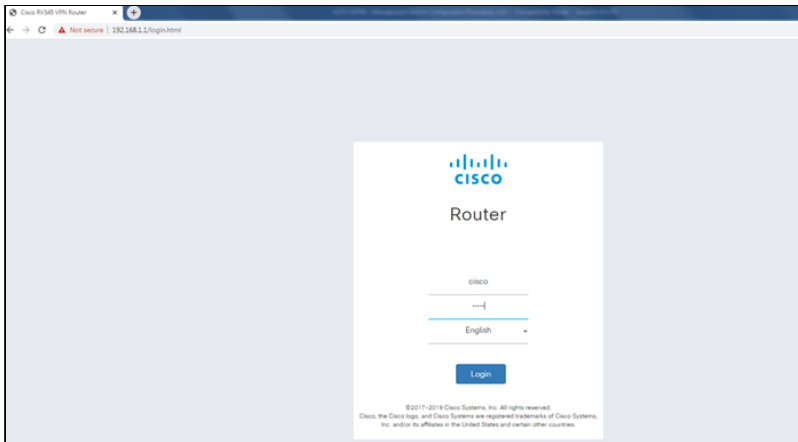
### How to power on PV345 management switch and initial setup (1:1)

Power on the PV345 switch and connect a PC to LAN port 16 (marked “DMZ”) or any LAN port. Configure the PC IP address to use DHCP. The 192.168.1.x range is assigned to the PC.

1. Open a web browser.
2. In the address bar, enter the default IP address of the device, 192.168.1.1. The browser might issue a warning that the website is untrusted. Continue to the website.
3. When the sign-in page appears, enter the default username **cisco** and the default password **cisco** (lowercase).
4. Click **Login**.
5. Before starting the setup wizard, a password change window appears when you log into the router for the first time after a factory reset. The screen displays the user accounts link. It will ask for the following:
  - a. Old password.
  - b. New password. (**Record and retain in a safe place.**)
  - c. Confirm new password (Password Strength Meter).
  - d. Click **Save**.



6. Click **Login**.



7. After the password change you do not need to use the setup wizard. use the instructions located in LAN settings changes (7:1) to manually adjust the settings.



**Note**

During the system boot up, the power LED will flash until the system has fully booted. The system boot time is less than 3 minutes, typically, if the device is fully configured with all features. With the configuration settings set to a maximum, it might take up to 7 minutes to fully boot the system. Refer to the description of the LEDs in PVR345 user manual.

## LAN settings changes (1:1)

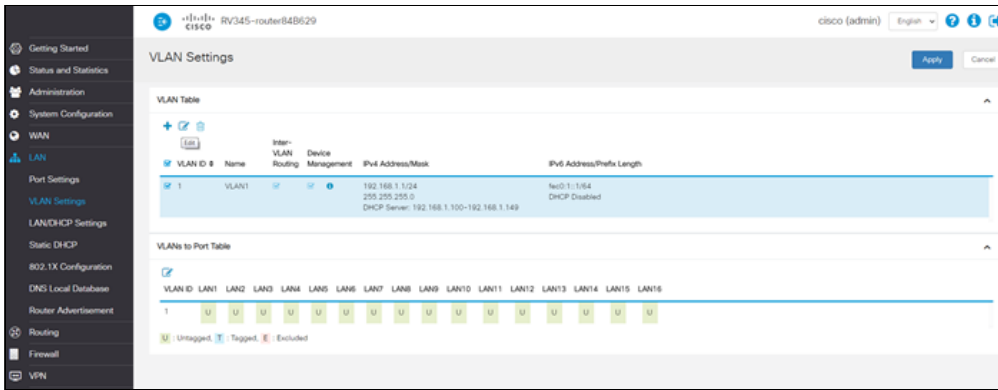
The PVR345 switch is configured with the default settings on the LAN setup as DHCP and the default IP addresses range as 192.168.1.XXX. However, the XOS IRD uses static IP addresses and 192.168.1.XXX might conflict with some sites default IP address range.



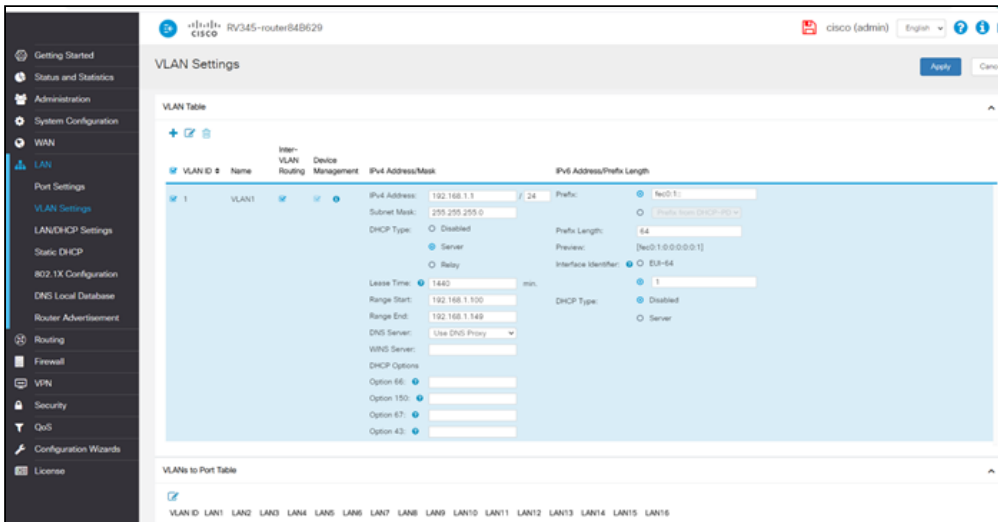
To avoid any errors, follow the procedure and settings below. Apply suitable IP addresses arranged to your network environment. Please review to **Section IP addressing 1:1 IRD configuration** (page 6/7) for IP addressing information.

1. Select **LAN > VLAN Settings**.

2. Click **VLAN1** and click **Edit**.

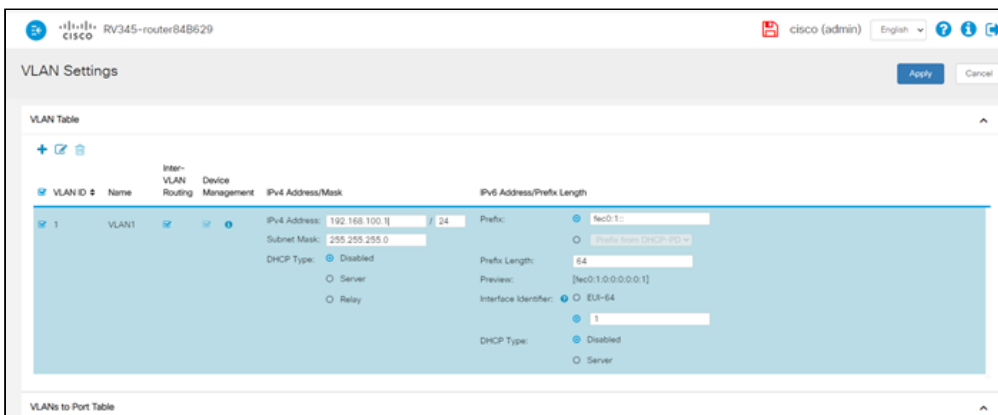


3. VLAN1 GUI expands as shown.



4. Change the IPv4 address to **192.168.100.1** and set the DHCP type to **Disabled**.

5. Click **Apply**.



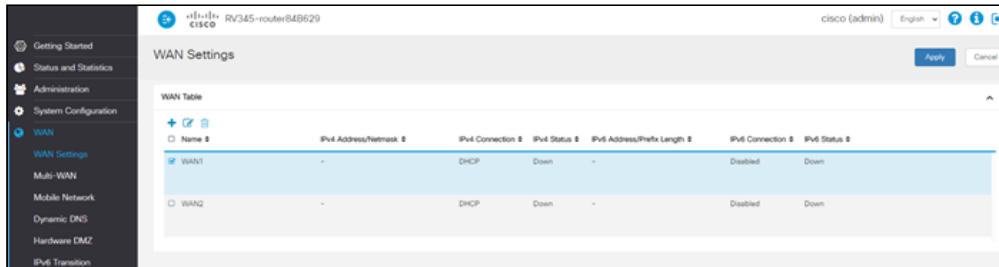
6. A warning message appears. Click **YES** to confirm.

7. Now all VLAN ports are on 192.168.100.XXX/24 range with static IP. Change the PC and the XOS IRD management IP address and the iLO IP address to a static IP address according to your site configuration IP address sheet.

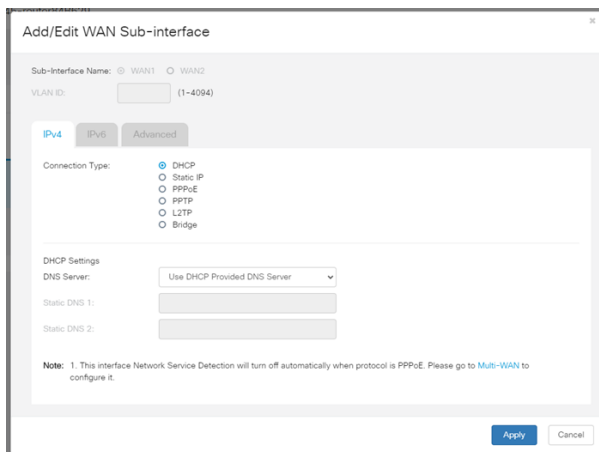
## WAN settings changes (1:1)

For default WAN1 set to get WAN IP address as DHCP from Internet provider or local network. If you need to modify the WAN IP address as a static IP address, please do the following:

1. Select **WAN > WAN Settings**.
2. Click **WAN1** and click **Edit**.

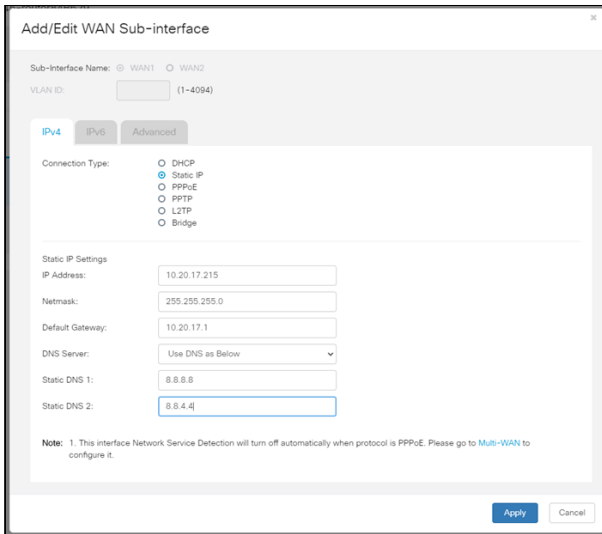


3. The WAN GUI expands.



4. Click **Static IP**, and the configure static IP will expand. Enter the following:
  - a. IP address.
  - b. Netmask.
  - c. Default Gateway,
  - d. DNS1.
  - e. DNS2.

5. Click **Apply**.

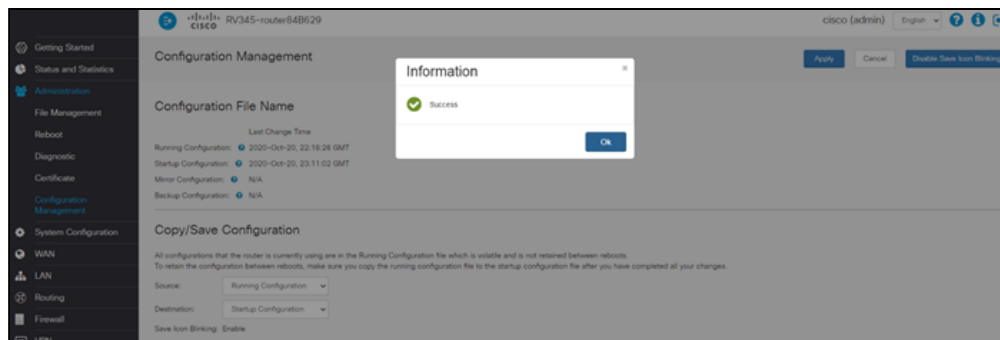


6. The changes take few minutes to complete.



## Important notes (1:1)

1. *Save configuration changes.* Always remember to save all changes after switch configuration. To save configuration, do the following:
  - a. Select **Administration > Configuration Management**.
  - b. Click **Apply** on the top right corner.



2. When you make LAN settings changes, sometime the switch displays that the password is expired page and might ask you to enter a new password.
3. By default, the switch checks the latest firmware. If one is found, it asks you to upgrade to the latest firmware. It is not necessary to upgrade to latest firmware. But if you choose to do so, an upgrade error might display. However, once you refresh the page, the GUI will show the latest firmware has been installed.

## Step 4 - 1:1 procedure: NTP-100 installation

### Start up and GPS acquisition (1:1)

When the NTP-100-GPS is initially powered up, the time to first fix (time the unit takes to acquire satellites and extract correct time) could be up to 25 minutes although it's typically 5-15 minutes. Factors such as atmospheric conditions, type of antenna, antenna location, and antenna cable length might affect the time to first fix.

### LED status (1:1)

Once the NTP-100 starts up, monitor the front panel LEDs for power up status. When power is first applied the initial sequence of the front panel LEDs are the following:

- Amber and green LEDs on briefly, with time display of 88:88:88.
- All LEDs go off briefly.
- Amber (NTP) LED are out, green (Status) LED on steadily.
- Green (Status) LED begins twice per second blink, with time display incrementing the seconds digit once per second (Lock to external TCXO osc) and acquiring lock to external source, if applicable.
- Green (Status) LED begins to blink once per second and time display increments the seconds digit once per second when synchronized to an external reference source.

 The green LED blinks once per second when unit is locked to the GPS.

### Notes (1:1)

#### NTP Client

- If using a static IP, make sure that under **Input Control > NTP Client** the **Use NTP server provided by the DHCP server** option is not checked.

#### Antenna Cable Length Compensation

- If using a GPS/GNSS antenna, nanosecond offsets can be added to compensate for cable length under **Input Control - [GPS/GNSS]**.

### Quick start instructions (1:1)

1. Keep the power disconnected until the final step.
2. Mount the antenna on the roof for clear line of site of GPS satellites.
3. Run the cable from the antenna to the NTP-100 server (100' cable is supplied).
4. For the NTP-100-GPS, connect the antenna cable coaxial connector to the gold SMA connector labeled **Antenna** on the rear of the unit.
5. Connect the ethernet cable from the NTP-100 unit to the management switch.
6. Apply power to unit.

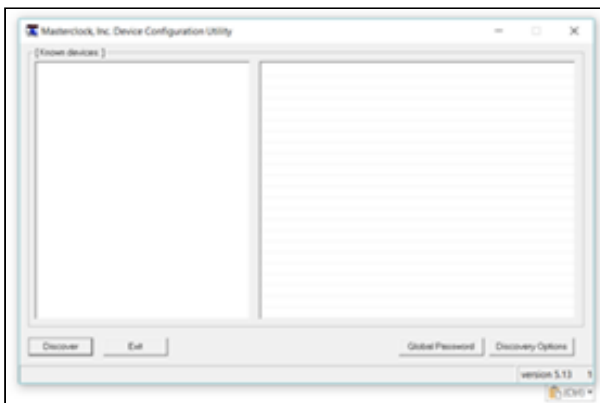
## Configuration (1:1)

The NTP-100 is configured via software control using the WinDiscovery.

1. Install the WinDiscovery software onto your laptop.

**!** If your laptop does not have a CD rom drive, the software can also be downloaded from <https://www.masterclock.com/products/software/windiscovery>.

2. Connect the NTP-100 (ethernet port) to your Cisco management switch.
3. Assign an IP address to your laptop with the same range as your Cisco management switch.
4. Connect your laptop to the Cisco management switch.
5. Power on the NTP-100 unit.
6. Launch the WinDiscovery app. The following window appears.

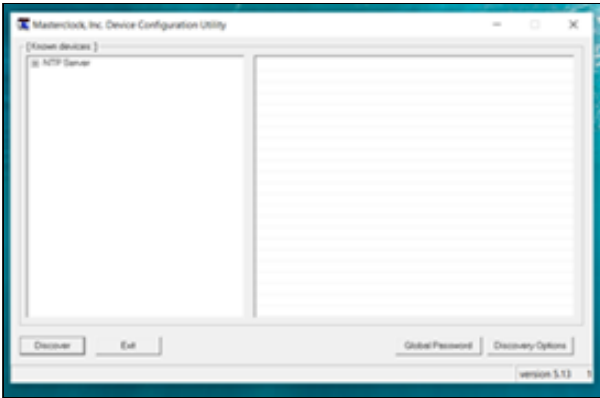


7. Click **Discover** on the bottom left. The app searches your network for available devices.

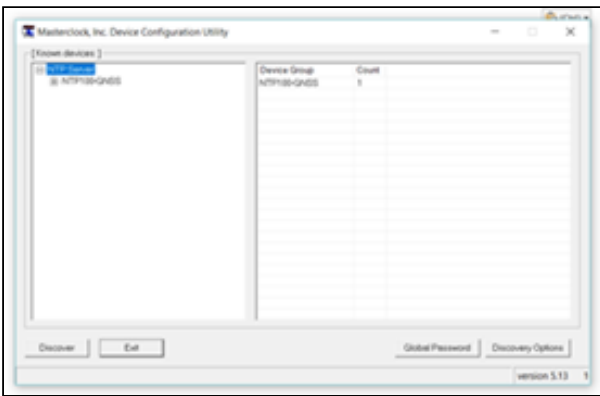
**!** If you have a firewall enabled on your laptop that is blocking you from receiving the UDP broadcast messages when using WinDiscovery, perform the following steps to change the management IP address on the NTP-100 server.

