



INSTRUCTION MANUAL

VF-9000

**SERIAL DIGITAL FIBER OPTIC TRANSPORT and DISTRIBUTION
SYSTEM FOR SMPTE 259, 292, 424, DVB-ASI,
with gigabit ethernet with SNMP & Web page monitoring and other protocols**

MultiDyne
Harnessing The Power of Light

10 NEWTON PLACE
HAUPPAUGE, NY 11788 USA
(877) 685-8439 / (516) 671-7278 / FAX (516) 671-3362
sales@multidyne.com
www.multidyne.com

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INTRODUCTION

The VF-9000 is a 1 Rack Unit, very high-density video fiber optic transport platform. It has up to 36 optical I/O (18 SFP Ports) and 36 Copper, HD-BNC I/Os. The configuration of input vs. output is configured automatically, following the I/O of the SFP installed. If a dual TX SFP is inserted in a slot, the two BNCs at the back of the slot become inputs. If a dual RX SFP is inserted in a slot, the two BNCs at the back of the slot become outputs.

There are no setups or configurations required. If the unit is populated with CWDM SFPs, 18 signals can be multiplexed/de-multiplexed over/from one SM fiber. The 36 channel version requires 2 fibers. Next to the SFP cages are the 18 or 36 optical multiplexer/de-multiplexer I/O's, configured with LC ports for easy patching with generic, inexpensive LC patch cables.

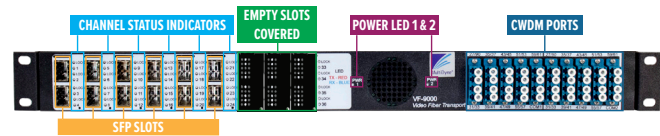
Each card in the VF-9000 has two or four BNCs on the back and one or two SFP cages in the front. These cards can be ordered with two-channel SFPs and two BNCs as described above or with a single BNC input and loop output. In this case, there will be only one optical output. The reciprocal receiver section would have only one optical input with a dual BNC output. The 36 channel version has twice the functionality per slot, with 2 SFP slots and four high-density BNCs (HD-BNC).

Ideal for use in OB vans where space is limited and high-density is a necessity. With dual AC inputs, there is peace of mind with power redundancy and no need for cumbersome external power supplies. The system can also be ordered with DC inputs.

FEATURES AND OPERATION

The VF-9000 series video cards support all popular standards for digital video transport such as SMPTE 424M, SMPTE 292M, and SMPTE 259M working at 3G-SDI, HD-SDI, SD-SDI respectively. In addition, the SDI interface also will transport signals compatible with DVB/ASI, and SMPTE 297M interfaces at the defined rates. The units include a digital re-clocker and repeater for the SMPTE SDI standards mentioned above. For other standards and rates, the signal is automatically or manually passed through without re-clocking. For all SDI input, the units include automatic cable equalization based on the data rate detected.

FRONT PANEL



VF-9000 front

The front panel of the quad BNC VF-9000 has a maximum of 9 slots OR 36 SDI channels for SFPs and can be ordered as per requirement. Each SFP slots has 2 channels. Each channel has 2 LEDs indicating lock and channel direction. The unit contains 40 LC ports for 36 CWDM cassette IO connections, 2 common IO from multiplexed signals and 2 spares. The CWDM is inside the box. This makes the overall design robust and avoids damage to the cassette's fiber. There are 2 power led that lights up green when the power adapters are plugged and red if there is a brick failure.

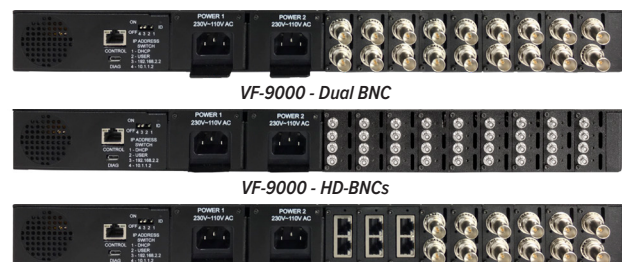
The lock LED is a bi-color LED. It is Red when there is no signal or when the signal does not lock to any data rate like SD, HD or 3G. When the signal is locked to a particular data rate the lock led changes color from Red to Green.

