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Overview

The AK4000 Ethernet product family enables point to point transport of Ethernet services over bonded pairs of copper, optimized for CSA distances (9kft 26AWG or 12kft 24AWG). The AK4000 family consists of Ethernet Central Office and Remote cards that plug into a 1RU high housing for 19” and 23” racks and for wall mounting. The remote card is either line powered by the Central Office card or locally powered. Aktino products utilize a technology “MIMO on DMT” which uses coordinated signal processing over multiple transceivers to achieve significant performance improvements over standard DSL technology.

The AK4000 family consists of the Central Office (CO) unit, the remote unit, and the 1RU shelf. Refer to the *Warranty and Customer Service* section for more information.

Inspection

After unpacking the unit, check for any damage. If damage is discovered, report it to the transportation company and to Aktino, Inc. Refer to *Warranty and Customer Service* section for more information.

Safety and Warnings

To ensure your safety when servicing and installing this equipment, please take the following precautions:

A 7.5A to 10A UL listed fuse/circuit breaker must be installed ahead of this unit in the end use building installation.

A fuse panel must be installed near the unit in accordance with the National Electrical Code so that it is accessible to the operator.

A fuse panel must be provided as part of the building installation in order to provide a UL required disconnect point.

Be careful when installing or modifying telephone lines; dangerous voltages can be present. It is unsafe to install telephone wiring during a lightning storm.

Only qualified personnel should service this system.

The equipment must be connected to a protective ground in accordance with the instructions provided in this manual. Improper grounding may result in an electrical shock.

Follow local grounding practice to ensure a good frame ground connection to the Aktino chassis. The frame ground is required for secondary voltage protection.

For performance and safety reasons, only power supplies listed for use with telephone equipment by a locally recognized organization should be used with Aktino equipment.

All wiring external to the product should follow the local wiring codes.

Use of this product in a manner other than defined in this installation guide may cause damage to equipment or injury to personnel.

If a problem has been isolated to this unit, do not attempt to repair. The unit's components are not user serviceable and therefore must not be replaced. Please return the unit to Aktino for repair.

All fuses on the unit are located in non accessible areas and are not field serviceable. Please return the unit to Aktino for repair.

Observe local practice electrostatic discharge precautions when handling electronic equipment. Do not hold electronic plugs by their edge. Do not touch components or circuitry. Use a grounding wrist strap attached to grounding connection point on the left side

of the chassis. Use only ESD-protective packaging materials when transporting equipment.

To prevent ESD events when handling this equipment, ESD shoes or wrist straps should be utilized by all personnel, or ESD flooring must be present. See Figure 6 for location of wrist strap grounding connection point.



Maximum operating ambient temperature is 65°C.

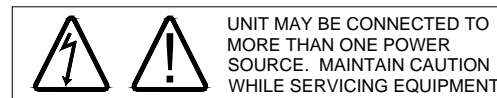
Never restrict the air flow through the unit's fan or vents.

Connect the unit only to a properly rated supply circuit. Reliable earthing (grounding) of rack-mounted equipment should be maintained.

The Aktino unit contains a battery for the Real Time Clock as a convenience to maintain date and time when unit is unplugged.

CAUTION

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by Aktino. Dispose of used batteries according to the manufacturer's instructions.



During installation and service do not connect the chassis to a live power source. Ensure that fuses are removed from the fuse panel.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

This product is intended for installation in Restricted Access Locations only.

The Aktino AK4000 Multi Pair span interface is designed to coordinate with either a standard 300 Vdc gas tube protector unit or with a standard 300V solid-state protector. Carbon block protectors shall not be used. The 300Vdc gas tube protector shall have the performance characteristics as follows:

- DC Breakdown Voltage (Max.) 475 V @ 2000V/sec
- Impulse Breakdown Voltage (Max.) 650 V max @ 100 V/ μ sec

The 300V dc solid-state protector shall have a maximum impulse breakdown voltage of 400 V at 100 V/ μ sec, 1000 V/ μ sec and 10000 V/ μ sec.

NOTE: If line powering is enabled, voltage on MSPAN pairs is either -135Vdc or -185Vdc.

The effective capacitance of the units between the connection points for the conductors of the tip and ring

is 43.5uF. The effective capacitance of the units between the connection point for one conductor of tip or ring and earth is 0.05uF.

At the time of installation, a system assessment shall be carried out to ensure that the effective capacitance of the total system, including the capacitance of the equipment, does not exceed the values specified in UL60950.