- a. Connect the laptop directly to the NTP server with your Ethernet network cable. The NTP-100 has a default IP address of 169.254.x.x
- b. Change your laptop network configuration as follows:
  - i. Management IP: 169.254.1.10.
  - ii. Subnet mask: 255.255.0.0.
  - iii. No gateway.
- c. Launch WinDiscovery.
- d. Click **Discover** on the bottom left. The app searches your network for available devices.
- e. Follow line 8 below (original procedure) to set the management IP address.
- f. Once the management IP is configured, change the laptop IP address back to the original management IP address you were using to setup the Cisco Management switch.
- g. Plug the NTP-100 server network cable back into the management switch port 9.
- h. Perform the discover function again to confirm you can now see NTP-100 server on your network.

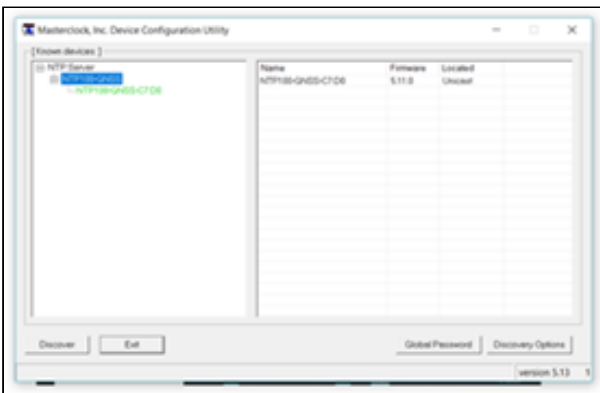
- A list of the device group is displayed in the left panel of the WinDiscovery panel.



- The NTP100 devices are listed under the NTP server. To configure and manage a device, right click the device name and a drop-down menu appears.



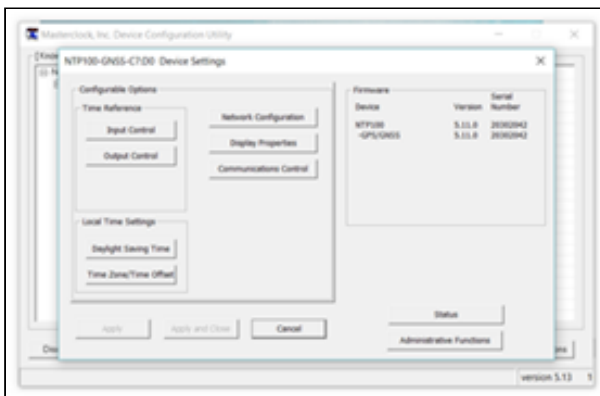
- Click on a menu choice to open the window for that function. Password for NTP-100 is "public."



## Network configurations

- Click on **Network configurations** from the device settings window.
- Network settings must be established for the clock to operate on the network.
- To use a static IP address, deselect the checkbox for **Automatically obtain network configuration from DHCP/BOOTP.**
- You must enter the IP address, netmask, gateway, primary DNS, and the secondary DNS address.

**⚠** To avoid any errors, follow the procedure and settings below. Apply suitable IP addresses arranged to your network environment. Please review to **Section IP addressing 1:1 IRD configuration** (page 6/7) for IP addressing information. If you are using the Harmonic supplied IP address schema, set the NTP mgmt IP to 192.168.100.100 NTP G/W IP to 255.255.255.0 NTP G/W IP to 192.168.100.1



## Input configuration

- The **Input Control** button provides access to the Input Control Window, which provides buttons for the NTP client, the time code reader of GPS/GNSS.

**⚠** If the NTP server IP address is not provided by the DHCP server, unclick the box "Use NTP server provided by the DHCP server"

## Output configuration

- The **Output Control** button provides access to the output Control window, which provides a button for NTP server.

## Time Zone

- To configure Time Zone offset, under Device Settings click on **Time Zone**.
- The pop-up window displays a list of time zones, including descriptions to help with the selection.

## Daylight Savings Time

- To configure DST, under Device Settings, click **Daylight Savings Time**. Manually enter the daylight saving time rules or select a pre-configured option.

## Email (SMTP) Configuration

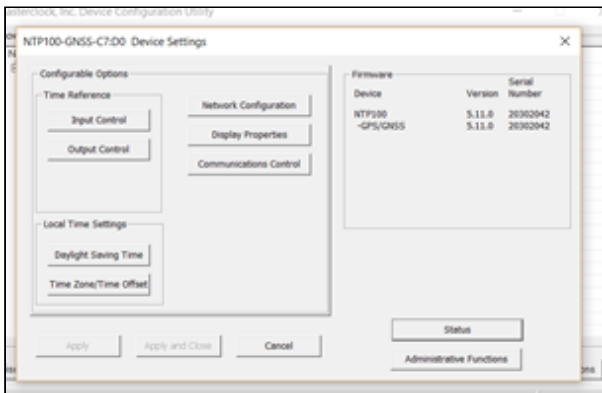
- To setup email alerts, under Device Settings, click on **Administrative Functions**, then **Email Configurations**.

## Display Options

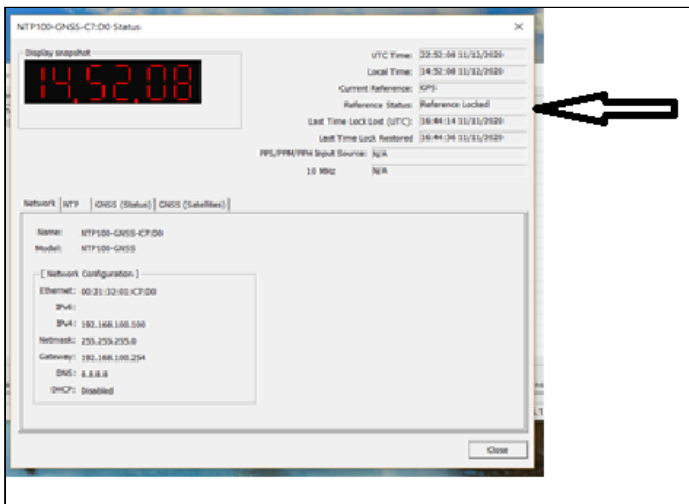
- To adjust brightness levels or to customize date and time display, under Device Settings, click on **Display settings**.

### Verify Status of GPS(reference) Lock

1. In the server setting menu click **Status**.



2. In the status menu verify that the referenced is locked.



3. If you would like to change the default password [Public], click of the Administration button and edit the password.
4. Use the **Save** and **OK** buttons to accept changes that you have made.
5. Use the **Exit** button to exit the screen without applying changes.

## Step 5 - 1:1 procedure: Cisco Catalyst 3560-CX video switch configuration

### Video switch purpose and scope (1:1)

The purpose of this document is to provide configuration procedures to configure the Cisco Catalyst 3560-CX video switch to fit in current affiliates sites video and data network environments for XOS IRD operation, monitoring, and troubleshooting.

### How to power on the 3560-CX video switch and initial setup (1:1)

1. Connect the RJ-45-to-DB-9 adapter cable to the 9-pin serial port on the PC. Connect the other end of the cable to the switch console port.

**⚠** Most of the newer Laptops don't come with a serial port, so a USB to serial port adapter may be required.

2. Start the terminal-emulation program on the PC or the terminal. The program, frequently a PC application such as HyperTerminal, ProcommPlus, or Putty makes communication between the switch and your PC or terminal possible.
3. Configure the baud rate and character format of the PC or terminal to match the console port default characteristics:
  - a. 9600 baud.
  - b. 8 data bits.
  - c. 1 stop bit.
  - d. No parity.
  - e. None (flow control).
4. Power on the switch.
5. The PC or terminal displays the bootloader sequence. Press **Enter** to display the setup prompt. Continue the steps entering the initial configuration information.
6. Enter Yes at two prompts.

```

--- System Configuration Dialog ---

Enable secret warning
-----
In order to access the device manager, an enable secret is required
If you enter the initial configuration dialog, you will be prompted for the enable secret
If you choose not to enter the initial configuration dialog, or if you exit setup without setting the enable secret,
please set an enable secret using the following CLI in configuration mode-
enable secret 0 <cleartext password>
-----
Would you like to enter the initial configuration dialog? [yes/no]: yes

At any point you may enter a question mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.

Basic management setup configures only enough connectivity
for management of the system, extended setup will ask you
to configure each interface on the system

Would you like to enter basic setup instead of extended setup? [yes/no]: yes
Configuring global parameters:

```

7. Enter a host name for the switch, and press **Return**.
8. Enter an enable secret password, and press **Return**.
9. Enter an enable password, and press **Return**.

10. Enter a virtual terminal (Telnet) password, and press **Return**.
11. (Optional) Configure Simple Network Management Protocol (SNMP) by responding to the prompts. You can also configure SNMP later through the CLI, Device Manager, or the Network Assistant application. To configure SNMP later, enter **No**.
12. Enter the interface name (physical interface or VLAN name) of the connection to the management network, and press **Return**. For this release, always use **vlan1** as that interface.
13. Configuring interface Vlan1:  
Configure IP on this interface? [no]: No
14. Select option 2 to save this configuration.

```
[0] Go to the IOS command prompt without saving this config.
[1] Return back to the setup without saving this config.
[2] Save this configuration to nvram and exit.

Enter your selection [2]: 2
Building configuration...
[OK]
Use the enabled mode 'configure' command to modify this configuration.
```

15. After the password change, you do not need to use the setup wizard. Follow the next section for manual settings.

#### **Note**


During the system boot up, the power LED will progressively keep flashing until the system has fully booted. The system boot time will be a few minutes typically, if the device is fully configured with all features. Refer to description LEDs in Catalyst 3560-CX user manual. You can view the log on switch console port.

## Video VLAN and network port settings (1:1)

You need to create a video VLAN if QAM video output type is required as IP multicast. These are typically the same as video switch port interfaces. There are few switch global options need to be set as well to support IGMP multicast features. Refer to the following steps:

All configuration commands use Cisco switch CLI commands and you need connected to switch your console port. Refer to the previous section for how to connect A PC by serial cable to switch console port.

1. Enable privileged EXEC mode. Enter command **enable** or **en**.  
Example:
2. Enter global mode. Enter command **configure terminal** or **configure t**.  
Example:
3. Set Vlan 100 as **video vlan** and allow multicast options. Enter the following commands:
  - a. interface Vlan100
  - b. ip address 172.10.100.1 255.255.255.0
  - c. exit.
4. Set video switch ports, assign to Vlan100 and associated options. Enter commands below:
  - a. Interface range GigabitEthernet0/1 – 10.
  - b. switchport access vlan 100.
  - c. switchport mode access.
  - d. spanning-tree portfast.
  - e. exit.

 The original video switch ports 9 and 10 were designed for trunk port. You can use these as normal switch ports as well. Please ignore the switch warning message regarding those two ports may not use as normal switch ports.

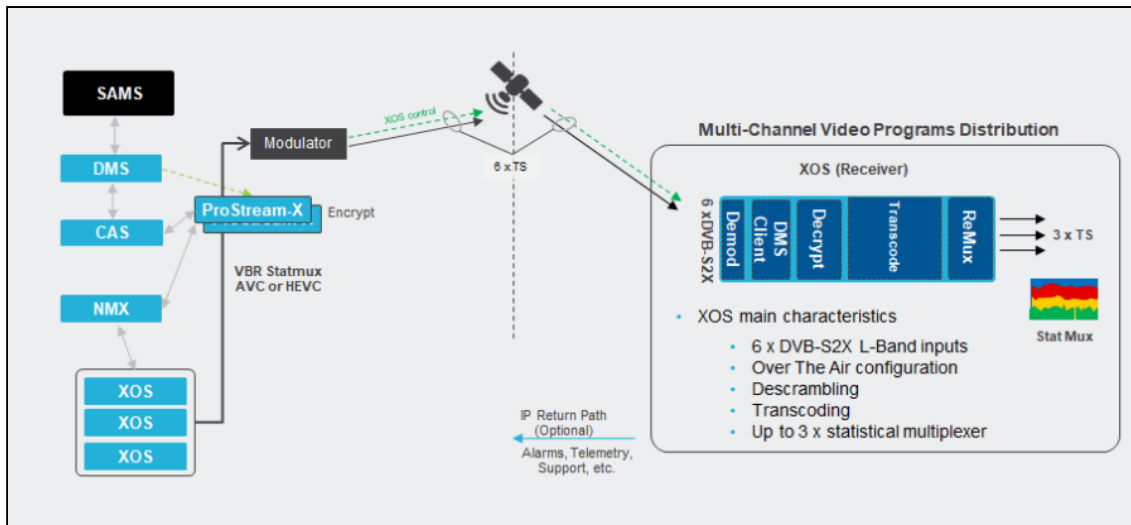
5. Type **exit** to exit switch configure mode.
6. Type **wr** or **write memory** to write to switch memory and save to current switch configure file.

## Step 6 - 1:1 procedure: XOS IRD installation

### General system architecture (1:1)

The SAMS, from main Headend, allows you to do the following:

- Manage Multi-Channel Video Programs Distributor (MVPD remote site).
- Manage the XOS receivers for each MVPD.
- Manage services per XOS receiver.



### Multi-Channel Video Programs Distribution System Architecture

Up to seven XOS are installed, it depends on MVPD sites.

The XOS functional architecture is composed of the following:

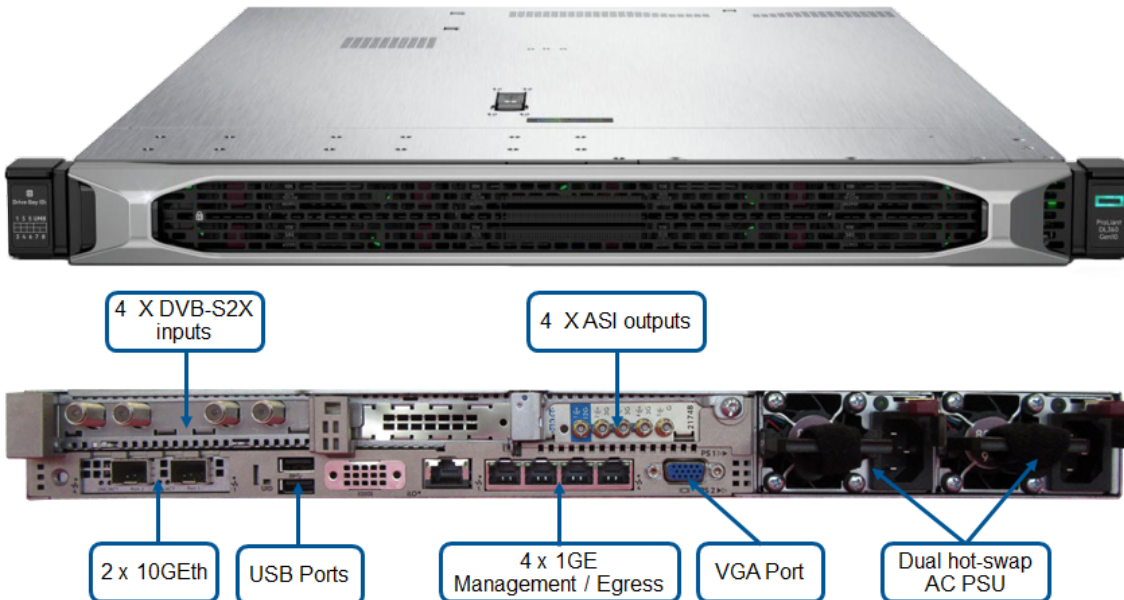
- **DVB-S2X** inputs to receive up to six transponders.
- **TS Processing** in charge of extracting services and signaling.
- **Decrypt** in charge of descrambling entitled services.
- **Transcode and Stat Mux** in charge of generating up to three statistical multiplexes in charge of building the MPTS output. Incoming radio services are decrypted and inserted in MPTS output.
- **DMS client** in charge of handling OTA configuration and upgrade.
- **Management / WEB UI** in charge of the following:
  - Extracting the XOS configuration, sent in a TS over satellite, and applying it when required.
  - Checking the RF parameters.
  - Setting the outputs IP multicast addresses.
  - Monitoring and troubleshooting the behavior of the XOS.

### XOS IRD hardware configuration (1:1)

The hardware is composed of the following:

- XOS server platform.
- DVB-S2X card.
- ASI card.

- SIM card reader for CAS inside the chassis.



- Two hot swappable **AC Power supplies**.
- **VGA** and **USB** ports only used to set the Management IP address.
- Four **1GEth** ports, from the left to the right:
  - Port 1: Connected to management network.
  - Port 2: Not used.
  - Port 3: Connected to the Primary data network switch.
  - Port 4: Connected to the Backup data network switch.
- Two **10GEth** ports: not currently used.
- Four **DVB-S2X** RF ports, from the left to the right:
  - Port 1 (RF input 1) connected to the AMC-11 satellite downlink, to receive all Transponders with Vertical Polarization.
  - Port 3 (RF input 3) connected to the AMC-11 satellite downlink, to receive all Transponders with Horizontal Polarization.
  - Ports 2 and 4: not used.
- Four **ASI ports** + Gen Lock, from the left to the right:
  - Ports 1 to 3 (ASI outputs): connected to QAM modulators.
  - Port 4: not used.
  - Port 5: not used (Gen Lock port).