The channel direction led is a bi-color LED. It is either Blue or Red. It lights up red when the optical port is in transmit mode and lights up blue when the optical port is in receive mode. The LED changes color based on the SFP installed.

There are 2 bi-color LEDs which light up green when both the AC inputs are powered up with AC input. When ordered with SNMP mode, in case of a power supply failure the LEDs will light up red. If the system was ordered without SNMP during a power supply failure the led will turn off.

In case of a dual BNC card front panel, the bottom SFP hole will not be accessible and covered. The system will need to go a factory upgrade if the box needs to change from a quad BNC to dual BNC card or vice versa.

REAR PANEL



VF-9000 - Dual Video BNC/Ethernet

The Rear panel has 2 AC power entry with IEC 60320-1 connector. There is an Ethernet RJ45 port for connecting to the frame controller via IP. There is a micro USB port for updating the firmware for the frame controller. There is a DIP switch for setting the IP address. There are BNCs and bi-color LED lights for each BNC.

Power 1 is the main supply and Power 2 is the redundant power supply. The system can be powered up by either one of the power supply. The system powers up through the first port plugged into the system. The second one can also be plugged in simultaneously. In case of failure of Power1, then the Power2 will take over the system or vice versa.

Each BNC has its own channel direction LEDs. The LEDs can light up as red or blue based on the SFP plugged into the front. When the LEDs are red it means the BNC is transmitting video over copper. If the LED is lit up blue it will receive video over copper. When ordered with regular BNCs they light up green when the signal is locked and turns off when a signal is not present.

VIDEO CARD

Quad Video



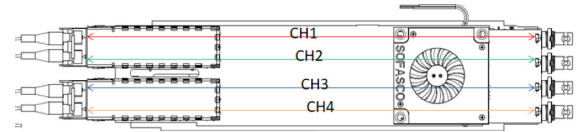
Video Card

The video cards are 4 channel cards. They can be ordered in 2 options based on the data rate required:

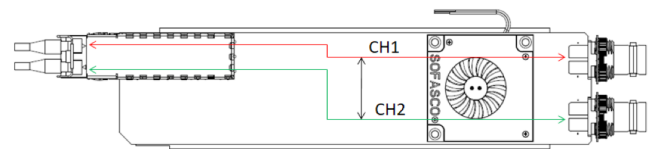
1. 3G option
2. 12G option

The video cards can be installed with a single\ dual transmitter or single\ dual receiver SFPs only. The SFPs have to be NON-MSA and SDI video. The SFPs can be dual TX, dual RX, single TX and single RX. When a transmit SFP is installed the board configures to receive video over copper and transmit over fiber. So the video is equalized and re-clocked before transmitted over fiber. In receive configuration, they are received over fiber and re-clocked and transmitted over copper. The video cards have High-density BNC on the rear and hot-swappable SFP ports in the front. Each video card has an assigned Slot ID and can transmit status information over Ethernet. Each video stream can support quad SDI streams and data rate up to 3Gbps. So an individual card can support a 4k stream.

A combination of a dual transmits SFP and a dual receive SFP can be used to configure the boards. Below is a diagram showing signal flow for different SFPs. Each card has a fan mounted on it. The fan pulls the air in from the front and then blows it out through the rear. Each fan has a sensor and a fan failure is reported over SNMP.



Signal flow (the arrow marks point based on the SFP installed)



Dual BNC card

Dual BNC

The dual BNC has 2 channels. The dual BNC card configures itself based on the SFP inserted. Each channel is re-clocked. There is a green LED on top of every BNC on the dual BNC card. It shows if the signal is locked and a presence of a signal in that channel. When a single TX SFP is installed the CH2 BNC is an input and CH1 BNC is a re-clocked loop out of the signal and the signal is outputted over fiber. When a single RX SFP is installed the CH1 BNC and CH2 BNC both are re-clocked outputs.