At the time of installation, it shall be checked that the voltage rating of the wiring of the telecommunication network is adequate for the normal Aktino unit's circuit voltage, together with superimposed transients.

At the time of installation, it shall be checked that the circuits to be connected together are all AK4000 or AK5000 family units.

Introduction

Aktino’s AK4000 family allows transport of Ethernet over bonded copper pairs. A link consists of a CO unit and an RT unit. Two types of CO units are available, one that provides line powering of the RT unit and one that does not. The RT unit is capable of being line powered by the CO unit or locally powered by a -48Vdc power supply.

The CO unit is mounted in CO racks or in Remote Terminals. Both the CO and RT units are hardened for operation in both CO and outside plant. The RT unit is mounted at the customer premises in a rack or on a wall. Both the CO and RT cards use the same chassis.

Multiple pairs are connected between the CO and RT units. The Aktino units are rate adaptable which allows multiple Ethernet rates to be offered.

The Aktino units are carrier class providing all the required and familiar CO connections. Ease of

deployment is designed into the Aktino products to make installation quick and easy.

This installation and maintenance practice goes through the steps required for successful turnup. It is very detailed to cover most questions and issues that may arise during installation and maintenance. The Aktino AK4000 Quick Installation guide (Document 180-0008-001) is normally sufficient to install the product with the practice used as a reference.

The steps are detailed in the table of contents. Generally, steps are installation of the units at the CO and customer premise, initialization of the management IP address, quick provisioning, and system health verification.

Figure 1 shows the typical application setup for the Aktino product.

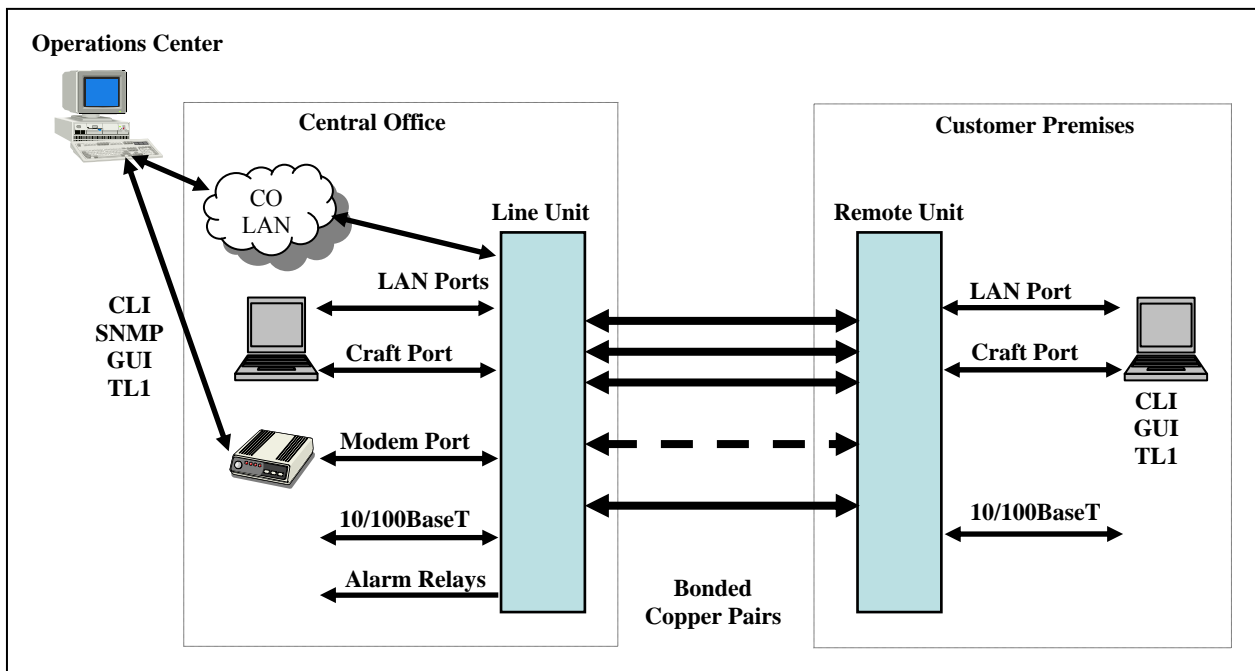


Figure 1 Typical Application Setup

Installation

The AK100S chassis is used for both the CO and RT installations.