For information the server configuration is the following:

Server model	HPE ProLiant DL360 Gen10 8-SFF
Processor	Two INTEL Xeon Gold 5220R
Hard Drives	SSD 240GB

Memory	96GB DDR
NIC	Four 1GbE ports (RJ45)2 x 10G SFP - SFP not included - not used
Power	Dual redundant power supplies, hot swappable 100/240 VAC, 50/60 Hz input <i>Max power @ room temp = 440W, Max power @ Max temp (35C) = 500W</i>
Environmental	Operating temperature: 10°C to 35°C (50°F to 95°F)Non-operating temperature: -30°C to 60°C (-22°F to 140°F) Operating humidity: 8% to 90%EMC Class A: FCC, CE, VCCI, KC, CCC, TCVN, CTick, BSMI Product Safety: US/CA NRTL, CB Scheme, BIS, CCC, EAC, BSMI Product Materials: EU RoHS, China RoHS, EU REACH, WEEE
Physical	1-RU server Dimensions (HxWxD): 4.3 x 43.5 x 70.7 cm (1.7 x 17.1 x 27.8 in)Weight: 15kg (33 Lbs)
Management (IPMI)	Yes, through ILO
Operating System	Linux

## How to configure the iLO Address (1:1)

The iLO server management can be accessed through Ethernet Management port (iLO and Management share the same port).

To configure static IP addresses for iLO and Management ports through the local console, do the following:

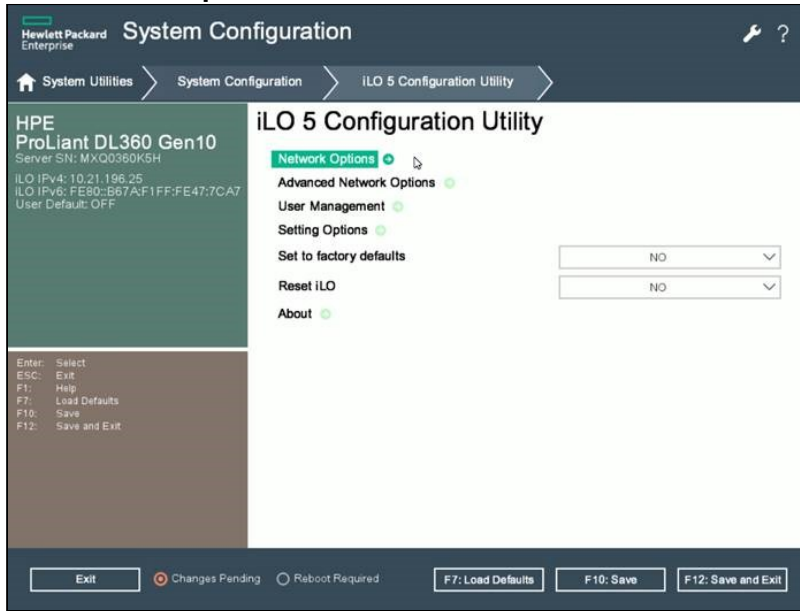
1. Connect the monitor, keyboard, and mouse to the XOS.
2. Turn on the platform.

3. Press **F9** for the System Utilities option during startup.



4. Select **System Configuration**.
5. Select **iLO 5 Configuration Utility**.
6. After enter “iLO 5 Configuration Utility”, screen will ask you enter “User Name” and “User Password”.
  - a. Please find iLO “Administrator” and Password from attached tag at front of XOS IRD.
  - b. Please notice, you need move to “User Password” field by enter keyboard “ENTER” key to enter password.

7. Select **Network Options**.



8. From the **Network Interface Adapter** menu, select **Shared Network Port-LOM**.

- a. Configure ILO network option as screen showed:
- b. Network Interface Adapter -> "Shared Network Port-LOM"
- c. VLAN Enable -> OFF
- d. DHCP Enable-> OFF
- e. DNS Name -> No change
- f. Enter IP address, Subnet Mask and Gateway IP Address.

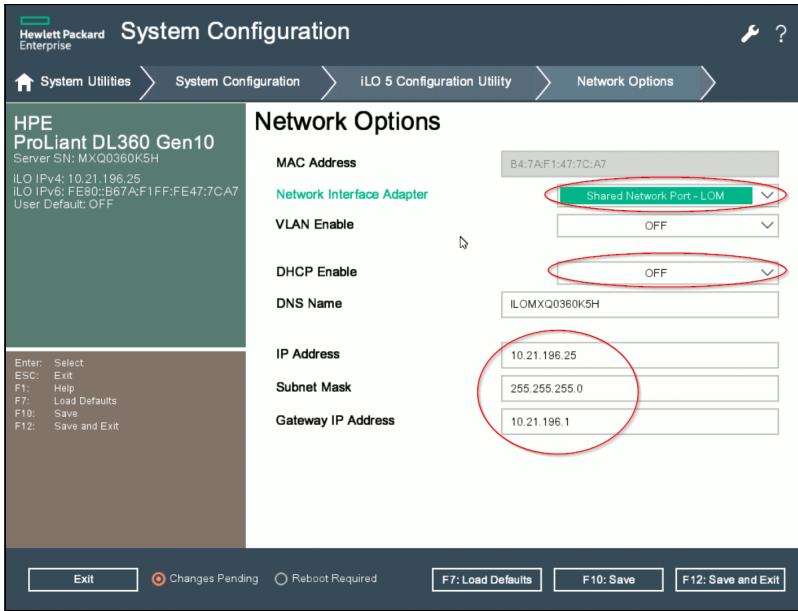
9. Enter the appropriate static network details in the fields.

**!** To avoid any errors, follow the procedure and settings below. Apply suitable IP addresses arranged to your network environment. Please review to **Section IP addressing 1:1 IRD configuration** (page 6/7) for IP addressing information.

If you are using Harmonic supplied IP addresses, see below

**Device IP addressing**

Device name	iLO IP address	Subnet Mask	G/W IP address
XOS-IRD01	192.168.100.111	255.255.255.0	192.168.100.1
XOS-SPARE	192.168.100.112	255.255.255.0	192.168.100.1

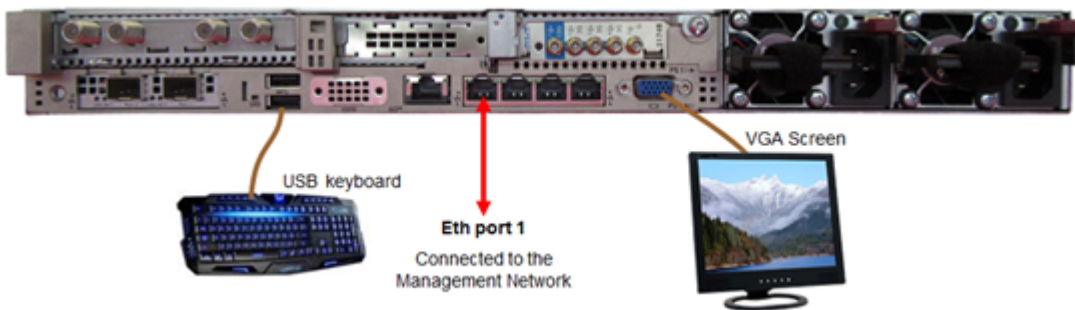


10. Press F12 “Save and Exit” to save iLO setting change and reboot XOS IRD.
11. After reboot XOS IRD, you can proceed to set XOS IRD management IP addresses. Please refer to other sections of user install guide.
12. After iLO configuration, you can use browser to type iLO IP address to access ILO from computer.
13. We recommend you create another username and password for iLO, so it can be easy remembered and consist to use on all XOS IRDs.

## How to configure the XOS IRD through the local console (1:1)

Use the following procedure to set the management network parameters:

1. Connect the VGA screen and USB keyboard to the XOS rear panel as shown below:



2. Connect the power cords to the power supplies at the rear panel of the XOS and then connect the cables to the power grid.
3. Once booted, use credentials **harmonic / harmonic** to log on.
4. At the prompt **\$**, set the network parameters for IRDs (See note below), type: ***nmi set network --ip <ip address> / <netmask> --gw <gateway address>*** and press **Enter**.
5. Below is a sample for IRD#1 (see note below)

```
nmi set network --ip 192.168.100.11/24 --gw 192.168.100.1
or
nmi set network --ip 192.168.100.11/255.255.255.0 --gw 192.168.100.1
```

**⚠** To avoid any errors, follow the procedure and settings below. Apply suitable IP addresses arranged to your network environment. Please review to **Section IP addressing 1:1 IRD configuration** (page 6/7) for IP addressing information.

If you are using Harmonic supplied IP addresses, see below

**Device IP addressing**

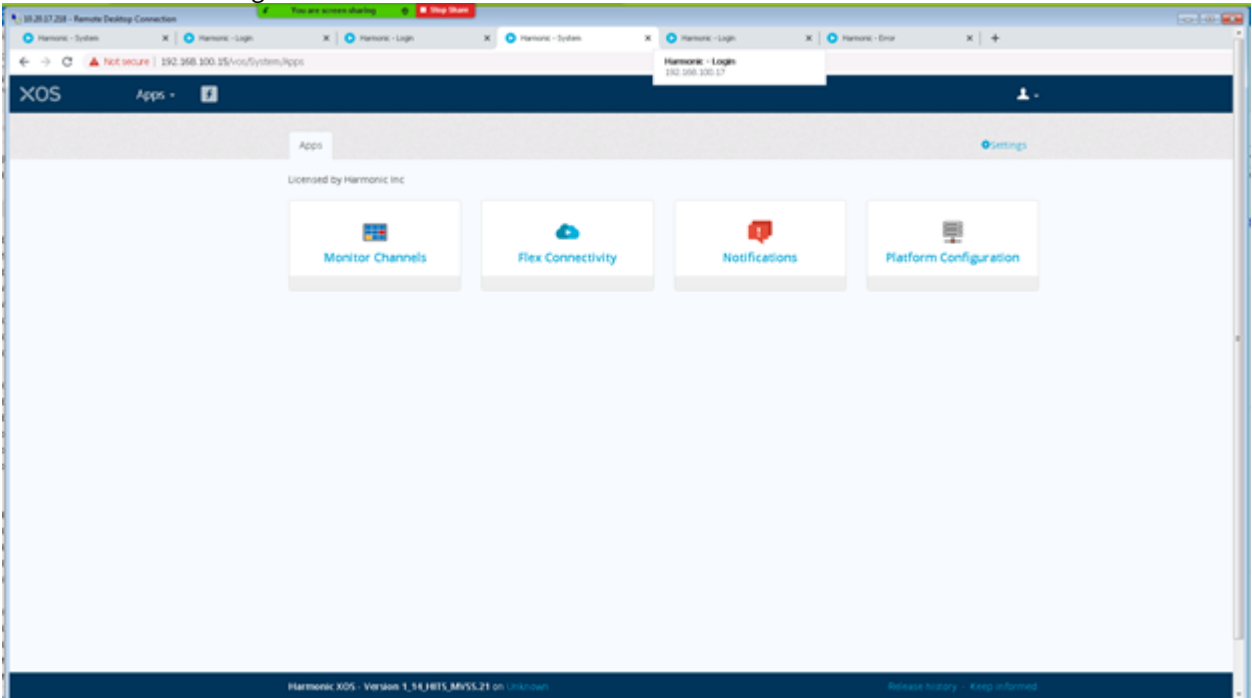
Device name	Management IP address	Subnet Mask	G/W IP address
XOS-IRD01	192.168.100.11	255.255.255.0	192.168.100.1
XOS-SPARE	192.168.100.12	255.255.255.0	192.168.100.1

6. Verify the new network parameters, type: **showip** and press **Enter**. (Type CNTL-C to stop scrolling)
7. Power cycle the XOS.
8. After reboot the GUI is accessible through your web browser.

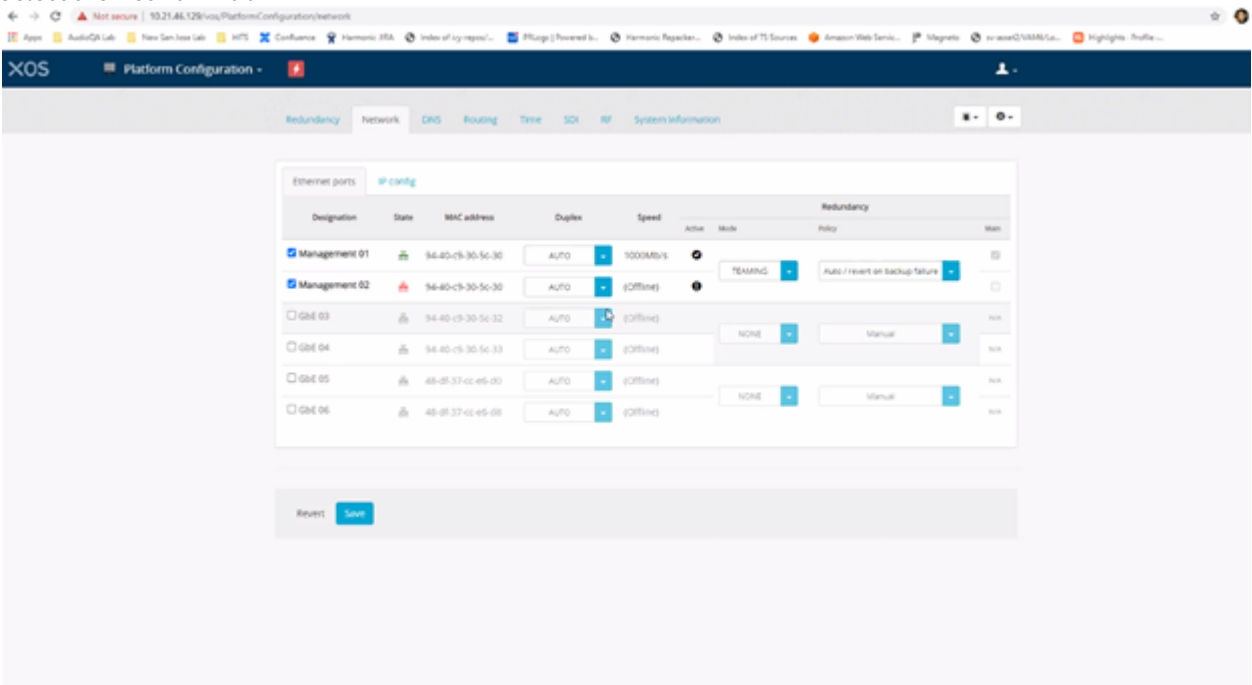
Once the management are parameters set, do the following:

1. In a web browser, type the URL of your XOS and press **Enter**.  
Example: [192.168.100.11](http://192.168.100.11). (IRD 1 Mgmt IP Address)
2. Log in to the XOS using the following credentials:  
Login = **hitsoperator** Password = **hitsaffiliate**.
3. From the factory the 2nd network port is configured as teamed to port 1. To disable this following the following instructions

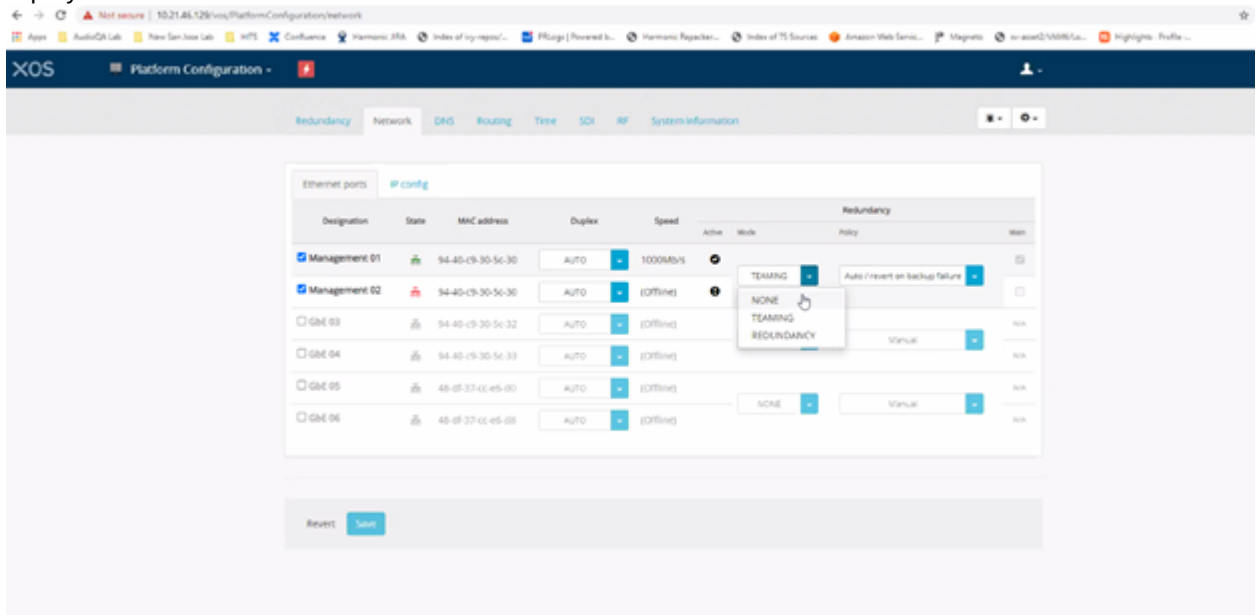
4. Select the Profile Configurations Tab from the Main Menu



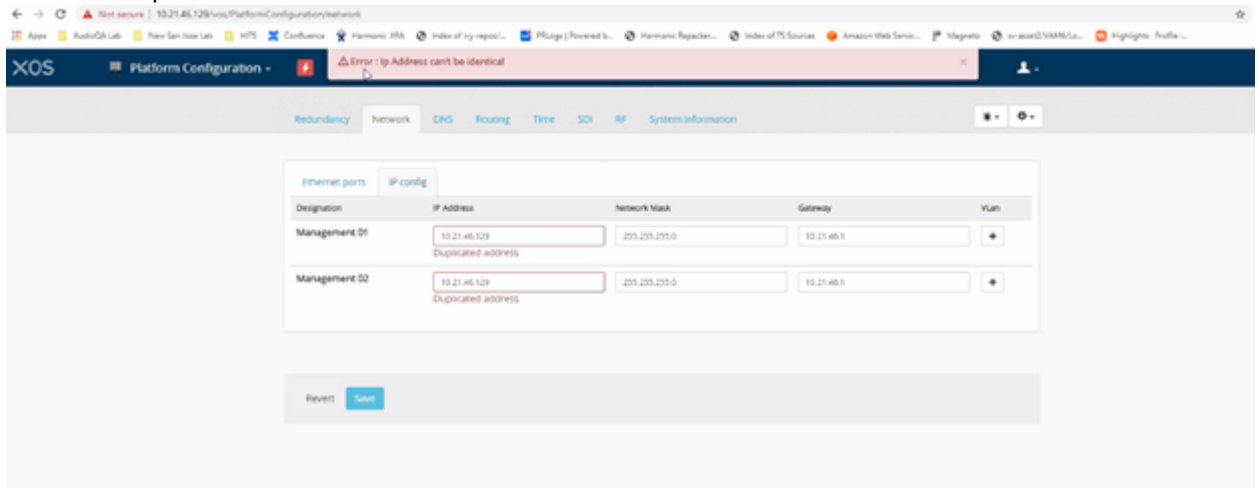
5. Select the Network Tab



- You should see 2 Mgmt port assignments. We need to disable mgmt port 2 since this isn't being used in this deployment.