Add or remove a card

There are 9 slots in the VF-9000 frame. The system can be upgraded or a card can be replaced by removing the individual back panel. There is a removable back panel for every single card. The back panel is held by 2 screws as shown in Figure5. Remove the 2 screws and slide out the card holding the BNC. Once removed slide in the new card and push it till you hear a clicking sound. The sound signals the card has mated to the front connector in the front panel. Then power the device after installing the screws.

NETWORK SETTINGS & STATUS MONITORING

You can monitor the status of all the cards in your VF-9000 frame via a Web page dashboard that is embedded within the frame. The steps for connecting to your facility's Ethernet network will depend on the network requirements of your facility. Contact your IT Department before connecting to your facility network to ensure that there will not be any conflicts.

Network Settings

The method for setting the IP address of the VF-9000 frame is determined using the 4-position DIP switch on the rear of the chassis. The four possible settings for IP address configuration are outlined below:

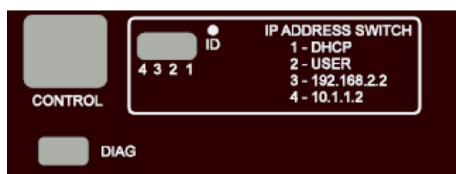
- Preset IP address configuration — the network controller card in the frame can be forced to use one of two specific predefined IP address settings. This can be used to establish initial communications, configure the frame for future deployment on another network, or to override a custom user configuration.
- User-defined IP address configuration — the network controller card in the frame can be configured to use a user-defined static IP address from the device's embedded Web page. Re-configuration can only be done once network communications have been established.
- Automatic configuration using DHCP — the network controller card in the frame is configured to automatically obtain network settings from a Dynamic Host Configuration Protocol (DHCP) server. This method would be recommended for advanced users only as there is no way to display the DHCP assigned address on the frame itself.

The physical DIP switching settings are shown below. Only one switch is allowed to be in the ON position (UP).

DIP SWITCH #	DESCRIPTION
1	DHCP. Network settings assigned by a DHCP server
2	User IP Address. IP Address is set by the user through the embedded Web page.
3	Fixed IP Address #1 - 192.168.2.2
4	Fixed IP Address #2 - 10.1.1.2

DIP SWITCH SETTINGS

Note — The IP Addresses of the VF-9000 frame and your computer must be on the same Subnet. For example, if the VF-9000 frame has an IP Address of 192.168.2.2, then your computer should be configured for an IP address of 192.168.2.X where X is a number other than 2.



IP address DIP switch

To use one of the fixed preset IP addresses:

1. Set the DIP Switch to specify the desired preset IP address as outlined in the IP address DIP switch table.
2. Ensure the network settings of your computer are compatible with those chosen for the VF-9000 frame. Both your computer and the VF-9000 must be on the same subnet. Contact your IT Department if you need help determining or configuring the network settings of your computer.
3. To prevent any possible IP address conflicts, initially isolate the VF-9000 frame and your computer from the rest of your network.

- If you are using a hub or switch, unplug all devices except the VF-9000 frame and your computer

Or

- Connect the VF-9000 frame directly to your computer with an Ethernet cable.

4. Launch a web browser on your computer.
5. Power up the VF-9000 frame.
6. In the address bar of the web browser, enter the preset IP address selected on the DIP switch.
7. Wait approximately 30 seconds while the frame establishes network communications.
8. Verify that the VF-9000 Dashboard Web page displays in the web browser.
9. Should the Web page fail to display after a minute or two:
 - Click the refresh/reload button in your browser.
 - Verify the Ethernet cables are properly connected.
 - Check the link/activity LEDs found on the Ethernet RJ-45 connectors.
 - Verify that you have properly performed each step of this procedure.
 - Contact MultiDyne Technical Support if you cannot establish a connection.

