

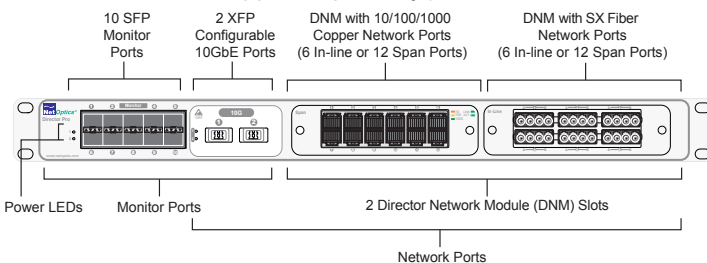
Unpacking and Inspection

Carefully unpack Director Pro™ and retain materials for later use.

Director Pro ships with the following:

- Director Pro main chassis
- One or two Director Network Modules (DNMs)
- Two power cords
- Indigo™ System Manager Software CD
- Director User Guide and Director Pro CLI Command Reference manual (on CD)
- RS232 RJ45 cable for Command Line Interface (CLI)
- RJ45 to DB9 adapter for CLI
- Extended Warranty if purchased

Carefully check the packing slip against parts received. If any part is missing or damaged, contact Net Optics Customer Service. (Note: SFP and XFP modules are ordered and shipped separately.)

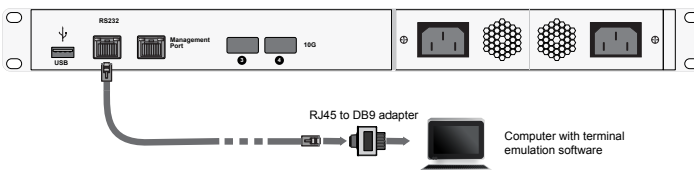


Configuring Director Pro

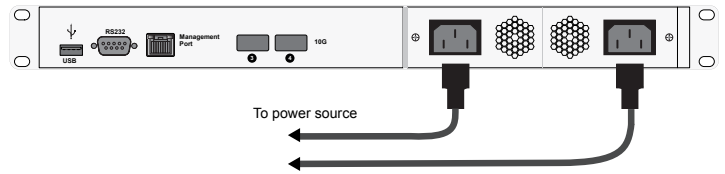
All configuration options, status, and statistics are accessible from the Command Line Interface (CLI). To use the CLI over a remote SSH connection, first set the system's IP address using the local RS232 interface. Only one IP address is required for any number of daisy-chained Director and Director Pro chassis.

To access the Command Line Interface:

1. Connect a PC with terminal emulation software to Director Pro using the supplied RS232 RJ45 cable and the RJ45 to DB9 adapter.



2. Launch terminal emulation software such as HyperTerminal or minicom with the following settings:
115200 baud, 8 data bits, no parity, 1 stop bit, no flow control
3. Connect power to Director Pro.
Make sure that you connect the power supplies to two separate, independent power sources.



4. At the login prompt, type **admin**; and at the password prompt, type **netoptics**.
5. Change the password for the **admin** account. Type:
user mod name=admin priv=1 pw=<new-pw>
where **<new-pw>** is the new password
6. Set the Director Pro IP address. Type:
sysip set ipaddr=<ipaddress> mask=<netmask> gw=<gateway>
sysip commit

where **<ip address>** is the IP address for Director Pro, **<netmask>** is the netmask, and **<gateway>** is the IP address of the gateway

7. For more information on the CLI, type **Help** to display command information, or see the User Guide. The tab key can be used to autocomplete partially typed commands. Entering ? following a command (and a space) displays the arguments for that command. The up- and down-arrow keys access the CLI command history buffer.

The CLI can now be accessed remotely by SSH over the Director Pro Management port. The default SSH username is **customer**, the password is **netoptics** and the port is 22. Connect the Management port with a CAT5 cable to a switch or hub to access the CLI over the network. Use the **passwd** command to change the SSH password.



Mounting Director Pro

Director Pro is designed for a 19-inch rack, occupying 1U of height.