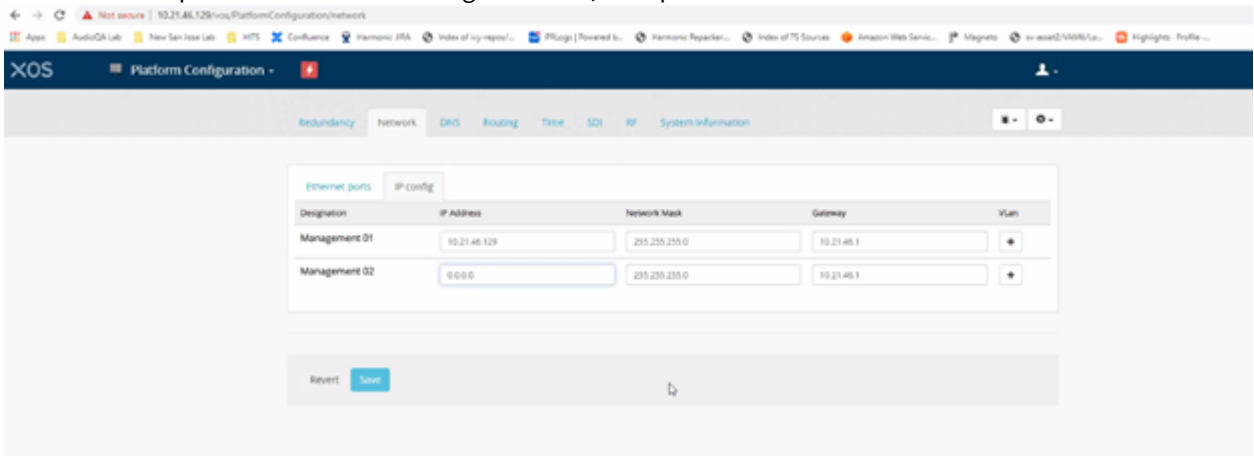


- On the mode pull down menu select **None**

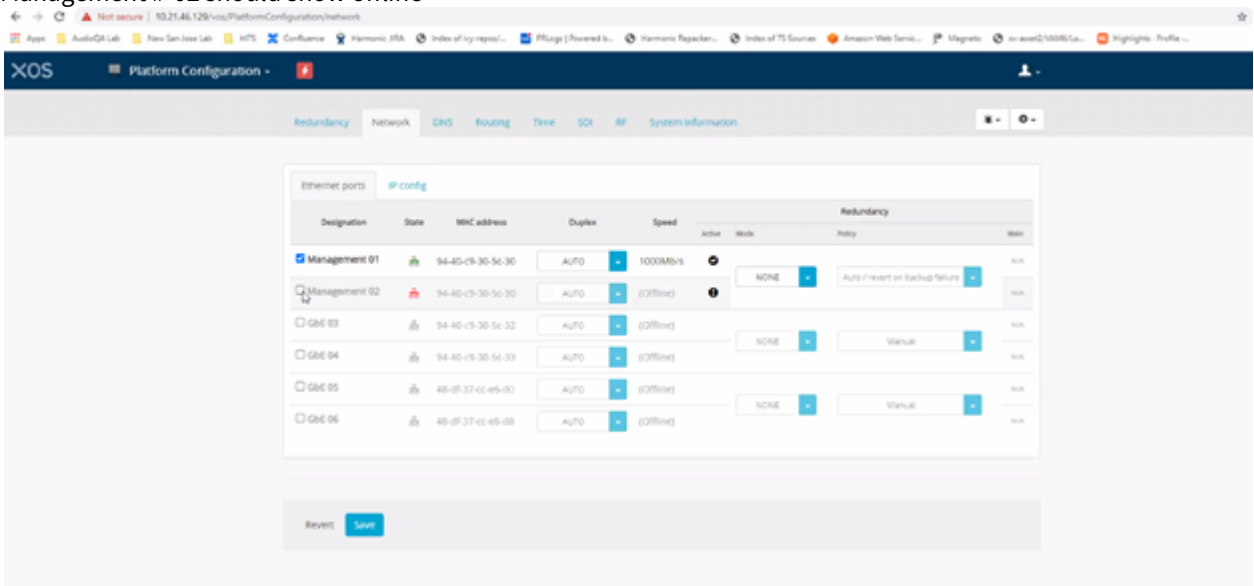


- Change Management #02 IP as below to 0.0.0.0, then press "Save"

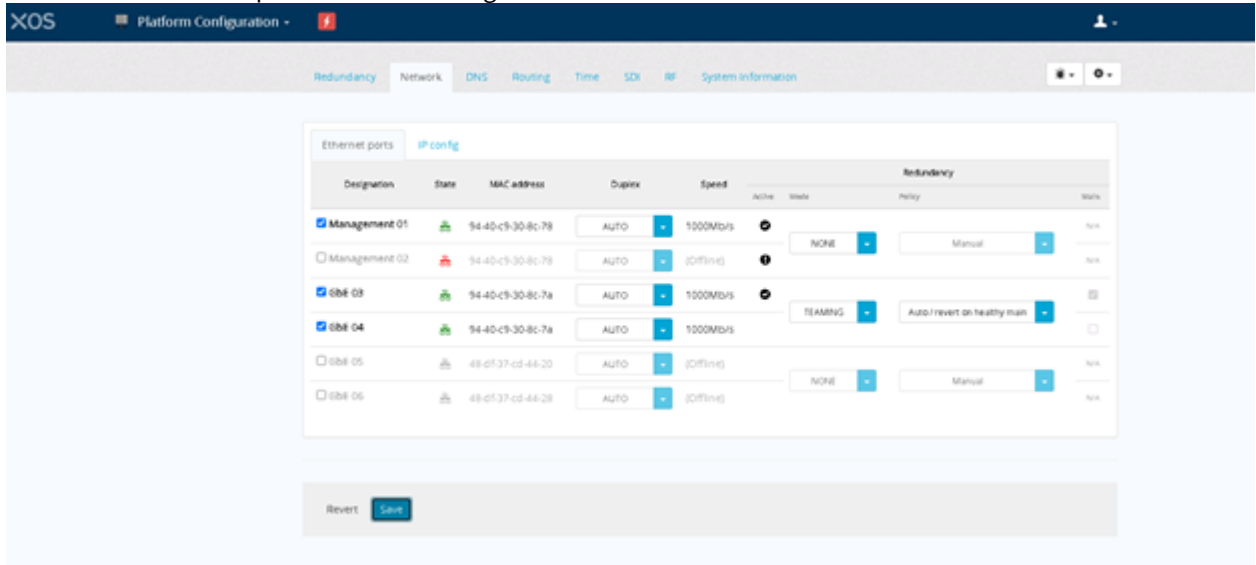
- Go to “Ethernet ports” to de-select “Management 02”, then press “SAVE”.



- Management #-02 should show offline



- In the network Tab set port 3 & 4 for teaming

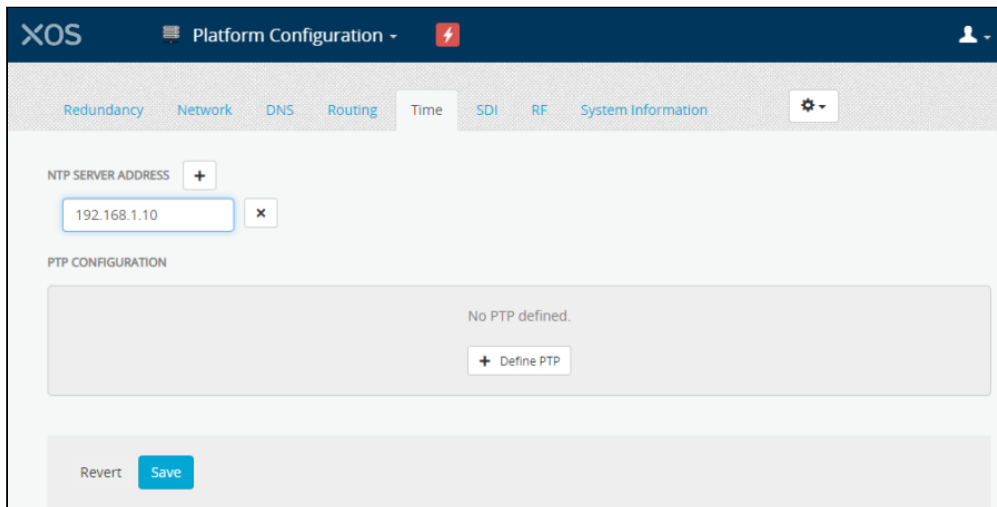


- In the IP tab set the IP address for Ports 3 & 4.
- Click the SAVE Button
- Click the XOS Symbol in upper Left to return to the Main Menu Screen

## How to configure the time synchronization (1:1)

The XOS needs to be synchronized with a NTP server, to do so:

- In the upper left corner of the home screen, mouse over/click on **Apps** and launch the Platform Configuration option.
- Select the **Time** tab.
- Add an NTP server by clicking **Define NTP server**.
- Set the IP address of the NTP server. (Example: 192.168.100.100)

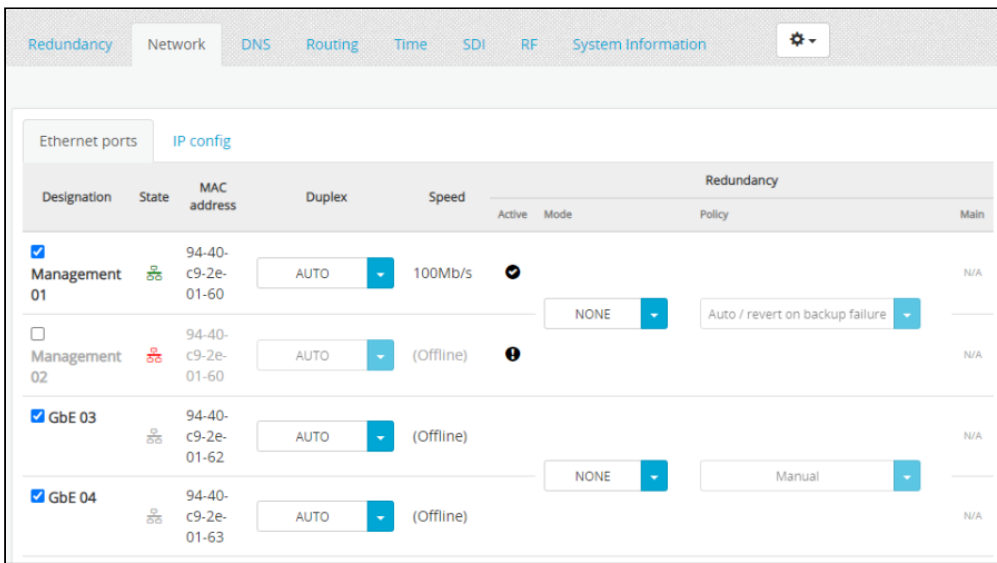


- Click **Save** to apply the new parameter.

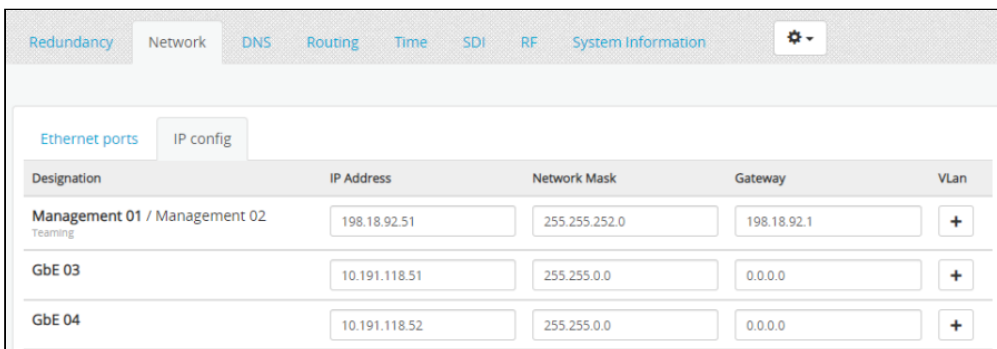
## How to configure the data IP ports (1:1)

The IP data ports are used to transport to the QAM modulators all Multicast that contain the Multiplexes. To do so, do the following:

1. Launch the **Platform Configuration**.
2. Select the **Network** tab.
3. Enable the GbE 03 and GbE 04 ports.



4. Select the **IP config** tab.



5. Set the **IP Address**, **Network Mask**, and **Gateway** of ports GbE 03 and GbE 04.
6. Click **Save**.

## Preliminary downlink system test (1:1)

Prior to the dual illumination period (Mar 1, 2021 - May 31, 2021), there will be two test loops on AMC-11 transponders 15 and 16.

One test loop for the horizontal and one for vertical feeds to help the affiliate confirm, there system is install and cabled properly to receive the RF feeds from AMC-11.

Once you have the AMC-11 feeds to the installed equipment installed and the equipment is cabled and powered on, the following will happen:

1. HITS upgrades the IRDs over the air if they aren't on the latest software version of code.
2. The RF cards are assigned their RF configurations
  - a. The Local Oscillator frequency values are:
    - **Port 1:** 5.15 GHz.
    - **Port 3:** 5.15 GHz.

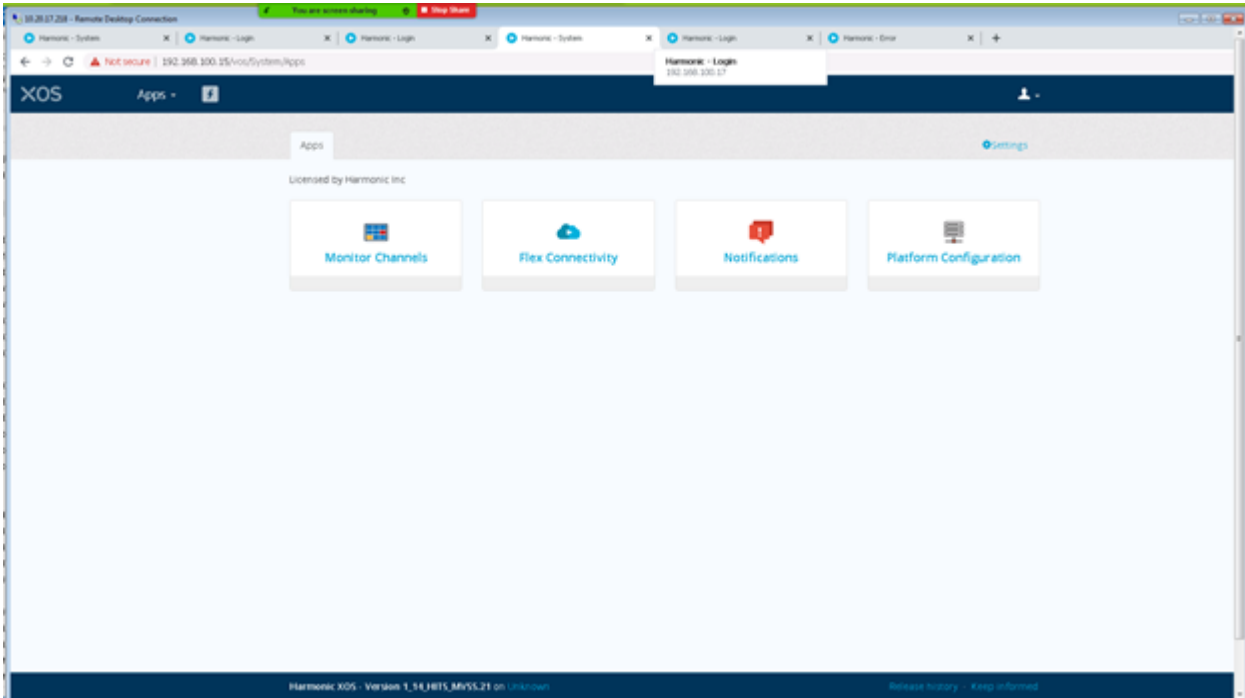
Each tuner has its own parameters:

	<b>Tuner 1 TP15</b>	<b>Tuner 2 TP16</b>	<b>Tuner 3 TP17</b>	<b>Tuner 4 TP18</b>	<b>Tuner 5 TP21</b>	<b>Tuner 6 TP22</b>	<b>Tuner 7 Disabled</b>	<b>Tuner 8 Disabled</b>
34.3Msps	34.3Msps	34.3Msps	34.3Msps	34.3Msps	34.3Msps	34.3Msps	-	-
Carrier Frequency	4000	4020	4040	4060	4120	4140	-	-
Polarization	V	H	V	H	V	H	-	-
Spectral Inversion	Auto	Auto	Auto	Auto	Auto	Auto	-	-
Modulation	8 PSK	8 PSK	8 PSK	8 PSK	8 PSK	8 PSK	-	-
FEC	5/6	5/6	5/6	5/6	5/6	5/6	-	-
Pilots	Auto	Auto	Auto	Auto	Auto	Auto	-	-
Pls Code	0	0	0	0	0	0	-	-
Roll Off (%)	0.05	0.05	0.05	0.05	0.05	0.05	-	-

The Test Loop can be found on TP15 and TP16.