Mounting the Shelf

The Aktino AK4000 Family's shelf (AK100S) can be mounted in either 19 inch or 23 inch racks. The 19 and 23 inch flanges and mounting screws are included in the installation kit. Mounting holes are provided for flush or mid mount. Note that the mid mount flange can be mounted forward or backward for either 5 or 6 inch recess. Figure 2 shows examples of 19 inch flanges attached to the flush position and 23 inch flanges attached to the mid mount position. The unit can also be mounted on a wall using either 19 or 23 inch flanges. See Figure 3. An optional hinged

bracket (AK100B) is available for easier wall mounted access.

It is not necessary for the flange to be bonded with the frame; the AK100S Ground Lug on the back of the shelf provides proper grounding.

NOTE The fan filter should be replaced every six months. Ordering information can be found at the end of this document.

Figure 2 Flange Mounting Positions

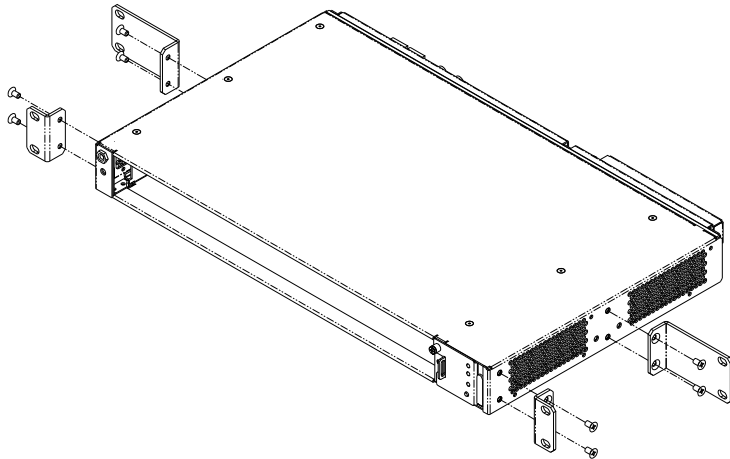
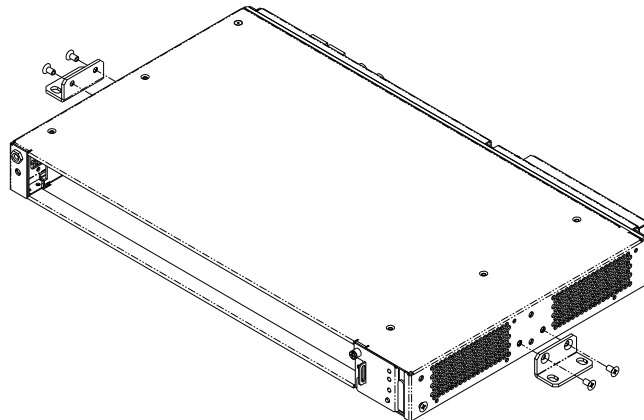