To use a Custom User IP Address via Web page Dashboard:

Once network communications have been established with a VF-9000 frame, a custom static IP address can be configured through the Frame Ethernet Settings box in the Web page Dashboard.

To configure the User IP address using the Web page Dashboard:

1. Establish Ethernet communications with the VF-9000 frame using one of the preset IP addresses, DHCP, or previously configured User IP address and load the device's Dashboard Web page in a web browser by entering the IP address in the browser's address bar.
2. In the Frame Ethernet Settings Box, enter the desired User IP address in the User IP boxes.

3. Ensure the new network settings chosen for the VF-9000 frame are compatible with the network the VF-9000 is to be employed in. The computer used for monitoring the VF-9000 frame must be on the same subnet. Contact your IT Department if necessary.
4. Verify the IP address entered is correct and then click the "Save IP" Button. This IP address will be stored in non-volatile memory on the frame controller card.
5. The new IP address will not take effect until the IP Address DIP switch is changed to the User IP address position. If the DIP switch is already in the User IP position, a toggle of the User IP position switch from off to back on again may be required for the new address to take effect.
6. Enter the new IP address in the address bar of a web browser and hit enter to verify the new IP address.

Frame Ethernet Settings

MAC Address: FC:C2:3D:0:8C:CA

Current IP Address: 192.168.1.249

IP Switch Setting: User IP

User IP Address: 192 . 168 . 1 . 249

Frame Description: Rack 12 Top

Frame ID Led:

Ethernet settings box on web page

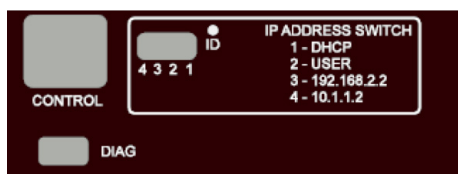
To use DHCP to automatically assign network settings:

Network settings for the VF-9000 frame may be automatically configured via a DHCP server on the facility network. This method would be recommended for advanced users only as there is no way to display the DHCP assigned address on the frame itself. To configure the network settings via DHCP:

1. Connect the VF-9000 frame to your network using an Ethernet cable.
2. Power up the VF-9000 frame.
3. Set the DIP Switch position 1 to ON to specify DHCP configured settings.

Physically identifying a VF-9000 frame in a facility:

On the rear of the chassis, there is an ID LED which can be used to help identify the location of a particular VF-9000 frame. The Frame ID LED button in the Ethernet Settings Box of the Web page allows you to turn this LED ON or OFF. When turned ON, the LED on the chassis will blink.



Rear panel showing network settings and ID LED

Web page status monitoring

You can monitor the status of all the cards in your VF-9000 frame via a Web page dashboard that is served from the network controller card within the frame. This Web page is accessed through any web browser by simply entering the IP address of the frame in the address bar. Shown below is a screen capture of the Web page from Internet Explorer.

Frame Ethernet Settings

MAC Address: FC:C2:3D:1:12:D4

Current IP Address: 192.168.1.249

IP Switch Setting: User IP

User IP Address: 192 . 168 . 1 . 249

Frame Description: VF9000 Rack 2 Top

Frame ID Led:

SNMP Settings

☒ Trap Enable

Trap Destination IP Address: 192 . 168 . 1 . 128 Port: 162

SNMP is v1 and Community String is: public

Frame Status: Software Rev 1.10

	Status	Voltage
Power Supply 1	PS1 Ok	11.99
Power Supply 2	PS2 Ok	11.94
Chassis Fan	Ok	

Slot Information

Slot 1: Quad 3G SDI Card V1.00

Card Fan Status: Ok

SFP	Type	Temperature
Top	Dual RX	38
Bottom	Dual RX	36

BNC	Direction	Rate	Lock	Optical Power	Optical Port
Ch 1	SDI Out		Unlocked	-40.00 dBm	2
Ch 2	SDI Out		Unlocked	-40.00 dBm	3
Ch 3	SDI Out		Unlocked	-40.00 dBm	4
Ch 4	SDI Out	3G	Locked	-1.57 dBm	1

The Web page is grouped into two areas. At the top is a box that contains the frame's current network settings information. Below that, there are individual boxes which display the information pertaining to the video cards that are installed in the chassis.