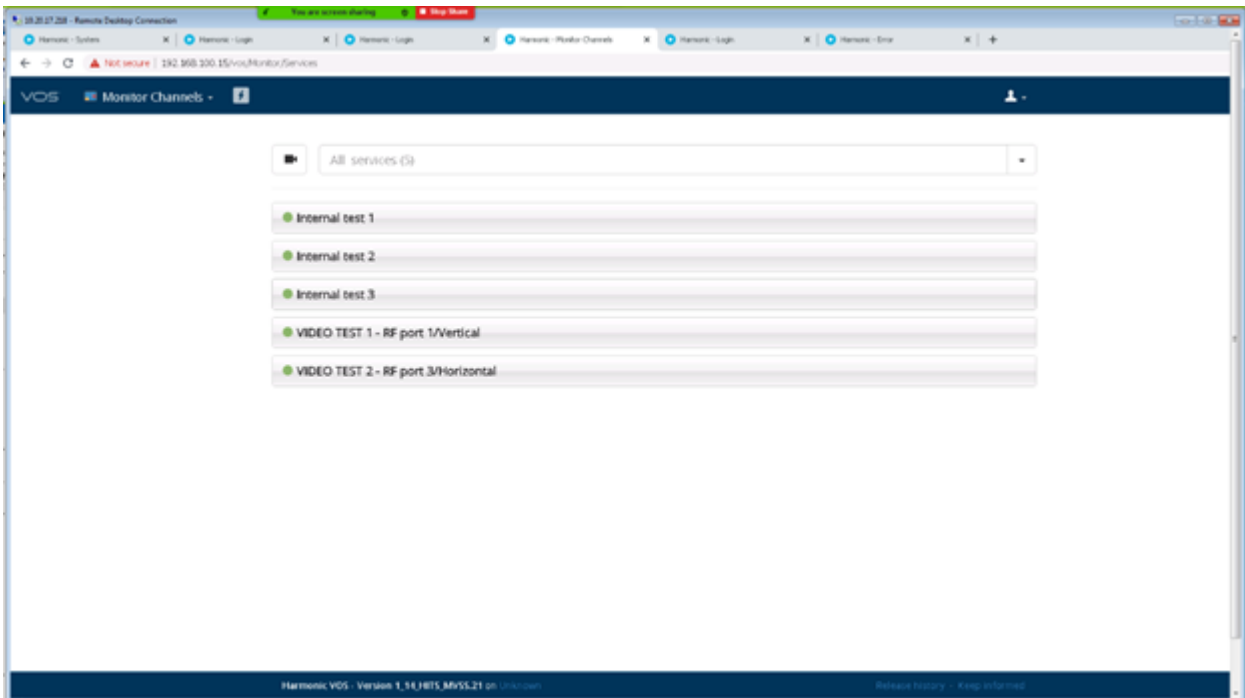
The IRD OTA upgrades are also performed via TP15.

1. In a web browser, type the URL of your XOS IRD and press **Enter**.  
Example: <https://192.100.100.10>.
2. The Login in prompt appears
  - a. Enter Login: hitsoperator
  - b. Enter Password: hitsaffiliate
3. This window below appears



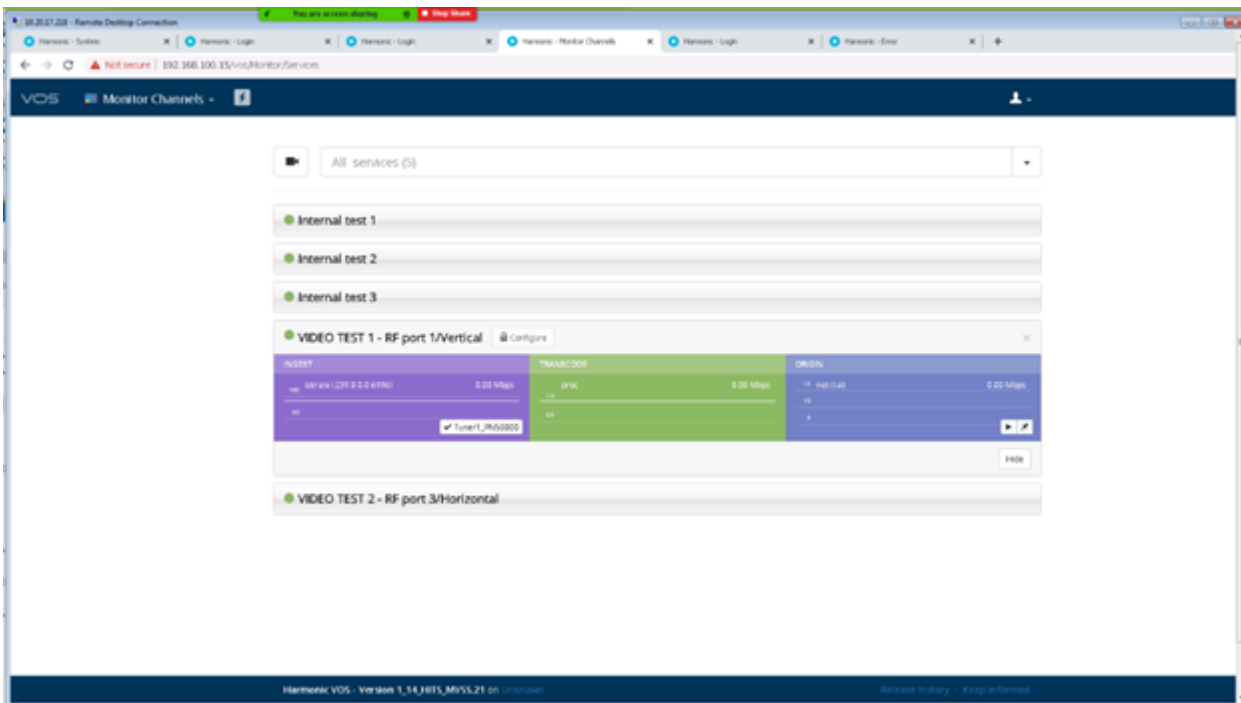
Click on Monitor channel

A window similar to the one below appears

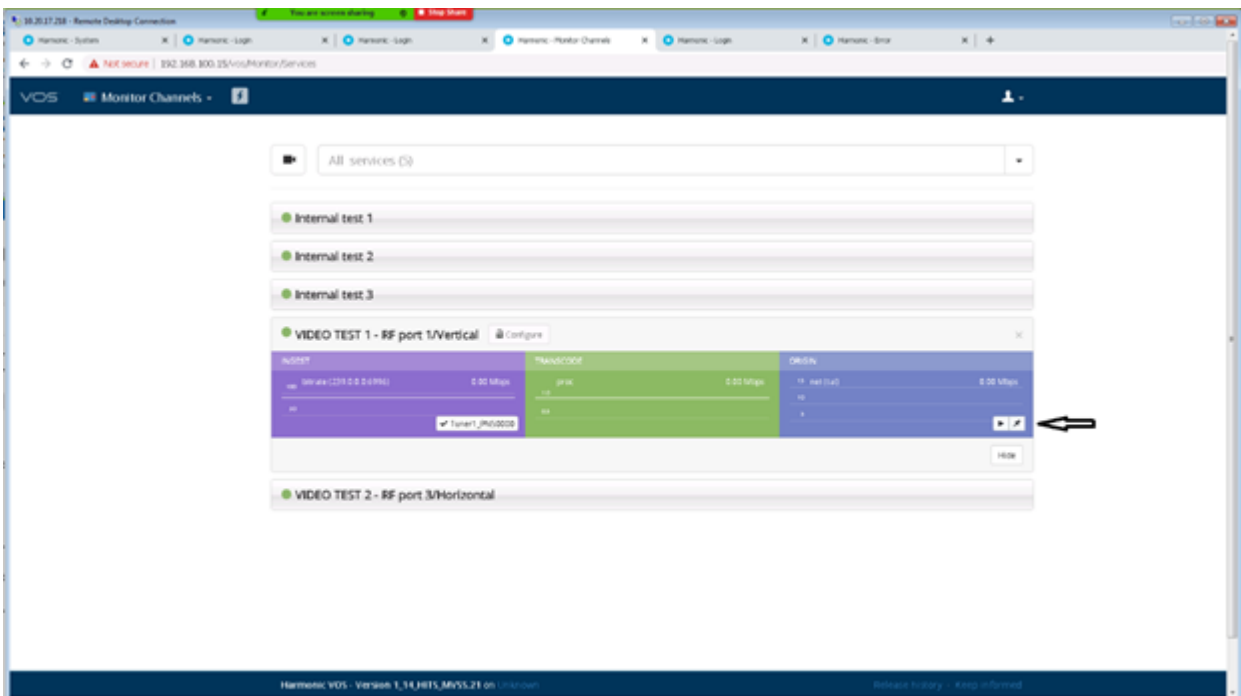


Click Video Test 1 – RF port 1/Vertical

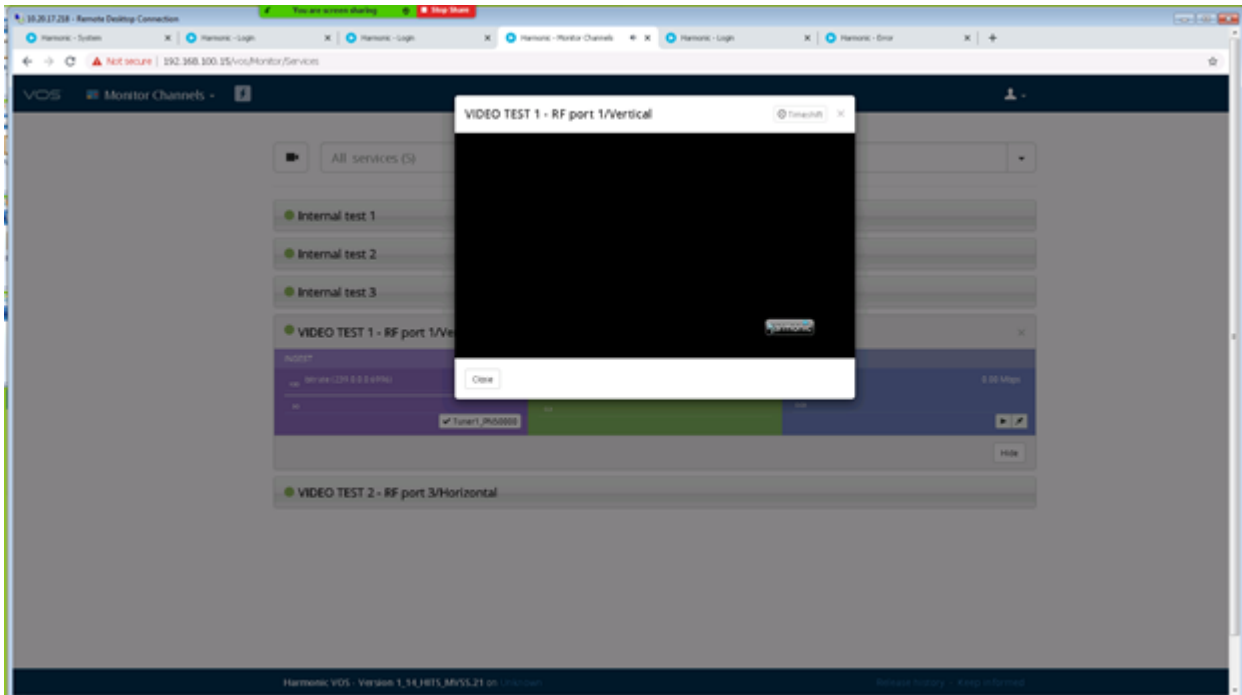
A window similar to the one below appears



Click play button (arrow) in lower right corner to play live video



The following screen appears. The test loop is the Harmonic logo w/ audio



Verify video test loop is displayed, audio also be present also.

There is also a test loop on the horizontal feed is you want to verify this also.

Note: this test loop may be removed during the dual illumination period.

Once your IRD is authorized during the dual illumination period, the same steps can be used to verify your authorized channels on your IRDs.

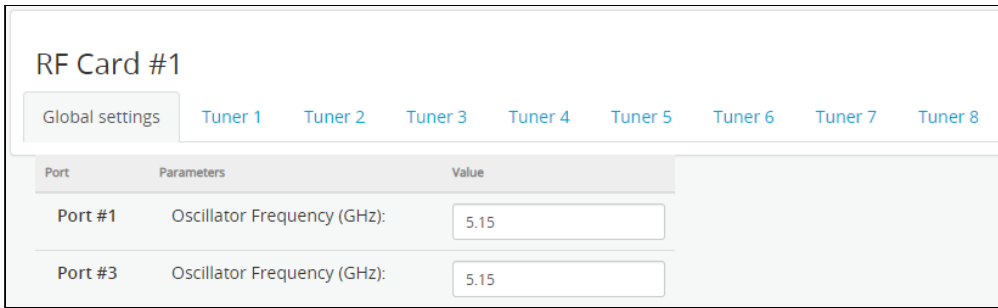
## Monitoring and troubleshooting (1:1)

### RF inputs status (1:1)

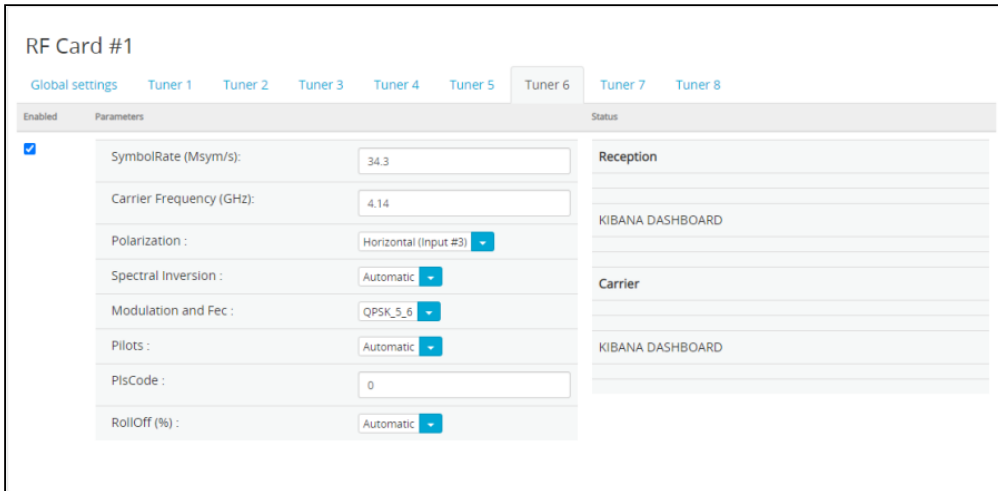
To check the RF inputs status, do the following:

1. Enter `https://mgmt` IP address (of XOS unit under test).  
Enter the login and password (**hitsoperator** / **hitsaffiliate**).
2. Click the **Platform Configuration** Tab.

3. Click the **RF tab > Global settings** to display the local Oscillator Frequency.



4. Select any Tuner tab to display its parameters.



5. On the right, check the status of the tuner (reception and carrier).

### How to monitor the RF inputs (1:1)

Each XOS is delivered with the same default RF configuration out of factory.

#### RF default parameters

The Local Oscillator frequency values are:

- **Port 1:** 5.15 GHz.
- **Port 3:** 5.15 GHz.