Figure 3 Wall Mounting



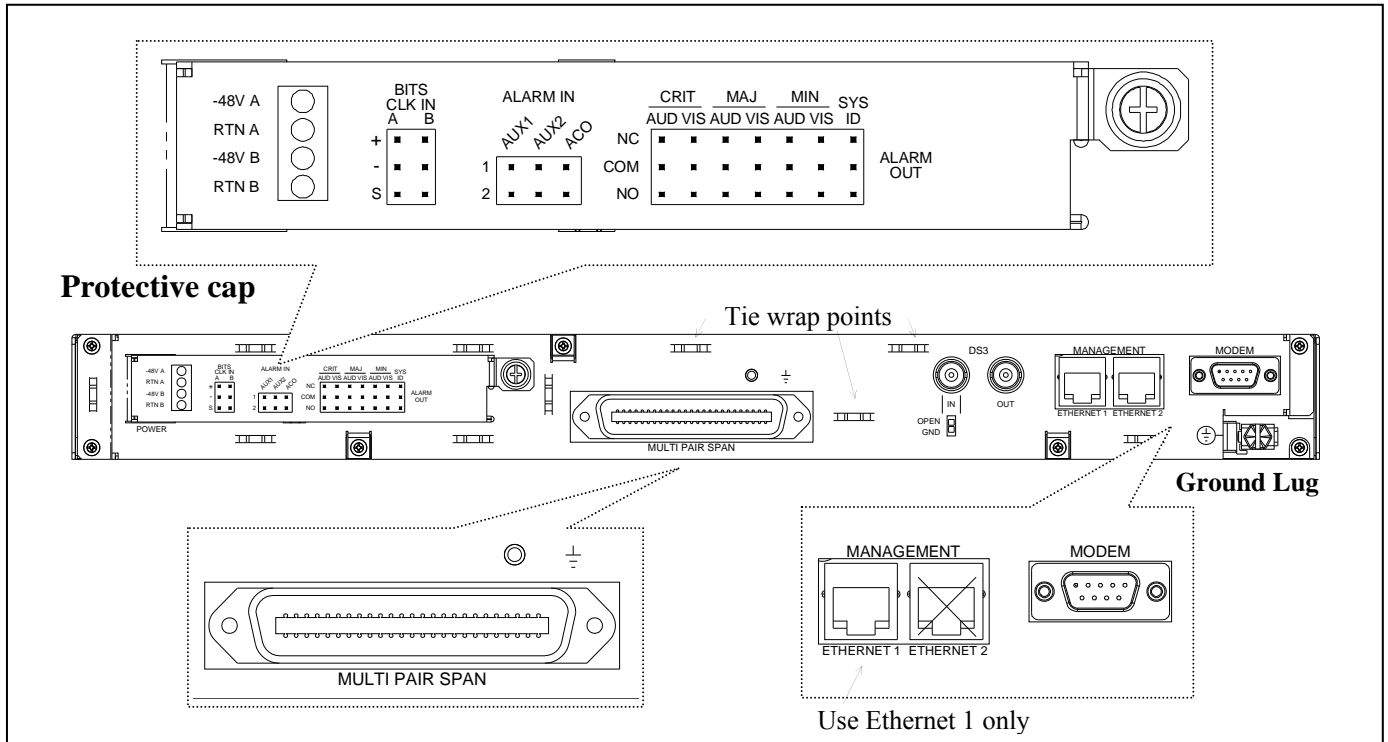


Figure 4 AK100S Back Panel

Connections

Frame Ground Connection

The Ground Lug located on the right hand side of the back panel (see Figure 4) can accommodate up to 6 AWG wire. Use a wire gauge for grounding at least as heavy as the power wiring. Attach the grounding wire to the AK100S Ground Lug to a nearby grounding screw on the equipment rack or facility ground. Test the ground connection with an ohm meter; there should be less than 2 ohms between the AK100S Ground Lug and facility ground. **Note that the ground connection is required for proper system operation.**

Power Connection

A 7.5A to 10A UL listed fuse/circuit breaker must be installed ahead of this unit.

To access the power block, the Protective Cap located on the left hand side of the back panel (see Figure 4) must be removed. Unscrew the captive screw on the right side of the Protective Cap, slide the cap to the left and lift off. Labels of the power block and wirewrap connections are silk screened on the Protective Cap as well as the back panel.

Two redundant power buses are provided (A and B). The two power inputs are identical and can be used for redundant power configurations.

Unscrew the captive screw on the power block (see Figure 5). Insert the ends of the -48 Vdc and Return power wires (16 AWG wire is recommended) into the A and B holes on the left side of the power block. Route the power wires towards the left of the back panel so that the Protective Cap can be reinstalled.

NOTE: The DC return terminal is not connected to the equipment frame or the grounding means of the equipment (Isolated DC Return).

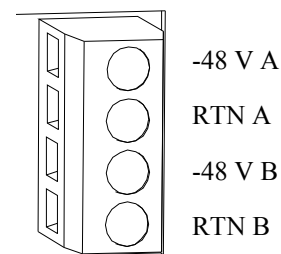


Figure 5 Power Block

MSPAN Connection

The MSPAN connector (see Figure 4) is used to connect the Aktino 4000 to the outside plant pairs. The table below specifies the 50 pin AMP connector pin assignments.

Table 1 MSPAN Connector Pin Assignments

	TIP	RING
Pair 1	26	1
Pair 2	27	2
Pair 3	28	3
Pair 4	29	4
Pair 5*	30	5
Pair 6*	31	6
Pair 7*	32	7
Pair 8*	33	8
Pair 9*	34	9
Pair 10*	35	10
Pair 11*	36	11
Pair 12*	37	12
Pair 13*	38	13
Pair 14*	39	14

* Note that only the first four pairs are active on the AK42x products and only the first eight pairs are active on the AK41x products.