Ethernet Settings Box

Shown below is the Ethernet Settings Box on the Web page, which contains the network settings information for the frame. Also in this box are some controls to set a custom IP address and a text box to enter a description or location information of the frame.

Frame Ethernet Settings

MAC Address: FC:C2:3D:0:8C:CA

Current IP Address: 192.168.1.249

IP Switch Setting: User IP

User IP Address: . . .

Frame Description:

Frame ID Led:

Ethernet settings box on Web page

Card Slot Information

Following the Ethernet Settings Box on the Web page is the card information for each slot in the chassis. The information for each slot is contained within its own individual box for easy identification. Slots which are not populated with a card will show blank information.

Slot 1: Quad 3G SDI Card V1.00

Card Fan Status: Ok

SFP	Type	Temperature
Top	Dual RX	39
Bottom	Dual RX	37

BNC	Direction	Rate	Lock	Optical Power	Optical Port
Ch 1	SDI Out		Unlocked	-40.00 dBm	2
Ch 2	SDI Out		Unlocked	-40.00 dBm	3
Ch 3	SDI Out		Unlocked	-40.00 dBm	4
Ch 4	SDI Out	3G	Locked	-1.49 dBm	1

Card slot information box on Web page

At the top of each Slot, Information Box is the Slot number, followed by the type of card that is installed in the slot and its software revision (if applicable). If a slot is empty, the card type and revision information will be blank.

The first table in a Slot Information Box displays the information about the SFP modules that are plugged into the SFP Cages on the card. Displayed are the SFP Module type and current operating temperature of each SFP in degrees Celsius. Cages which are empty will show blank information.

SFP	Type	Temperature
Top	Dual TX	51
Bottom	Dual RX	45

SFP information table

The second table in a Slot Information Box displays the information about the video signals that are present on the card. The table is organized in rows with respect to the BNC connectors which are numbered 1 to 4 from top to bottom on the card.

Each BNC can be either an SDI Input or SDI Output depending on the types of SFP Modules that are plugged into the card. The direction is automatically configured when the SFP is installed. The direction of each BNC is shown, followed by the Video Data Rate and Signal Lock information. Following that is the Optical Power, transmitted or received, and the Optical Port the BNC is associated with. Optical ports are numbered 1 to 4 from top to bottom on the card. If the BNC is an Input, the Optical Power shown is the Transmitted Power onto the fiber. If the BNC is an output, the Optical Power shown is the Received Power from the fiber.

BNC	Direction	Rate	Lock	Optical Power	Optical Port
Ch 1	SDI In		Unlocked	-1.48 dBm	2
Ch 2	SDI Out		Unlocked	-40.00 dBm	3
Ch 3	SDI Out		Unlocked	-40.00 dBm	4
Ch 4	SDI In		Unlocked	-2.07 dBm	1

Video information table

ELECTRICAL CHARACTERISTICS OF THE CARDS

V in (V)	I in (A)	Power (W)	Configuration
12	0.22	2.64	No SFP's Installed
12	0.29	3.48	1 Dual TX SFP Installed
12	0.33	3.96	2 Dual TX SFP Installed
12	0.34	4.08	1 Dual RX SFP Installed
12	0.4	4.8	2 Dual RX SFP Installed
12	0.36	4.32	1 Dual Rx and 1 Dual TX SFP Installed

SNMP MONITORING

SNMP System Overview

The Network Controller Card can provide optional support for remote monitoring of your VF-9000 frame using the Simple Network Management Protocol (SNMP). This protocol is compatible with many third-party monitoring and control tools.

The SNMP agent running in the frame will accept SNMP requests on the default SNMP port (161), using SNMP version 1. The SNMP Agent will send SNMP Traps to a notification target, with user-configurable IP address and port number.