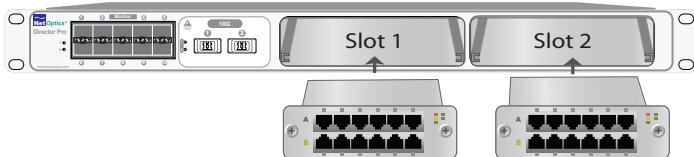
To rack mount Director Pro:

1. Slide the Director Pro main chassis into the desired rack location.
2. Secure it to the rack's front posts using the four supplied screws.
3. Secure it to the rack's rear posts using the set of supplied brackets that matches the rack depth.
4. Make sure that the rack is properly grounded.

Connecting to the Network

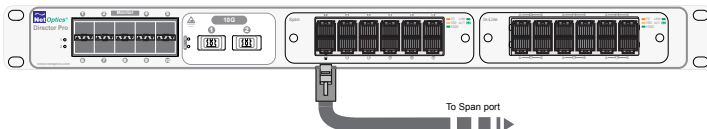
If the Director Network Modules (DNMs) are not already installed when you receive the unit, install them by sliding them carefully into the DNM slots in the front panel. Director Pro uses the same DNMs as Director.

To install DNMs:



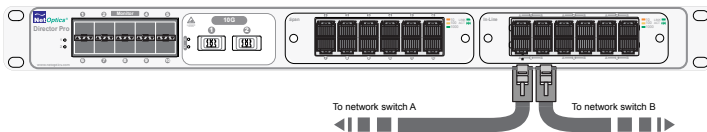
1. Remove the cover plate from Slot 1 (if present) by unscrewing the two thumbscrews.
2. Slide the DNM into Slot 1 with the DNM circuit boards riding in the rails.
3. Push in the DNM firmly until you feel the connectors mate and the bezel is flush with the front panel.
4. Secure the DNM with the two captured thumbscrews.
5. Repeat for Slot 2 if installing two DNMs.

To connect Director Pro to a Span port on your network:



1. Connect any network port on a Span DNM to an appropriate network cable. Monitor ports may also be used as Span inputs.
2. Connect the other end of the cable to a Span port on a network switch. Alternately, it can be connected to an external Tap or Port Aggregator Tap.

To connect Director Pro in-line to your network:



1. Connect any odd-numbered network port on an in-line DNM to an appropriate network cable.
2. Connect the other end of the cable to one side of the network link you are tapping.
3. Connect the next higher even-numbered network port to an appropriate network cable. In-line port pairs are located side-by-side in the DNMs.
4. Connect the other end of the cable to the other side of the network link you are tapping. The Tap connection is fully passive – if Director loses power, traffic continues to flow in the link.

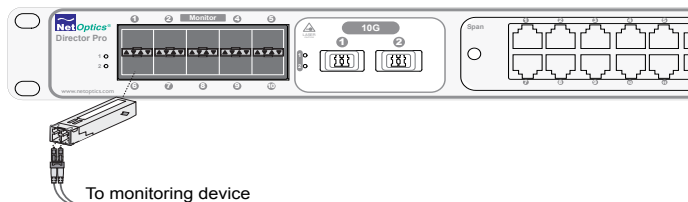
Connecting to Monitoring Devices

SFP modules may be shipped separately. An appropriate cable is shipped with each SFP module.

To connect Director Pro to a monitoring device:

1. Remove the temporary plug from the monitor slot and insert the SFP module until it clicks into place.
2. Connect the cable supplied with the SFP module to the SFP port.
3. Connect the other end of the cable to the monitoring device.

Note: Span network ports can also be used as monitoring outputs.



Connecting to 10 Gigabit Ports

Each of the four 10 Gigabit ports (two on the front of the chassis and two on the rear) can be connected as network or monitor ports. An XFP module (may be shipped separately) must first be installed by inserting it into the slot until it clicks. The function of the port, as network or monitor, is determined by the filters that are defined for the port.

Checking the Installation

After you have connected Director Pro, verify that it is functioning correctly.

- Check that the power LEDs are illuminated.
- Check the link LEDs for each of the connected ports to verify that the links are connected and traffic is present.