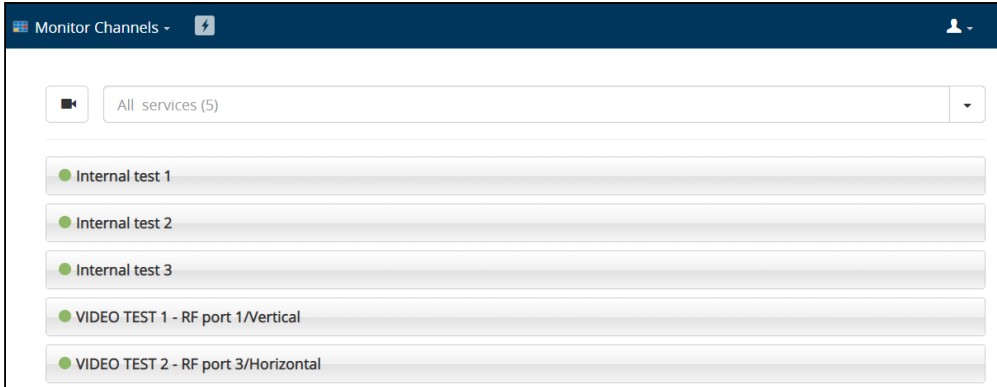
Each tuner has its own parameters:

	<b>Tuner 1 TP15</b>	<b>Tuner 2 TP16</b>	<b>Tuner 3 TP17</b>	<b>Tuner 4 TP18</b>	<b>Tuner 5 TP21</b>	<b>Tuner 6 TP22</b>	<b>Tuner 7 Disabled</b>	<b>Tuner 8 Disabled</b>
Symbol Rate	34.3Msps	34.3Msps	34.3Msps	34.3Msps	34.3Msps	34.3Msps	-	-

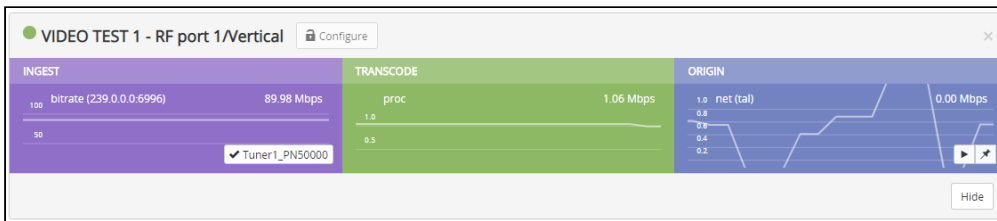
Carrier Frequency	4000	4020	4040	4060	4120	4140	-	-
Polarization	V	H	V	H	V	H	-	-
Spectral Inversion	Auto	Auto	Auto	Auto	Auto	Auto	-	-
Modulation	8 PSK	8 PSK	8 PSK	8 PSK	8 PSK	8 PSK	-	-
FEC	5/6	5/6	5/6	5/6	5/6	5/6	-	-
Pilots	Auto	Auto	Auto	Auto	Auto	Auto	-	-
Pls Code	0	0	0	0	0	0	-	-
Roll Off (%)	0.05	0.05	0.05	0.05	0.05	0.05	-	-

## How to monitor the channels (1:1)

1. From the home page, select the **Monitor Channels** app.
2. Click **Launch**. The general view with all services is displayed.



3. Click on a service to display the visualization graph.



- a. On the **INGEST** panel, verify the service bitrate and IP socket.
- b. On the **TRANSCODE** panel, verify the processing bitrate.
- c. On the **ORIGIN** (OTT service) or **PACKAGE** (IP service) panel, verify the video output bitrate.

**Note**

If you are using an OTT service, click on the play button (bottom right of the panel) to display the video.

## Customize the display

The menu at the top right allows you to filter the services to be displayed:



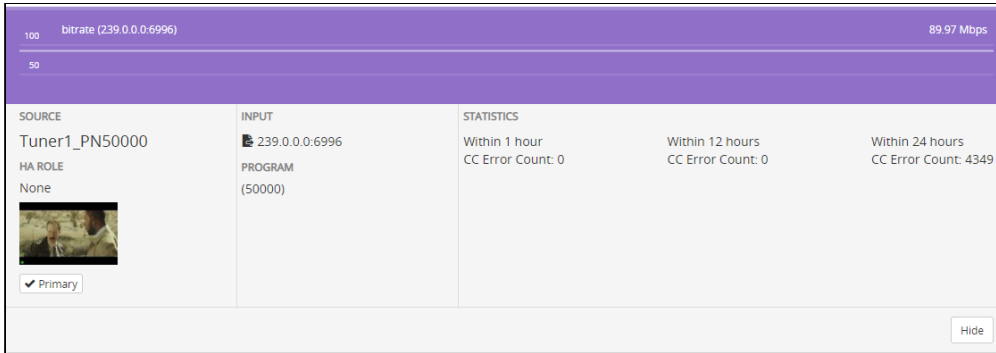
- **Critical:** Display only services with a critical notification.
- **Warning:** Display only services with a warning notification.
- **IPTV:** Display only services dedicated to IPTV output.

- **OTT:** Display only services dedicated to OTT output.
- **All:** Display all services.

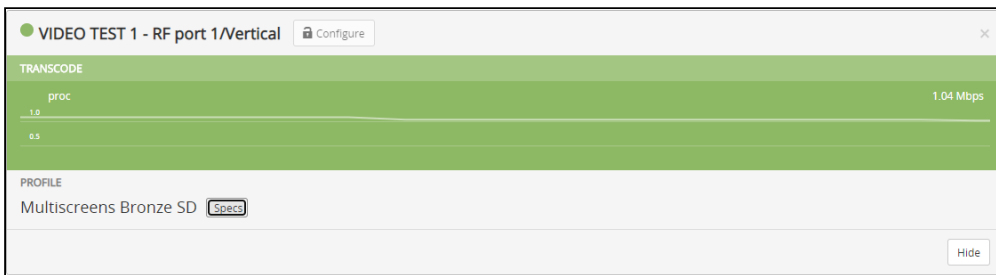
**Display details**

Click on the top of a panel to view its details.

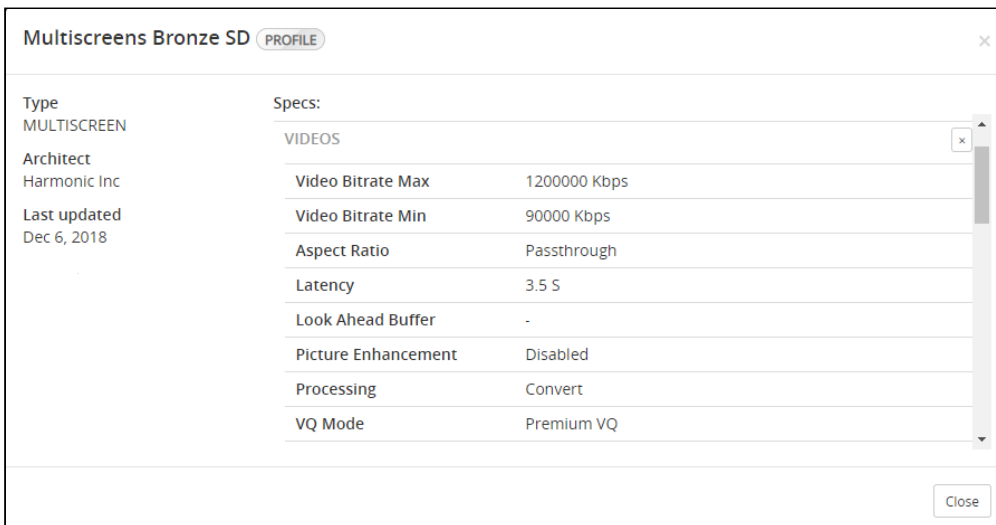
Ingest panel



Transcode panel



Click Specs to display the specifications of the transcoding:



### Origin panel

**ORIGIN**

1.0 net (HLS) 0.68 Mbps

0.8  
0.6  
0.4  
0.2

PROFILE	DASH	DASH
HLS DASH pull Destination	HLS	HLS

DESTINATION  
Tuner1\_PN50000 to HLS DASH pull output

Hide

### Package panel

**PACKAGE**


15 net (tal) 0.00 Mbps

10  
5

PROFILE	IP : PORT
Broadcast Divitrack Destination	0.0.0.0: 9999

DESTINATION  
Tuner5\_PN50000\_ToPool

Hide

 Access to the configuration is not allowed.

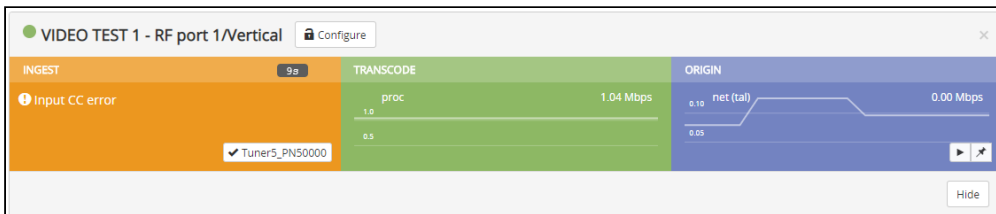
### Notifications display

From the Monitor Channels view, the XOS displays all current notifications.

From the general view:

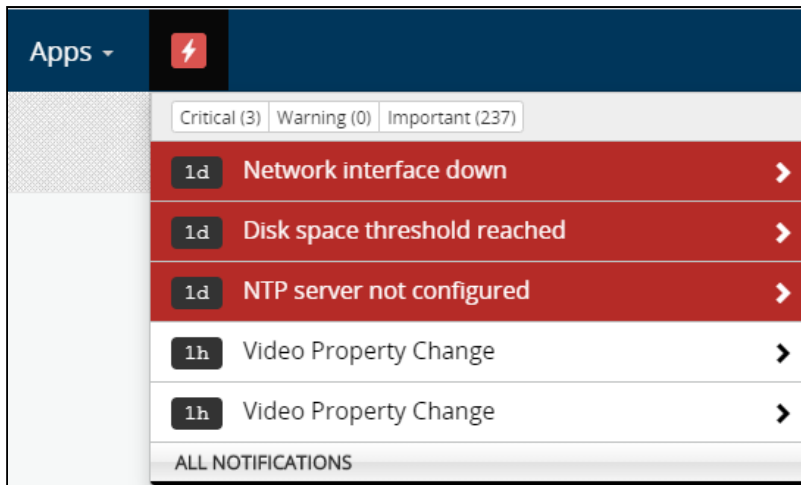


From the selected service:

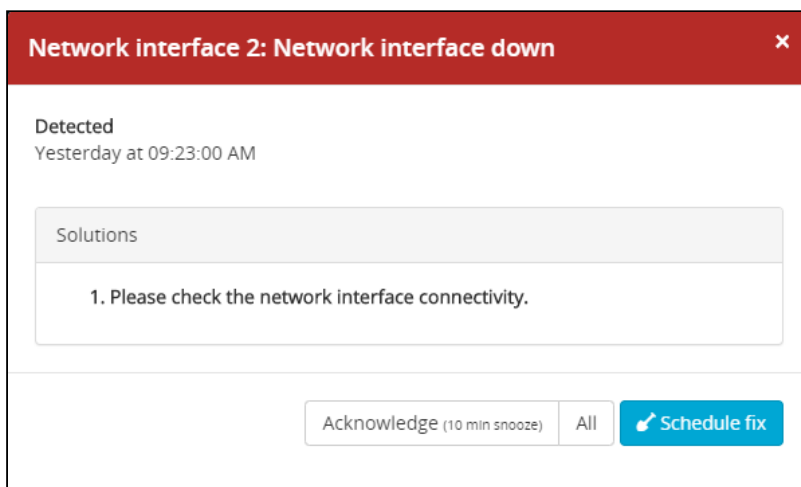


## How to monitor the alarms and events (1:1)

The current notifications can be displayed by clicking on the **Flash** icon on the top left.



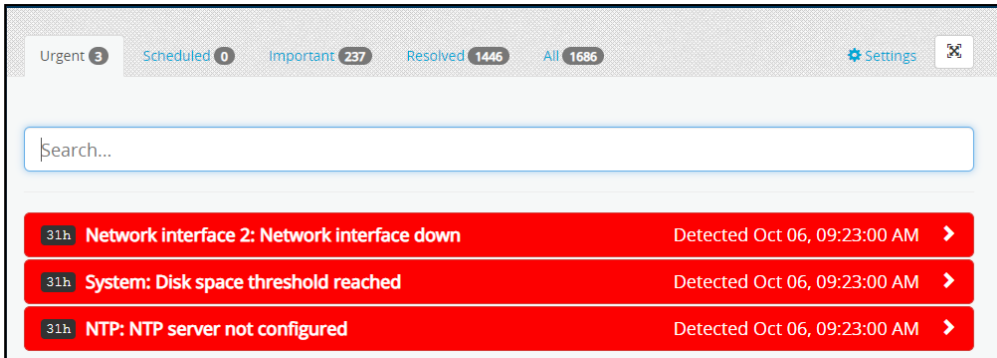
Clicking on a notification opens a popup window that describes more details:



## How to manage notifications (1:1)

View, filter, or forward alerts and schedule dates and times to resolve notifications from the **Notifications** app.

1. Launch the **Notifications** app.
2. Click on a category or enter a search term to find the type of notifications you want to view.



Type	Description
Urgent	Notifications that are labeled as <b>Critical</b> or <b>Warning</b> .
Scheduled	Notifications you have scheduled or acknowledged but not yet fixed.
Important	Notifications that have a lower severity level than those marked as <b>Critical</b> or <b>Warning</b> .
Resolved	Notifications that you have fixed.
All	A complete list of all notifications.

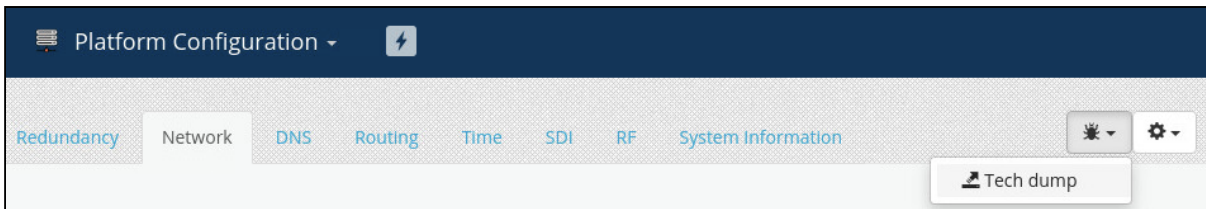
3. Click a single notification to view details.

## How to generate a technical report (1:1)

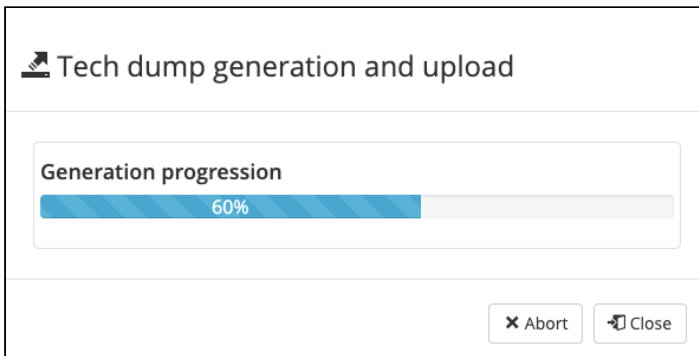
XOS integrates a mechanism to generate a technical report (TechDump file) for internal usage by Harmonic employees. When reporting a case, attaching a technical report can ease the analysis of the issue.

To generate the TechDump file, do the following:

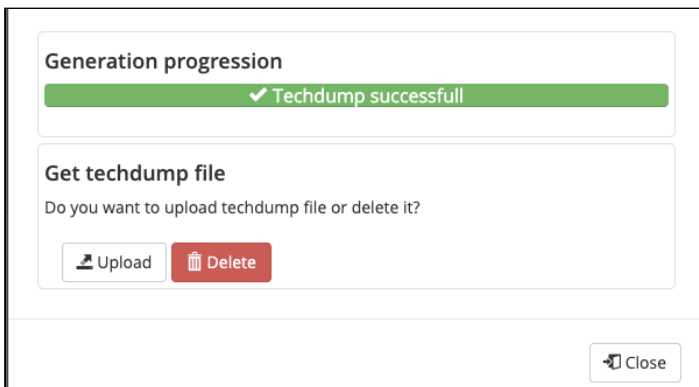
1. Launch the **Platform Configuration** app.
2. On the top right click on the **Tech dump** button to open a dialog box.



3. Click **Generate**.
4. The TechDump progression is displayed.

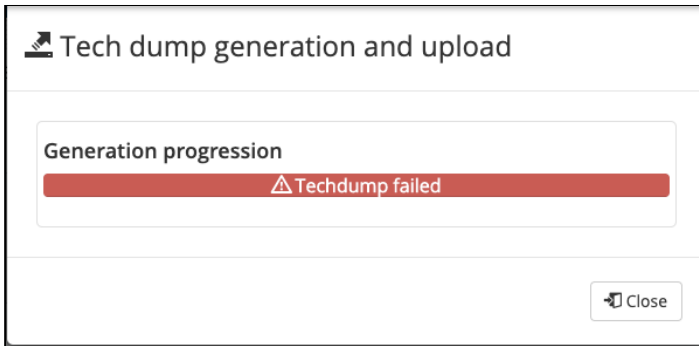


5. At any time, you can click on the **Abort** button to stop the generation of the TechDump file.
6. If the TechDump is successfully generated, the following message is displayed:



7. Click **Upload** to open a browser and select the file destination.

8. If the TechDump generation failed, the following message is displayed:



9. Close the dialog box and try again.

**TechDump generation status:**

When the TechDump dialog box is closed, the operator can follow the TechDump progression as shown below:



The TechDump is empty.




The TechDump is in progress.



The TechDump failed.



The TechDump is ready and can be uploaded.