The CO MSPAN cable should be shielded with a pigtail wire that attaches to the ground lug just above the MSPAN connector. The RT MSPAN cable's shield should NOT be connected to ground (leave open). Tie wrap points are available in several places on the back panel. The MSPAN cable can be routed to the left or right.

Alarm Connections

Alarm connections are generally used on the CO end. The alarm wirewrap connections are located under the Protective Cap (see Figure 4). Unscrew the captive screw on the right side of the Protective Cap, slide the cap to the left and lift off. Labels of the wirewrap connections are silk screened on the Protective Cap as well as the back panel. Each alarm consists of a three pin wire wrap header. Alarm connections available are:

- Critical, audio and visual
- Major, audio and visual
- Minor, audio and visual
- SysID
- Alarm CutOff (ACO)
- Aux1, Aux2 Alarm In

Each alarm can be connected to Normally Open (NO) or Normally Closed (NC) position. Use the Common (COM) pin to complete the connection. SysID

wirewrap contacts can be used to identify the equipment in alarm. SysID is active during any alarm activation. Aux1 and Aux2 are input alarm dry contact relay points. The Alarm CutOff (ACO) wirewrap pins are input dry contact relay points used for remote activation of ACO. The BITS Clock wirewrap pins are reserved for future use.

Ethernet Data Connections

Attach Ethernet data cables to any of the four 10/100BaseT RJ45 plugs on the front panel.

Caution To order to comply with the intrabuilding lightning surge requirements, all intrabuilding Ethernet wiring must be shielded, and the shield for the wiring must be grounded at both ends.

Management Connections

Ethernet 1 female RJ-45 port (located on the back panel) can be used for local or remote management access. The Ethernet port automatically is set to either 10BaseT or 100BaseT and auto-sense the polarity of TX/RX (automatic MDIX). Ethernet 2 port is not available.

The back panel RS232 modem port is not usable with R3.2.x software.

The front panel Craft port is used for command line access using a terminal emulator program; AktinoView is not supported on the craft port except for IP initialization. The DB-9 female RS232 port pin assignments are shown below; note that only pins 2, 3, and 5 are active on the front panel Craft port.

For both the back panel RS232 modem port and the front panel Craft port, the settings are 9600 baud, 8 data bits, no parity, and 1 stop bit.

Management is generally attached at the CO end.

Table 2 RS-232 DB9 Pin Assignments

RS-232 Signal	Pin
DCD	1
Receive Data*	2
Transmit Data*	3
DTR	4
Ground*	5
DSR	6
RTS	7
CTS	8
RI	9

* Front panel Craft port uses pins 2, 3, and 5 only.

Front Panel

Figure 6 shows the AK4000 family front panel. The AK4000 family kits consist of an AK4xx Line card and the AK100S shelf. The AK100F fan module is included with the AK100S shelf. The CO and RT kits have identical front panel indicators and functions. Note that the AK42xC and AK42xR (four pair Ethernet products) front panel has eight Pair Status LEDs; only Pair 1 through 4 are active in these products.