The VF-9000 system parameters that are available for monitoring through SNMP are defined by a series of MIB (Management Information Base) files that must be loaded into the management system. These MIB files define and structure the parameters logically in a tree hierarchy format system-frame-card.

For a complete list of VF-9000 parameters that can be monitored using SNMP, refer to the MIB files for your system.

SNMP Configuration

The SNMP monitoring feature of the VF-9000 must be configured through the Web page Dashboard in order for Traps to be sent to the proper monitoring station. By default, Traps are disabled until a valid station IP address and port number are entered.

To enable SNMP Trap support using the Web page:

1. Ensure that you have configured the network settings for your VF-9000 frame as outlined in the “Network Settings” section of this manual.
2. Open the VF-9000 Web page Dashboard in a web browser.
3. In the SNMP Settings Box, check the Trap Enable check box.
4. In the SNMP Settings Box, enter the IP address and Port # for the SNMP Manager system that will be used to monitor the Traps.
5. In the Frame Ethernet Settings Box, click the Save Button to send and save this information in the frame.

SNMP settings

System Parameters and Traps

The following is a condensed list of the VF-9000 System Parameters that may be monitored by the SNMP Management software. For a complete list of parameters that can be monitored, please refer to the MIB files for your system. As of the time of this writing, the only type of plug-in cards supported by the VF-9000 frame is the VBC2-3G Quad SDI I/O cards.

Frame Parameters:

- Frame Name
- Frame Controller Software version

- Frame Controller MAC address
- Frame Controller IP address
- Number of active card slots in frame
- Frame PSU1 status
- Frame PSU1 voltage
- Frame PSU2 status
- Frame PSU2 voltage
- Frame Fan status

Card Parameters:

- SDI Card Software version
- SDI Card SFP1 Type
- SDI Card SFP1 Temperature
- SDI Card SFP2 Type
- SDI Card SFP3 Temperature
- SDI Card Ch 0 SDI signal status
- SDI Card Ch 1 SDI signal status
- SDI Card Ch 2 SDI signal status
- SDI Card Ch 3 SDI signal status
- SDI Card Ch 0 SDI signal optical power status
- SDI Card Ch 1 SDI signal optical power status
- SDI Card Ch 2 SDI signal optical power status
- SDI Card Ch 3 SDI signal optical power status
- SDI Card fan status

The following is a list of the VF-9000 System SNMP Traps that are sent to the SNMP Management software.

Frame Traps:

- Power Supply 1 status alarm: insertion, removal, failure, OK.
- Power Supply 2 status alarm: insertion, removal, failure, OK.
- Chassis Fan status alarm: failure, OK.

Card Traps:

- Card insertion, removal.
- Ch 0 SDI signal status change alarm: loss of signal, rate change, rate lock.
- Ch 1 SDI signal status change alarm: loss of signal, rate change, rate lock.
- Ch 2 SDI signal status change alarm: loss of signal, rate change, rate lock.
- Ch 3 SDI signal status change alarm: loss of signal, rate change, rate lock.
- SFP1 status change alarm: insertion, removal, over-temperature alarm, temperature OK.
- SFP2 status change alarm: insertion, removal, over-temperature alarm, temperature OK.
- Card fan status alarm: failure, OK.

The following is the list of the MIB files that are required to be installed on the SNMP Management system for a VF-9000 system with VBC2-3G plug-in cards. Please contact MultiDyne to obtain the most current versions of these files.

"MULTIDYNE-MIB.mib"

"VF-9000-MIB.mib"

"VF-9000-FRAME-MIB.mib"

"VF-9000-NODE-MIB.mib"

"VF-9000-GENERIC-CARD-MIB.mib"

"VBC2-3G-CARD-MIB.mib"

Basic Testing

SNMP Management Systems vary greatly in complexity, capabilities, and cost. Operation of these systems is beyond the scope of this manual but basic SNMP operation can be verified using the de-facto Open-Source tool in every Networking professionals toolkit: Net-SNMP. It is included with most Linux distributions and is also available as a free download for Windows <http://www.net-snmp.org>.