 A message is generated when the TechDump is ready or has failed.

**How to solve an issue (1:1)**

If you experience any problems with the equipment, follow the procedures described below to help you understand or solve the issue.

**The notifications (alarms and events)**

Where can I find them?

- In the page header (current notifications).
- In the Notifications app (current and closed notifications).

How do I read the notifications?

- Explain the different parts of the notifications: Title, Description and Recommendations.

To do so, refer to [How to monitor the alarms and events \(1:1\)](#) (see page 52).

**RF Input issue**

Notifications:

- Tuner input signal loss.
- Input CC errors.

Actions:

- Launch the **Platform Configuration** app and select the RF / Tuner tab.
  - Check the LO frequency: make sure that this value is conform to the characteristics of its antenna (the LNB).
  - Check the tuner settings.
  - Check the statistics: look at the different counter values, for a few minutes.

To do so, refer to [How to monitor the RF inputs \(1:1\)](#) (see page 46).

- Check the antenna, the connectivity.
- From another XOS (if one available), check the same tuner input.

**Service missing in the MPTS output**

Is there a notification?

- Tuner input signal loss (see **RF input issue** above).
- Descrambling issue due to Smart card issue: read the recommendation in the notification.
- No Smart card issue, but the input is scrambled: contact your provider.
- RF card failure: read the recommendation in the notification, contact your provider to change the RF card if required.

If there is no notification, launch the **Monitor Channels** app:

- The service is absent from the list:
  - Check that you subscribed to it.
  - Check in RF monitoring that the XOS is under central head-end control.
  - If both are ok, contact your provider.
- Check if this service is present in the other MPTS outputs.
- Another possibility is the blackout of the service for some specifics events.

**An MPTS output is missing**

Is-there a notification?

- ASI output failure.
- Ethernet link down.
- IP address conflict.

If there is no notification, launch **Monitor Channels** app:

- Check that you subscribed to it.
- Check in RF monitoring that the XOS is under central head-end control.
- If both are ok, contact your provider.

ASI output:

- If there is no signal on this output, check the port number on your subscriber portal.
- Change ASI port assignation on the portal and check output.

IP output:

- Check IP address and port on your subscriber portal.

- Check your network connectivity between the XOS and the receiver (QAM modulator).
- Try to connect the receiver directly on the XOS.

### Environment issues

Notifications:

- RF card temperature or CPU temperature:
  - Check the temperature in the room.
  - Check there is no obstruction to the XOS airflow.
- Ethernet link down:
  - Check the connectivity.
- NTP sync loss:
  - Check the NTP server (if it's a local server).
  - Check network connectivity (if it's a remote server).

### Advice:

Use a spare XOS (if one available) with three full MPTS outputs for video recording, to do the following:

- Show filter in the **Monitor Channels** app.
- Show the consequences when a tuner input is loss.

To provide the best possible description and make it easier to solve the issue, make note of the following:

- Circumstances of the failure.
- Symptoms, for example: the video output became black.
- Is it a temporary, repetitive or permanent issue?
- Service impact in order to define the severity.
- Alarms description: give an exact and full wording of the alarms.

For technical support please contact CTS's Managed Satellite Distribution team at:

Tel. 800-426-7790  
HITS\_CCR@cable.comcast.com

For questions related to the overall C-band transition plan and reimbursement please reach out to the SES C-band help desk at:

Tel. 609-987-4400  
CbandHelp@ses.com

## Step 7 - 1:1 procedure: How to authorize IRDs

1. Confirm that you are able to see the Harmonic Test loop on the Vertical and Horizontal feeds of AMC-11 prior to March 1.
2. Login to the CTS Customer Portal and configure your IRD output multicasts, if you don't have access to the CTS Customer Portal, please contact the HITS Operations team.

CTS Customer Portal: <https://sso.comcasttechnologiesolutions.com/>  
Phone: 1-800-426-7790


3. On March 1, the Dual illumination period starts.
4. HITS Operations will download all the Mux outputs and authorizations to your XOS IRDs.
5. Verify your Mux outputs on your Primary Data Switch with a laptop. (See section IRD System Test).
6. If you have any missing muxes or channels, please contact HITS Operations.

## Step 8 - 1:1 procedure: IRD system test

After registering your IRDs on the HITS Portal and the IRDs have been authorized by HITS, you can confirm that your output muxes are present on your IRDs.

The following test equipment and software is required:

- PC or Laptop Using XOS IRD Monitor channels function
- PC or Laptop w/ TS reader or VLC s/w to view multicast output on Data Switch or IRD GbE output port.
- ASI Decoder(similar to DecTec) if using ASI output of IRD.

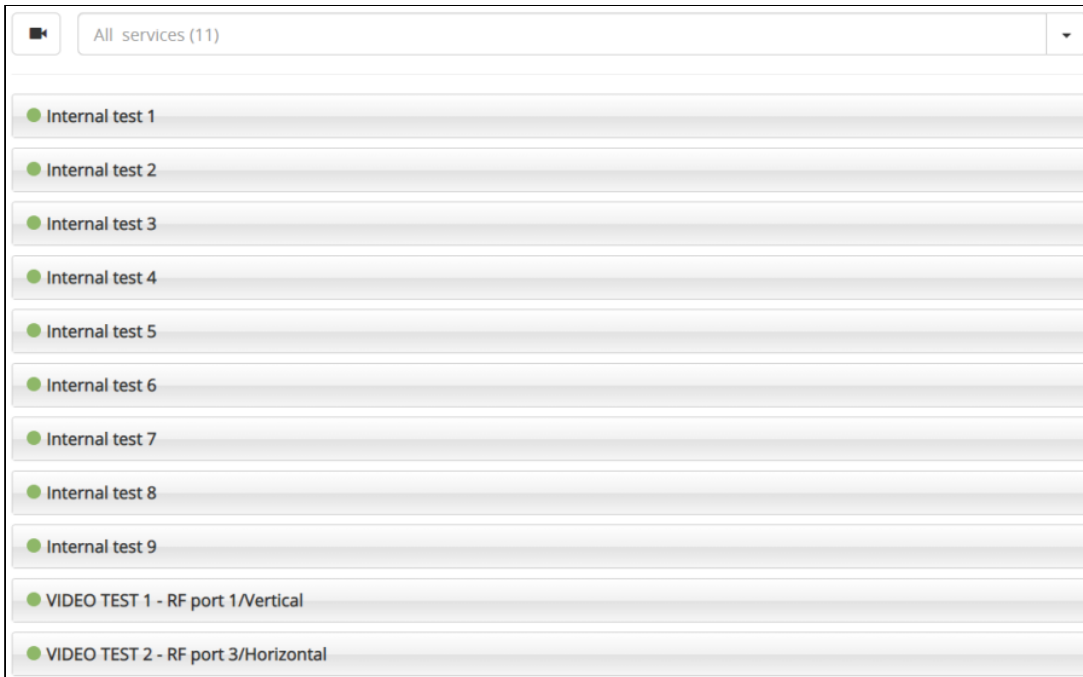
 If possible, leave a Laptop or PC connected to the Management Switch and Data Switch. This setup is advantageous for troubleshooting issues and configurations in the future.

### XOS IRD channel monitoring function

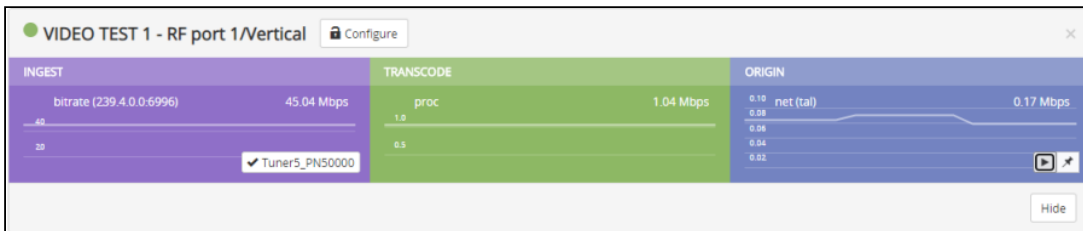
Using the built-in feature of the XOS IRD, you can view the channels authorized on the IRD. To do so, do the following:

1. Connect a laptop or PC to the Management Switch uplink port.
2. Enter the **https://mgmt/** IP address (of XOS unit under test).
3. Enter your login and password (hitsoperator / hitsaffiliate).
4. From the home page, select the **Monitor Channels** tile.

5. Click **Launch** to display the general view with all services.



6. Click on a service to display the visualization graph.



7. On the **INGEST** panel, verify the service bitrate and IP socket.
8. On the **TRANSCODE** panel, verify the processing bitrate.
9. On the **ORIGIN** (OTT service) or **PACKAGE** (IP service) panel, verify the video output bitrate. If it's an OTT service, click on the play button (bottom right of the panel) to display the video.

### Customize the display

The drop-down menu (at the top right) allows you to filter the services to be displayed.



The following services can be displayed:

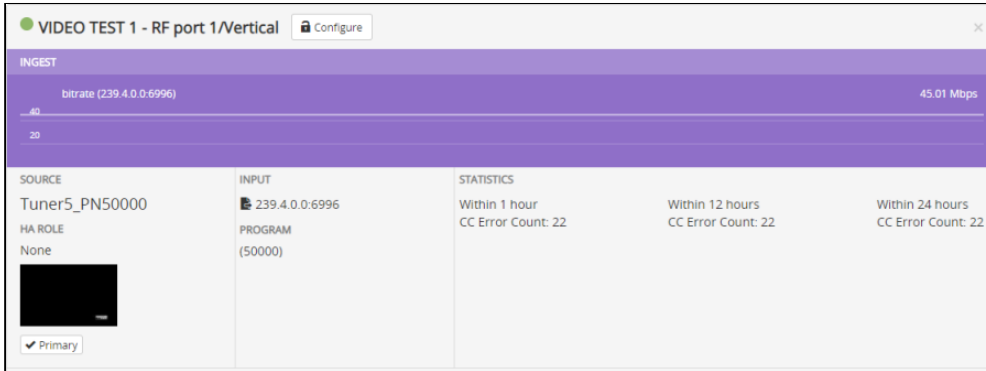
- **Critical.** Display only services with a critical notification.

- **Warning.** Display only services with a warning notification.
- **IPTV.** Display only services dedicated to IPTV output.
- **OTT.** Display only services dedicated to OTT output.
- **All.** Display all services.

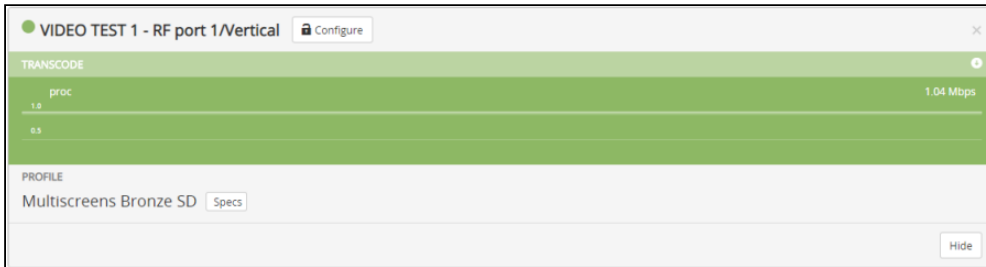
**Display details**

Click on the top of a panel to view its details

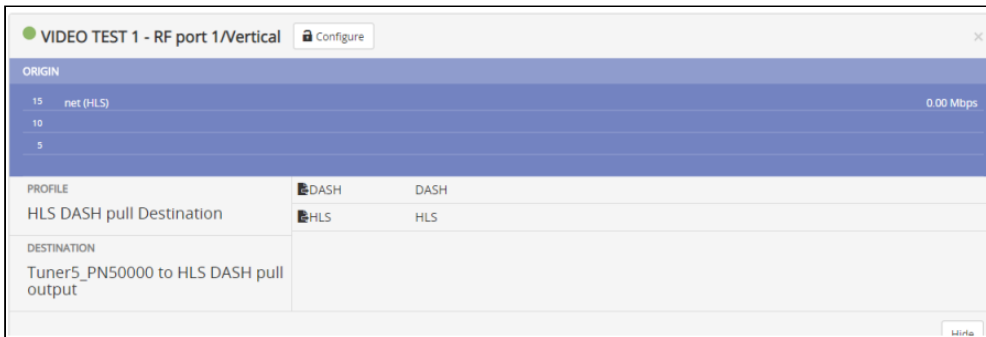
**Ingest Panel**



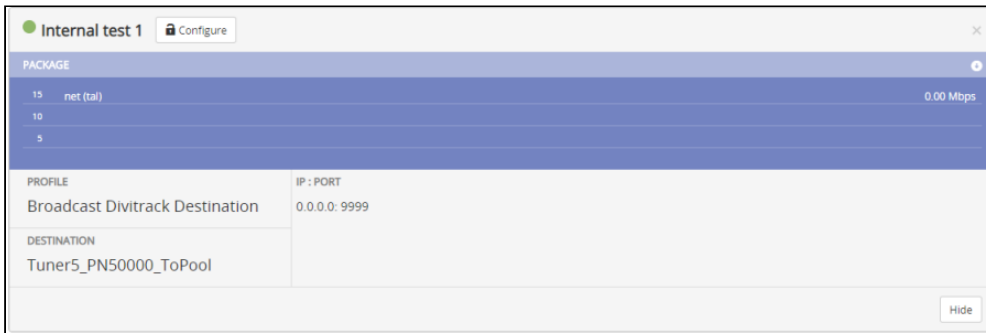
**Transcode panel**



**Origin panel**



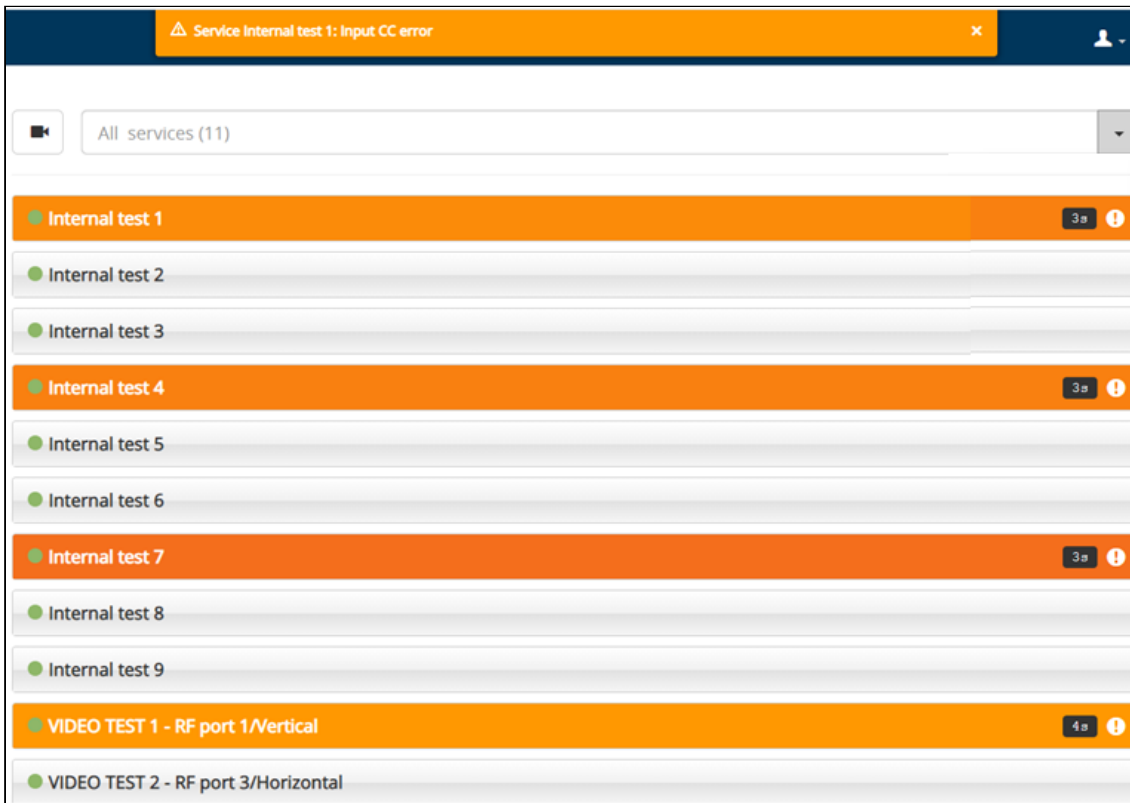
### Package panel



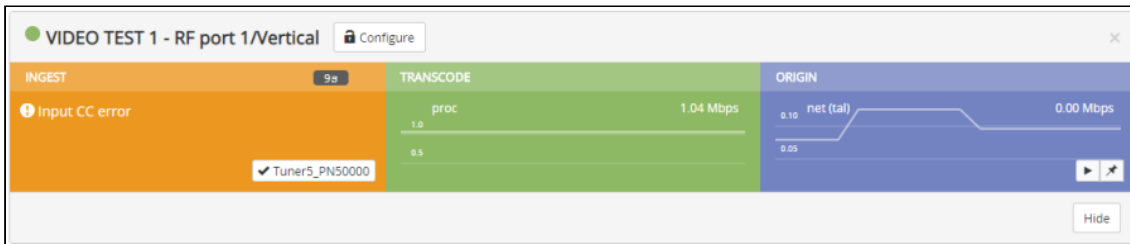
### Notifications display

From the Monitor Channels view, the XOS displays all current notifications, critical or warning.