Creating a Filter

To view traffic on monitor ports, you must define one or more filters. For example, create a filter that

- Aggregates traffic received on Network Ports 1 to 5 and 7
- Regenerates it to Monitor Ports 1 and 2
- Forwards only traffic going to Layer 4 Port 80
- But drops any traffic originating from 10.1.1.1

To create the filter, enter:

```
filter add in_ports=n1.1-n1.5,n1.7 ip_src=10.1.1.1  
action=drop
```

```
filter add in_ports=n1.1-n1.5,n1.7 l4_dst_port=80  
action=redir redir_ports=m.1-m.2
```

commit

*Note: **commit** must be executed to activate previously defined filter actions.*

For more information, see the User Guide included on the Director Pro CD (PUBDIRU.PDF).

Welcome to Net Optics Director

Director Pro is pre-loaded with pre-defined filters to help you get started. Follow these instructions and you will have data moving through your new Director Pro in no time!

To run the Director Command Line Interface (CLI):

- Follow the instructions in the Director Pro Quick Install Guide, which was included in the box with Director Pro.

To view the pre-defined filters:

- Type **list** in the CLI. A list of configuration files containing the pre-defined filters is displayed. The filter functions are described in the box on the right side of this sheet.
- Type **show <filename>** to view the contents of a configuration file, substituting the name of the desired configuration file for <filename>.

To load and activate a pre-defined filter:

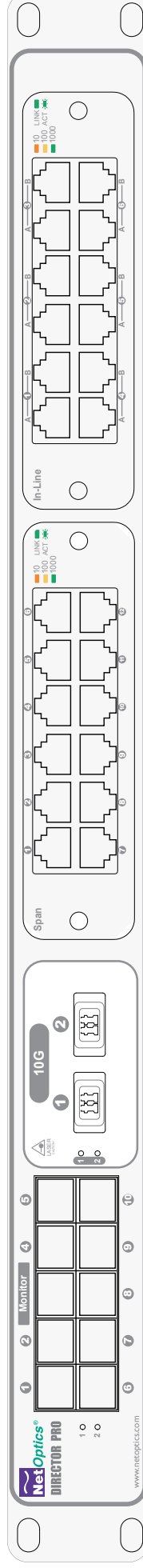
- Type **load <filename>**. The pre-defined filter is loaded and made pending.
- Type **filter list**. The pending filters are displayed.
- Type **commit**. The pending filters are made active.

To view the active filter configuration:

- Type **show running**. The filters that are actively running in Director Pro are displayed.

Pre-defined Filter Functions

Filename	Function
one2oneDNM1	Maps eleven network ports straight through to the monitor ports, including the left front-panel 10G port to the right one: n1.1->m.1; n1.2->m.2; n1.3->m.3 ... n1.10->m.10; t1.1->t1.2
one2oneDNM2	Same as one2oneDNM1, but for the DNM_2 network ports
all2oneDNM1	Aggregates all of the DNM_1 network ports to one monitor port: n1.1-n1.12->m.1
all2oneDNM2	Same as all2oneDNM1, but for the DNM_2 network ports
one2all	Regenerates the first network port to all of the 1G monitor ports: n1.1->m.1-m.10
all2allDNM1	Aggregates all of the DNM_1 network ports to all of the 1G monitor ports: n1.1-n1.12->m.1-m10
all2allDNM2	Same as all2allDNM1, but for the DNM_2 network ports
protocols	Distributes traffic from the the left front-panel 10G port to ten 1G monitor ports by protocol: m.1-m.10 <- FTP, Telnet, UDP, TCP, TFTP, DHCP, HTTP, SIP and H.323/VoIP, BGP, Citrix
tenG2zoneG	Distributes traffic from the the left front-panel 10G port to eight 1 Gigabit monitor ports based on subnets: m.1<-1.1.0-1.1.7; m.2<-1.1.8-1.1.15 ... m.10<-1.1.172-1.1.179



Deep Packet Inspection

Inspecting the Payload

Director Pro can perform Deep Packet Inspection (DPI) by searching for patterns within the packet payload:

- One or two patterns can be included in each filter definition.
- Each pattern can be up to 64 bytes long.
- Masking is supported to implement “don’t care” bits or characters in the pattern.
- Each pattern can be “anchored,” meaning it is located at a fixed offset within the packet payload, or “unanchored,” meaning that the pattern may be located at any point in the packet payload following a specific offset.
- When two patterns are included, the search for the second pattern begins after the first pattern has been found.