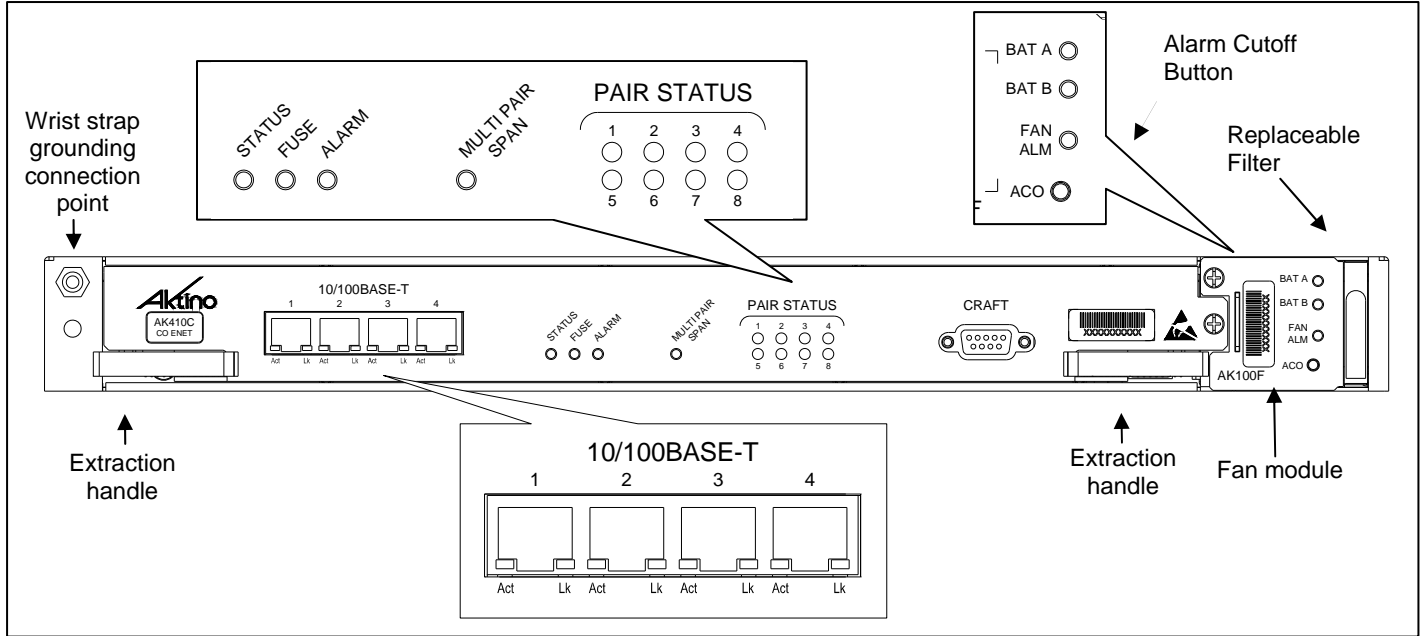


Figure 6 AK4000 Family Front Panel

Table 3 Card Front Panel Indicators

LED	Condition	Function
10/100 BaseT Act	Off Green	No data present Data present
10/100 BaseT Lk	Off Green	Ethernet link is down Ethernet link is up
STATUS	Off Green Red	Power off Normal Card malfunction
FUSE	Off Red	Unit fuse ok Unit fuse has blown
ALARM	Solid green Solid yellow Solid red	Normal Minor Alarm active Critical or Major Alarm active
MULTIPAIR SPAN	Solid green Solid yellow Solid Red	Normal Minor Alarm Critical or Major Alarm
PAIR STATUS	Off Solid green Flashing green Solid red	Pair is disabled Pair is up Pair is acquiring Pair LOS/Open circuit/Short

LED	Condition	Function
BAT A, BAT B	Off Solid green	External DC power has not been applied External DC power is present
FAN ALM	Solid green Solid yellow Flashing red	Fan status normal One fan has failed More than one fan has failed

Pushbutton	Function
ACO	Push Alarm Cut Off pushbutton to, deactivates audio (not visual) relay for all active alarms. Note that ACO can also be activated by the wirewrap connection on back of unit.

Provisioning

AktinoView GUI V3 software is presented as the preferred means of maintenance access. TL1 commands are available.

AktinoView V3 software is used to provision and monitor the system. Load AktinoView V3 software onto the maintenance computer per the instructions on the CDROM package.

Note: AktinoWeb web browser is an alternative method of maintenance access. Simply enter the IP address of the Aktino unit in the address bar of a web browser. Features not available in AktinoWeb vs. AktinoView are:

- System Backup and Restore
- System/Slot Software Upgrade
- Export Alarm Log, Alarm History and PM
- Automatic update for configuration changes from other interfaces (AktinoView, AktinoEMS, CLI)
- No circuit display (CO-RT) for AK5000

Configuring the Management Ethernet Port

AktinoView uses the Ethernet port 1 for access to the Aktino unit. Generally, the CO unit is used to set up the system; the RT unit can be provisioned through the CO unit.

Use *one* of the two following procedures to configure the unit's Management Ethernet port.

Method #1: Initialization using the front panel Craft port

- 1) Connect a serial cable between the maintenance computer and the Aktino unit's front panel craft port.
- 2) Start a terminal program such as HyperTerminal on the maintenance computer. Parameters are 9600 baud, eight bits, no parity bits, 1 stop bit, and no handshake.
- 3) After the unit has finished booting, a prompt "AKxxxx>" should appear, where xxxx is the part number of the unit. At the prompt, type bolded item:
AKxxxx> **enable**
- 4) At prompt login: type the login name*
- 5) At prompt Password: type the password*
- 6) You will be prompted to enter the following information:
Enter TID [CO]:
Enter IPAddress [192.168.10.1]:
Enter NetMask [255.255.255.0]:
Enter Gateway [0.0.0.0]:
Enter ProxyIP-Address[0.0.0.0]: (CO only)
Enter Date (yyyy-mm-dd)[2005-08-11]: (CO only)
Enter Time (hh-min-sec)[13-03-24]: (CO only)
- 7) Inputs can be modified with AktinoView at a later time. Hit enter to use the default value in the brackets.
- 8) Exit the terminal program.