With Net-SNMP installed on a PC or Linux computer, copy all the VF-9000 system MIB files listed above to the default MIB directory used by Net-SNMP which is typically either \$HOME/.snmp/mibs or /usr/local/share/snmp/mibs

To test that the VF-9000 MIBs are installed in the correct folder(s), open up a command line window and type the following at the prompt:

```
snmptranslate -IR -Td -On VF-9000-FRAME-MIB::vf9000PSU1Voltage
```

The following response should be returned if the MIBs are loaded properly on the computer:

```
.1.3.6.1.4.1.27334.2.1.2.1.3.1.3
vf9000PSU1Voltage OBJECT-TYPE
- FROM VF-9000-FRAME-MIB
SYNTAX Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The PSU1 voltage in mV."
```

```
::= { iso(1) org(3) dod(6) internet(1) private(4)
enterprises(1) multidyne(27334) vf9000(2)
vf9000Objects(1) vf9000FrameMib(2)
```

```
vf9000FrameObjects(1) vf9000FrameHardwareTable(3)
vf9000FrameHardwareEntry(1) 3 }
```

Now an actual frame can be queried to obtain parameter information. Below are some Net-SNMP command line examples:

To "Walk" the entire VF-9000 Frame
(replace 192.168.1.249 with the IP Address of the frame, if necessary):
snmpwalk -m ALL -Os -c public -v1 192.168.1.249 vf9000

To do the above, but send the output to a text file:
snmpwalk -m ALL -Os -c public -v1 192.168.1.249 vf9000 > C:\temp\vf9000snmpwalklog.txt

To Walk just the VBC2 cards installed in the Frame
(replace 192.168.1.249 with the IP Address of the frame, if necessary):
snmpwalk -m ALL -Os -c public -v1 192.168.1.249 vbc2G3CardMib

To get the voltage of Power Supply #1 in the frame:
snmpget -m ALL -Os -c public -v1 192.168.1.249 vf9000PSU1Voltage.1

To get the temperature of SFP #1 on card #2 in the frame:
(for other cards, replace the last # with the slot #)
snmpget -m ALL -Os -c public -v1 192.168.1.249 vbc2G3SFP1Temperature.2

DC INPUT MONITORING

DC input monitoring is done in every box individually. There is a voltage monitor circuit on the frame controller. This will in return report the status of the power input and the status of the frame fan over SNMP or the IP interface as ordered by the customer.

	Status	Voltage
Power Supply 1	PS1 OK	11.98
Power Supply 2	PS2 OK	11.94
Chassis Fan	OK	

Power monitoring

Technical Specifications

Digital Video

Video Connectors	BNC or HD-BNC
Number of copper inputs or outputs	up to 18 BNCs or up to 36 HD-BNCs
Interface	SMPTE 424M, 297M, 292M, M259M-C, DVB-ASI
Input Coax EQ	3 Gbps: 120M 1.485 Gbps: 240M 143-260 Mbps: 450M
Input level	100mV (peak to peak)
Impedance	75 Ohms Bit-error
Rate	10-12
Return Loss	>15 dB at 5 MHz - 1.485 GHz >10 dB up to 3 GHz

Mechanical, Environmental

Overall Dimensions (LxWxH)	19"L x 7.5"W x 1.75"H (Standard Frame)
Module Capacity	9 SFP modules (VF-9000-18-BNC or 18 SFP modulars "VF-900-36-MBNC")
Temperature Range	-25 to 50°C FAN

Power

Power Supply Configuration	Dual Internal power supplies
Voltage	AC input 100-240V~47-63Hz 1.1A max
Maximum Power Consumption	25 watts (fully loaded frame with all accessories) Note: Power consumption dependent on SFP type
Connectors	C13 line chord
Status Indicators	Power LEDs and Data Rate indicators



10 Newton Place
Hauppauge, NY 11788
(800)-488-8378 / (516)-671-7278
sales@multidyne.com
www.multidyne.com