DPI example

At the CLI command prompt, type:

```
Net Optics> filter add in_ports=n1.1 action=redir redir_ports=m.1  
ip_protocol=6 pro=yes pro_pat1_skip=10  
pro_pat1_string=confidential pro_pat1_case=off  
pro_pat2_string=A1FB pat2_string=FF0F pro_pat2_hex=yes  
pro_pat2_anchor=off
```

Explanation

- A copy of traffic received at network port n1.1 is filtered and sent to monitor port m.1.
- Only TCP traffic (protol=6) can pass the filter.
- TCP packets are examined for two payload patterns.
- At the beginning of the payload, 10 bytes are skipped. The next 12 bytes are matched against the ASCII pattern “confidential” without case sensitivity.
- If this pattern matches, then 100 bytes are skipped, and then rest of the packet payload is searched for the second pattern.
- The second pattern is two bytes specified as hex A1FB. The third nibble, F, is a “don’t care” because of the mask pattern FF0F.
- If the second pattern is found, then the packet passes the filter and is sent to port m.1.

Load Balancing

Balancing the Load

In addition to the static load balancing supported by Director, Director Pro provides a dynamic load balancing engine. As compared to static load balancing, dynamic load balancing generates more even loading when the input data distribution is uneven or changing.

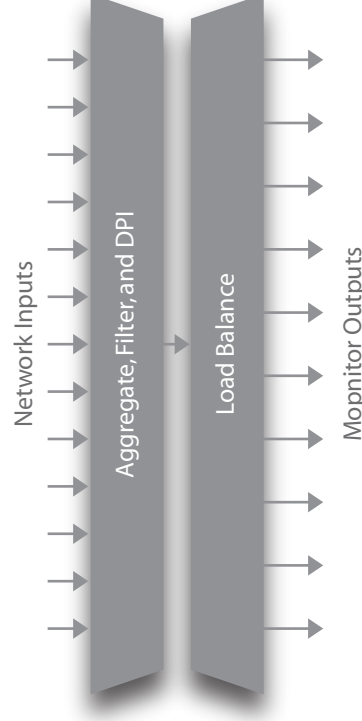
DPI example

At the CLI command prompt, type:

```
Net Optics> pro-engine lb_set mode=flow_con ports=m.1-m.4  
weights=m.1-m.2,2 spare=m.5  
Net Optics> filter add in_ports=n1.1 ip_protocol=6 pro=yes  
action=lb lb_ports=m.1-m.7
```

Explanation

- The first command configures the load balancer.
- The balancing mode is set to **flow_con** (flow based on conversation, or IP source-destination address pair). Other available modes are **flow_dst** (flow based on IP destination address), **flow_src** (flow based on IP source address), **packet_rr** (packet-by-packet round-robin), and **disable**.
- The load will be balanced to the first four monitor ports, weighted with m.1 and m.2 receiving twice as much traffic as m.3 and m.4.
- If any of the ports lose link, their traffic is switched to the spare port m.5.
- The second command defines a monitor traffic stream to send to the load balancer: Traffic received at the first two network ports is aggregated, filtered for TCP protocol, and sent to the load balancer, which distributes it among m.1-m.4 as set up by the first command.



Daisy-chaining Director Pro Units

Director Pro can be connected on a daisy-chain with Director devices. Up to 10 units can be connected in a daisy-chain. Director Pro has only a single daisy-chaining port on the rear panel, so it is restricted to occupying end positions on the daisy-chain, with at most two Director Pro units in a multi-unit daisy-chained system. Some rules about daisy-chaining are:

- DIR-6400P, DIR-7400, and DIR-5400 models support multi-unit operation; different models can be mixed on a daisy-chain.
- Two to ten units can be included in a multi-unit system.
- The units must be interconnected in a daisy-chain configuration by cabling rear-panel 10 gigabit port t2.2 of one unit to rear-panel 10 gigabit port t2.1 on the next unit. Ports t2.1 on the first unit in the daisy-chain and t2.2 in the last unit are unused. (They cannot be used as network or monitor ports either.)
- The units are assigned Unit ID (UID) numbers consecutively starting with 1. The UID 1 is at the beginning of the daisy-chain and is the *master* unit; the rest are *slave* or *remote* units.
- Once the system is operating in a multi-unit configuration, all device management (CLI, Web Manager, and System Manager) functions must operate through the master unit. If a remote unit's device management functions are accessed through the remote unit's serial port or management IP address, the results are unpredictable.