Method #2: Initialization using the Management Ethernet port

- 1) Connect an Ethernet cable between the maintenance computer and the Aktino unit's Management Ethernet 1 port located on the back of the chassis.
- 2) The Aktino CO and RT units have a factory default IP address of 192.168.10.1 and 192.168.10.2 respectively.
- 3) Configure the maintenance computer's IP address to 192.168.10.3 and Netmask to 255.255.255.0. Note the maintenance computer's original settings.
- 4) Run AktinoView using 192.168.10.1 (CO) or 192.168.10.2 (RT) as the IP address for the Aktino unit. Enter the user name and the password*.
- 5) If desired, the Aktino units can now be provisioned with AktinoView.
- 6) If adding the Aktino unit to the local LAN, in the AktinoView GUI, under "Tools" in the top menu bar, select "Quick Provisioning".
- 7) Configure the Aktino unit's desired IP address, subnet mask, and gateway address for the local LAN.
- 8) Exit AktinoView.
- 9) Reconfigure the maintenance computer's IP address to original setting.

***NOTE: Default login name and password is superuser. For system security, the password for superuser should be changed.**

Provisioning with AktinoView V3

Note: Use AktinoView V3 to access the most up to date features available. Some features described in this document require Aktino unit software R3.2.

AktinoView V3 System Requirements

The minimum AktinoView system requirements are:

- Pentium 4 processor-base computer
- Recommended 256Mb, Minimum 128Mb
- Microsoft Windows 2000, XP, or NT
- CD-ROM drive

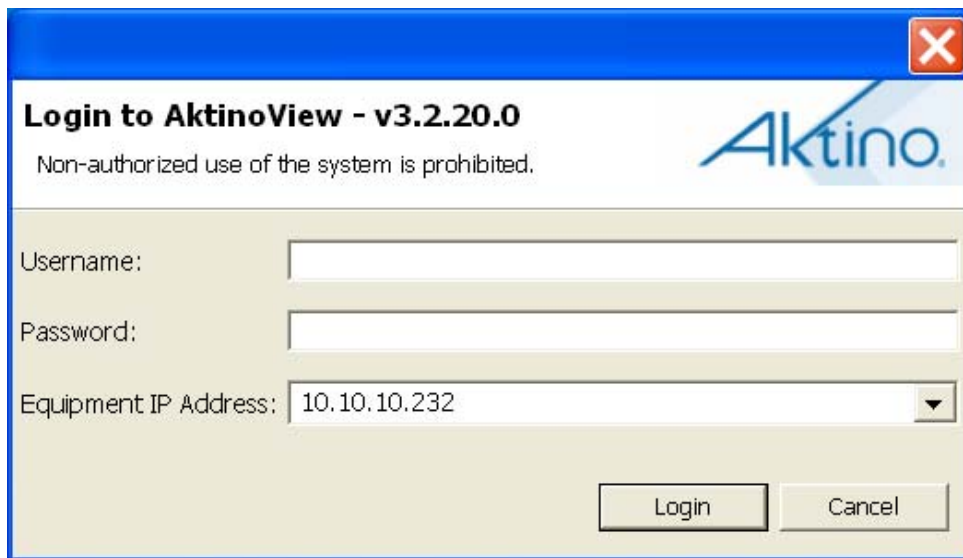
AktinoView V3 Installation

- Insert the AktinoView CD in the CD ROM drive
- Open Windows Explorer and click on the CD drive option
- Double click on install.exe in the AktinoView folder
- Follow the instructions on the screen

Login Window

Once the Management Ethernet port has been set up, AktinoView should be started to continue with provisioning and verify the health of the circuit.