From the general view



### From the selected service



The channel monitor includes everything, each transcoded channel and multiplex. You can also do the following:

- Use channel filtering to find the QAM multiplex output.
- Retrieve the IP / ASI output in title.

### IP output test

To test the IP output, do the following:

1. Connect a laptop or PC to the Data Switch uplink port.
2. Launch VLC or TS Reader.
3. Setup up the VLC or TS Reader to view your Output Multicast.
4. Confirm that the channels you expect to be in this output multicast are present.
5. Repeat step 4 for any remaining output muxes.

### ASI output test

To test the ASI output, do the following:

1. Connect an ASI Decoder to the ASI port on the IRD under test.
2. Confirm that the channels you expect to be in this ASI output are present.
3. Repeat step 2 for any remaining output muxes on the other ASI ports.

## Technical support (1:1)

### For locations that did **NOT** elect the Lump Sum option offered by the FCC

- Your transition support will be provided by Harmonic Professional Services.

**Harmonic HITS Transition Support**

**Email:** [HITS-HELP@harmonicinc.com](mailto:HITS-HELP@harmonicinc.com)

**Phone:** 1-408-490-7684

- ENABLE REMOTE CONNECTIVITY**

To quickly assist you in resolving issues during the transition and after you have put the new IRDs into production operation, Harmonic recommends enabling remote access via the provided Cisco Management Switch. Please refer to the steps listed below.

The Harmonic HITS Transition Support team and the Technical Assistance Center (TAC) utilize remote assistance software to aid in the diagnosis of all product lines. To start a remote, real-time assistance session, please follow these steps:

- STEP 1: CONTACT SUPPORT - Contact the HITS-HELP team by slack, phone or email to plan your remote assistance.
- STEP 2: DOWNLOAD SOFTWARE -
  - Download TeamViewer [here](https://get.teamviewer.com/fkhjg6a): <https://get.teamviewer.com/fkhjg6a> and open the executable file on the PC/Mac you wish us to access. Click **OK** to run. This will start the TeamViewer client.
- STEP 3: CONNECT WITH SUPPORT - Provide the ID and password to our support team, enabling the engineer to connect remotely.

**Alternate secured access methodology (ex. VPN) could also be established.**

**OPTIONAL Enhanced Support** - The XOS IRD comes with the latest technology in cloud based appliance monitoring. If you would like to take advantage of this capability during the transition or once your IRDs are in production, please refer to the Enhanced Technical Support section at the end of the installation guide for additional details.

### For locations that elected the Lump Sum option

- Your transition support will be provided by Comcast HITS Operations team.

**Comcast HITS Operations**

**CTS Customer Portal:** <https://sso.comcasttechnologysolutions.com/>

**Phone:** 1-800-426-7790

**If you are unsure whether your location elected lump sum, please contact the Harmonic HITS Transition Support team to confirm your status.**

## Enhanced technical support (1:1)

### Benefits of remote connectivity (1:1)

- XOS 7060S cloud monitoring and enhanced support
- Harmonic cloud monitoring and enhanced support for HITS

### XOS 7060S cloud monitoring and enhanced support (1:1)

#### Basic network connectivity

The XOS 7060S comes with the latest technology in cloud based appliance monitoring. In order to enable this, the XOS needs to be able to resolve internet names via the Domain Name Service (DNS), set its local clock accurately by accessing a Network Time Protocol server and make outbound HTTPS connections to report telemetry and for remote diagnostics.

By default, the following is the configuration for DNS and NTP:

Type	Protocol	UDP/TCP	Outbound Traffic	
			Servers	Port
DNS	DNS	UDP/TCP	8.8.8.8 8.8.4.4	53
NTP	NTP	UDP	time1.google.com time2.google.com	123

If you have local servers available you may change this configuration through the provided web user interface available via making a https connection to the XOS 7060S using your browser (Chrome recommended).

#### Cloud monitoring

In today's connected world gathering telemetry data from our appliances like the XOS 7060s allows us to the following:

- Gain continual insights from machine learning algorithms that get smarter over time.
- Follow "best next actions" derived from predictive analytics to improve system health.
- Know the benefits and effectiveness of software updates and upgrade with confidence.
- Accelerate issue resolution.

In order to achieve this, the XOS 7060S makes some https outbound connections to enable device registration and report the telemetry data.

Use	Server	Protocol	UDP/TCP	Outbound Traffic Destination Port
Device Registration	vos-ms.herokuapp.com	https	TCP	443

Use	Server	Protocol	UDP/TCP	Outbound Traffic Destination Port
Analytics Reporting	*.ods.opinsights.azure.com	https	TCP	443

Data is collected on an as available basis and interruption of these services or the inability of the XOS 7060S to connect to them will not impact the performance of the device, however a notification will be displayed in the web user interface to let you know that the connection is unavailable to aid in initial set-up and troubleshooting.

All the telemetry that the XOS 7060S submits is delivered securely over an https connection using at least AES-256 bit encryption. The following is a representative sample of the data we collect, we may vary the content of the collected data over time as we learn more, but we do not collect any personally identifiable data, the data is collected approximately every 10 seconds and will have an average data rate of less than 100kb/s.

- Host information
  - Serial Number
  - CPU utilization
  - Memory utilization
  - Disk utilization
  - Network utilization
    - Interface utilization / throughput
    - Interface Error
- Satellite information
  - Carrier Lock
  - Estimated input bit error rate
  - Eb/No
  - Temperature
  - Input CC error count
- Over Satellite Command and Control
  - Log actions
- Service Notifications
  - Loss of Input
  - Process restart

Enhanced support

### Software upgrades

In addition to providing for software upgrade over the satellite we also allow software upgrades from our hosted internet servers in order to enable this the XOS 7060S needs access to those servers.

Use	Server	Protocol	UDP/TCP	Outbound Traffic Destination Port
Software Upgrade	hlitreleases.azurecr.io	https	TCP	443

Software upgrades delivered by this method must be manually initiated, however software upgrades can be delivered and applied automatically over the satellite connection.

### Remote diagnostics

In the event of the XOS7060S deployed on your site encountering service problems our support team may need to run additional diagnostic commands. In accordance with our security practices these commands are only accessible to our

authenticated support personnel. Authentication is accomplished via the third-party service, Okta. Harmonic has centralized on this as the authentication layer for all our cloud data services.

Our platform follows industry best practices including “Least Privilege” and “Role-based access control” around logical access to our production environment. Access is controlled on a strict need basis and is only granted for select authorized personnel using multi-factor authentication mechanisms in addition all access is securely logged. For more information about our commitment to security please see <https://www.harmonicinc.com/security>.

To enable this functionality the XOS 7060S needs access to one further server.

Use	Server	Protocol	UDP/TCP	Outbound Traffic Destination Port
Enhanced diagnostics	teleport360.harmonicinc.com	HTTPS	TCP	443

### Harmonic cloud monitoring and enhanced support for HITS (1:1)

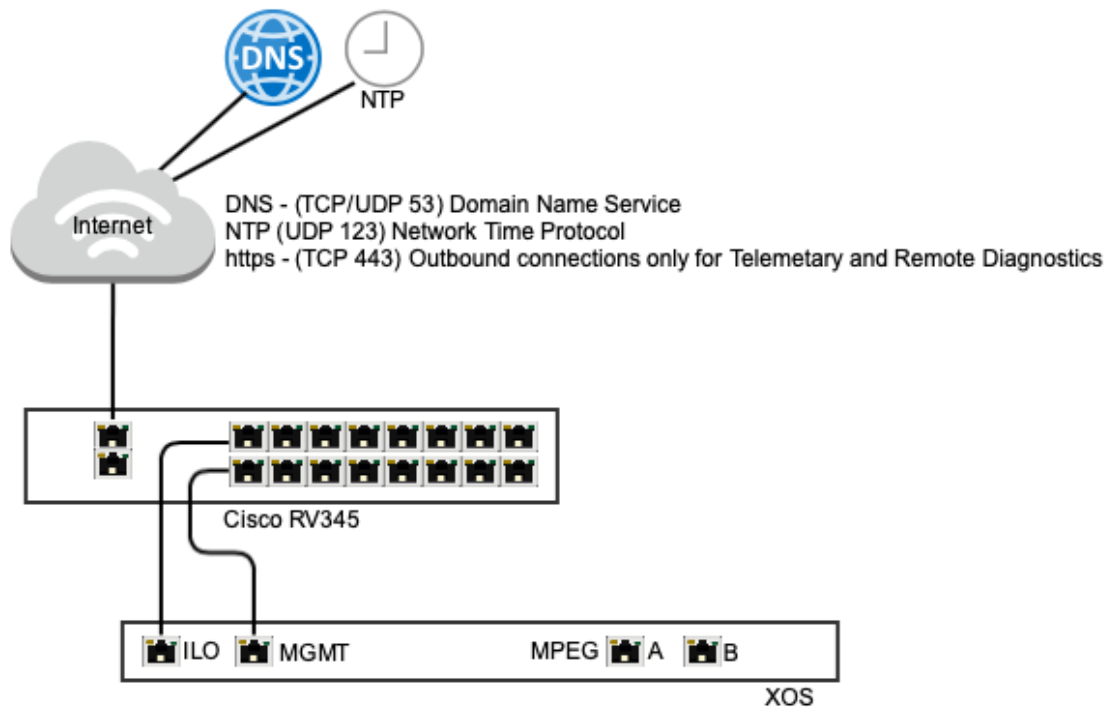
The details of Harmonic Cloud Monitoring and Enhanced Support can be found at XOS 7060S cloud monitoring and enhanced support . This document describes the options for connecting the XOS7060S to the service for HITS.

As part of the equipment delivered, you were provided with a Cisco RV345 , which is an enterprise-class security router. You can use the following options to ensure security of your network while still allowing the XOS 7060S to access our Cloud Monitoring and Enhanced Support offering.

- Option 1: Connect directly to the Internet
- Option 2: Connect to your management network
- Option 3: Connect to your DMZ (Copy)

#### Option 1: Connect directly to the Internet (1:1)

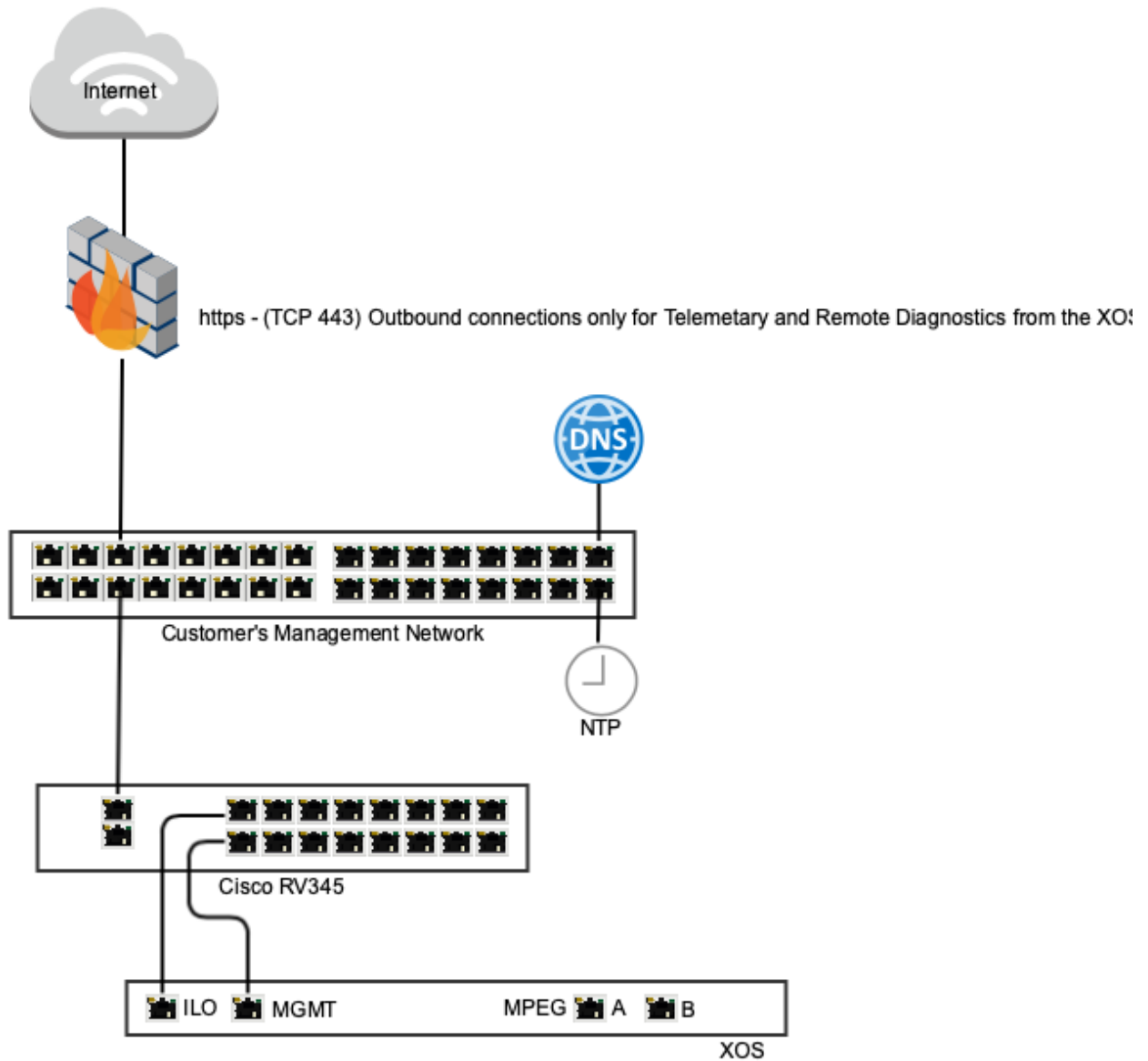
In this option, the uplink port of the RV345 is connected directly to the internet. This connection could be through a cable modem or directly into an internet port of a cross connect. The firewall on the RV345 is configured as shown only letting outbound connections, address assignment is RFC 1918.



This is the simplest configuration. You are only required to supply one public IP address for the interface of the Cisco RV345, however it leaves you without access to the web user interface of the XOS.

#### Option 2: Connect to your management network (1:1)

As detailed in the XOS 7060S Cloud Monitoring and Enhanced Support document, we believe that the XOS 7060S is secure enough to connect directly to your management network. In this case we expect that DNS and NTP is provided locally and your firewall is configured to allow https outbound connection from the XOS 7060S. The firewall in the RV345 is turned off. The advantage of this configuration is that it allows you access to the web user interface for the XOS which will aid in troubleshooting service issues.

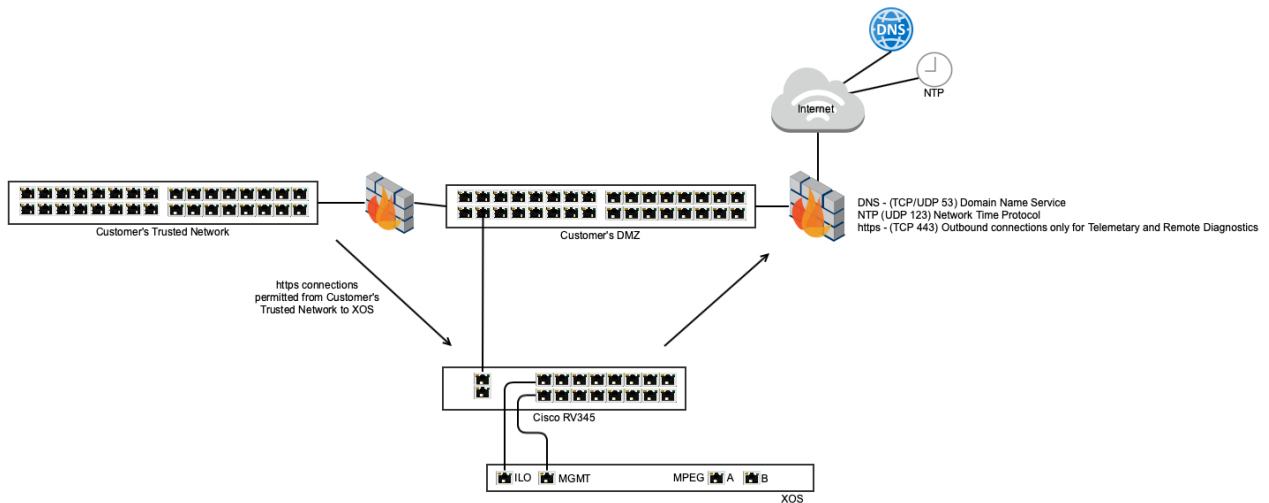


The following configuration is required for the management network:

- 2 IP address per XOS (one for ILO and one for management).
- Routing configuration for the XOS.
- DNS server IP address.
- NTP server address.
- You also need to configure your firewall to allow outbound initiated https connections on TCP port 443 from the XOS 7060S units.

Option 3: Connect to your DMZ (1:1)

In this option, you consider the XOS devices part of your DMZ allowing access from your trusted network to the https. Web servers running on the XOS 7060S allow for access to the management user interface while allowing the XOS 7060S to connect to internet based NTP, DNS server, and to make https requests to the Harmonic Cloud Monitoring Service.



This configuration requires one IP address per XOS in your DMZ as the RV345 is configured as a NATing firewall with the XOS being assigned address from the RFC 1918 pool. In addition it requires the following configuration on both of your firewalls:

- Interior firewall - allow outbound connections to the IP address assigned to the RV345 on TCP port 443.
- Exterior firewall - as shown, DNS, NTP and https outbound.