See the other side of this card for more about configuring and operating an expanded multi-unit Director system.

Upgrading Director Pro Software

All units in a multi-unit system must run the same version of Director software. Compatibility between Director Pro software versions and Director software versions is stated in the release notes for each Director Pro version. If you are unsure of whether your units meet this condition, then you should connect to each unit individually and verify the software level by using the **image show** CLI command. Version 1.2.3 shows the image name **dir_010203_mmddyy** where mmddyy is the compile date.

If you need to change the software on any Director unit, you must connect to the unit individually and use the **upgrade** CLI command. The syntax of the command is:

```
upgrade srvip=<svrip> user=<username> pw=<passwd> file=<filename>
```

where

<svrip> is the IP address of the server that the new image file is on

<username> is the user name needed for FTP access to the server

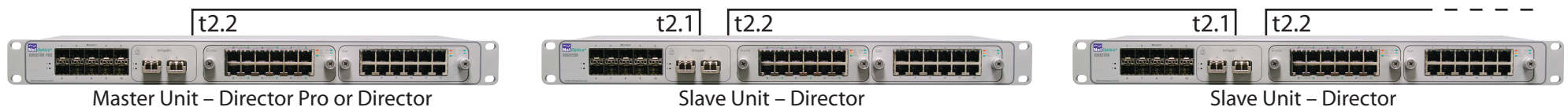
<passwd> is the password needed for FTP access to the server

<filename> is the name of the image file

Contact Net Optics technical support at ts-support@netoptics.com or (408) 737-7777 if you need the values of these parameters.

The **upgrade** command can take a few minutes or longer depending on how busy the network and server are. When the **upgrade** command finishes, execute a **system restart** command to complete the upgrade process. For example:

```
netoptics> upgrade srvip=208.74.182.244 user=director pw=dir3ctnet!  
file=dir_030201_010210.tgz  
netoptics> system restart
```



Multi-Unit Configuration and Operation

Configuring the Daisy-chain

To configure a multi-unit daisy-chained system, first connect to every unit individually and set them for remote operation by typing **remote set admin=enable** followed by **remote commit**. Then power off all of the units and connect the daisy-chain cables between them as shown in the diagram at the bottom of the other side of this sheet. Power up the units and connect to the management port of the master unit to perform the following procedure. Do not log into the management facilities (CLI, Web Manager, or System Manager) of the other units when they are configured for remote operation.

To complete the multi-unit daisy-chain setup:

1. Enter **remote set admin=enable master=enable**. The configuration of the master unit is pending.
2. Enter **remote group topology=1,2,3,4,...** Include numbers for as many units as are in the system, such as **remote group topology=1,2** for a two-unit system. (The UID list cannot contain spaces.) The configuration is pending.
3. Enter **remote show**. The pending configuration is displayed; verify that it is correct.
4. Enter **remote commit**. The master unit initializes the slave units with the configuration routing information.
5. Enter **remote show**. Verify that the running configuration is correct and all units are Up. The multi-unit system is now ready for operation.
6. If any remote unit is Down at any time, enter **remote commit** to bring it up.

Creating Filters in a Multi-Unit System

In a multi-unit system, all management communication goes through the master unit. Director Pro automatically allocates resources from the necessary pools in the various units to implement filters that span units.

Specify ports in remote units with a UID prefix, for example, u3.n1.1 for n1.1 of the third unit in the daisy-chain. Ports without a prefix default to the master unit (u1).

Example: This filter sends UDP traffic from the first network port on the first unit in the daisy-chain to the last monitor port on the fourth unit of the daisy-chain:

```
filter add in_ports=u1.n1.1 ip_protocol=17 action=redir
redir_ports=u4.m.10
```

Filter inputs (network ports) can be freely aggregated across multiple units. Filter outputs can be freely regenerated to multiple monitor ports in the same unit or across different units.

Changing a Multi-Unit System Configuration

To move, add, or remove units in a multi-unit system, restore all the units to their factory setting (**load factory** command) and build the new configuration from the beginning.

For technical assistance, please call:

- Net Optics Technical Support
(408) 737-7777
- John Mattes, Application Engineer