Upon running AktinoView V3, a login window will appear:

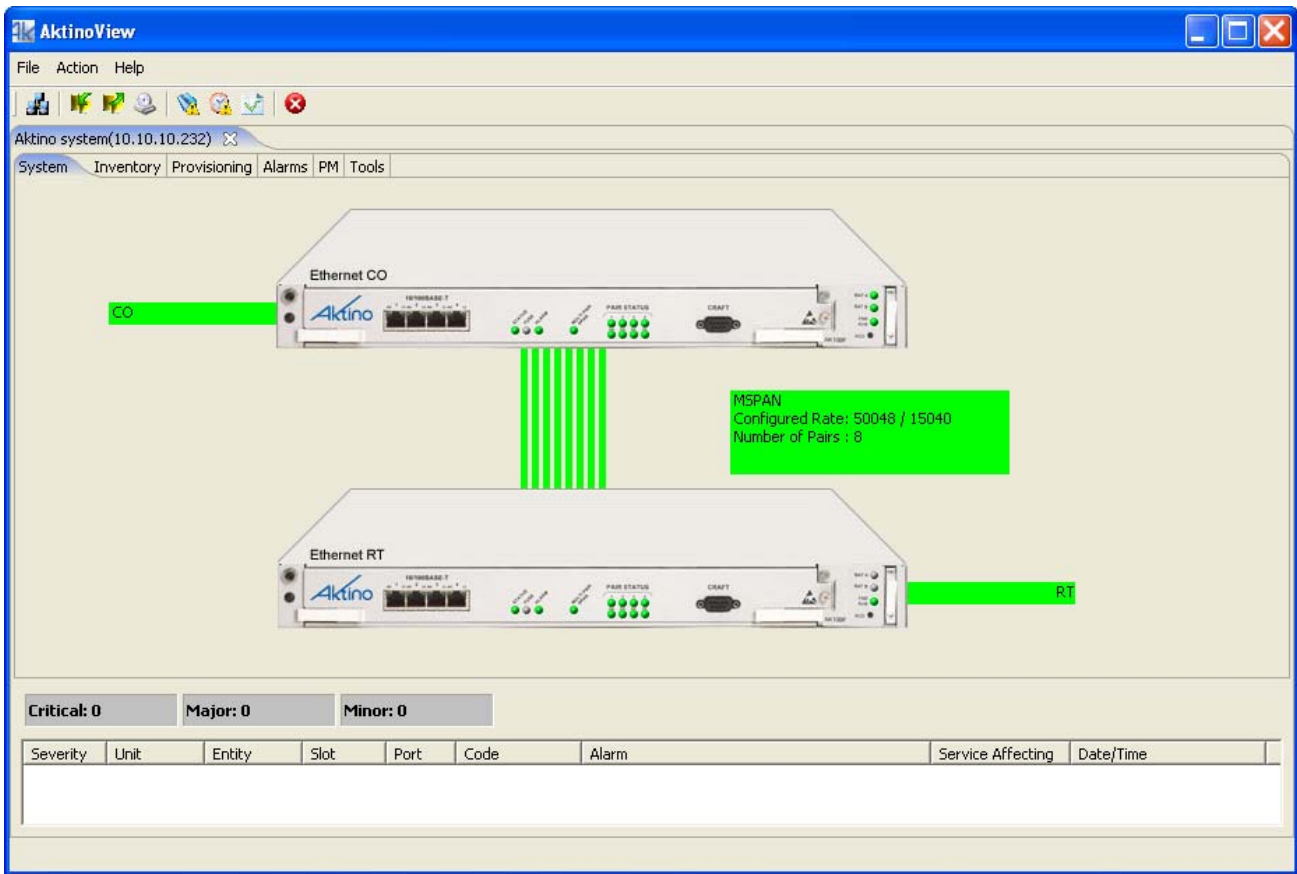


The screenshot shows a Windows-style dialog box titled "Login to AktinoView - v3.2.20.0". The dialog has a blue header bar with a red "X" close button in the top right corner. Below the title bar, the text "Aktino." is displayed in a blue, stylized font. Underneath, a warning message reads "Non-authorized use of the system is prohibited." The main area of the dialog is light beige and contains three input fields: "Username:" with an empty text box, "Password:" with an empty text box, and "Equipment IP Address:" with a text box containing "10.10.10.232" and a small downward arrow on the right. At the bottom right of the dialog are two buttons: "Login" and "Cancel".

Enter IP address of the AK4000 unit username, and password. See above *Note for user name and password. To provide system security, the password for superuser and user accounts should be set up with AktinoView menus.

After logging on, the main status screen will appear:

Main Status Screen



The window components consist of the following sections:

Menu bar

File, Action, and Help along with action icons.

Tabs

Allows navigation of menus for provisioning, performance monitoring, and alarms.

Workspace/Summary area

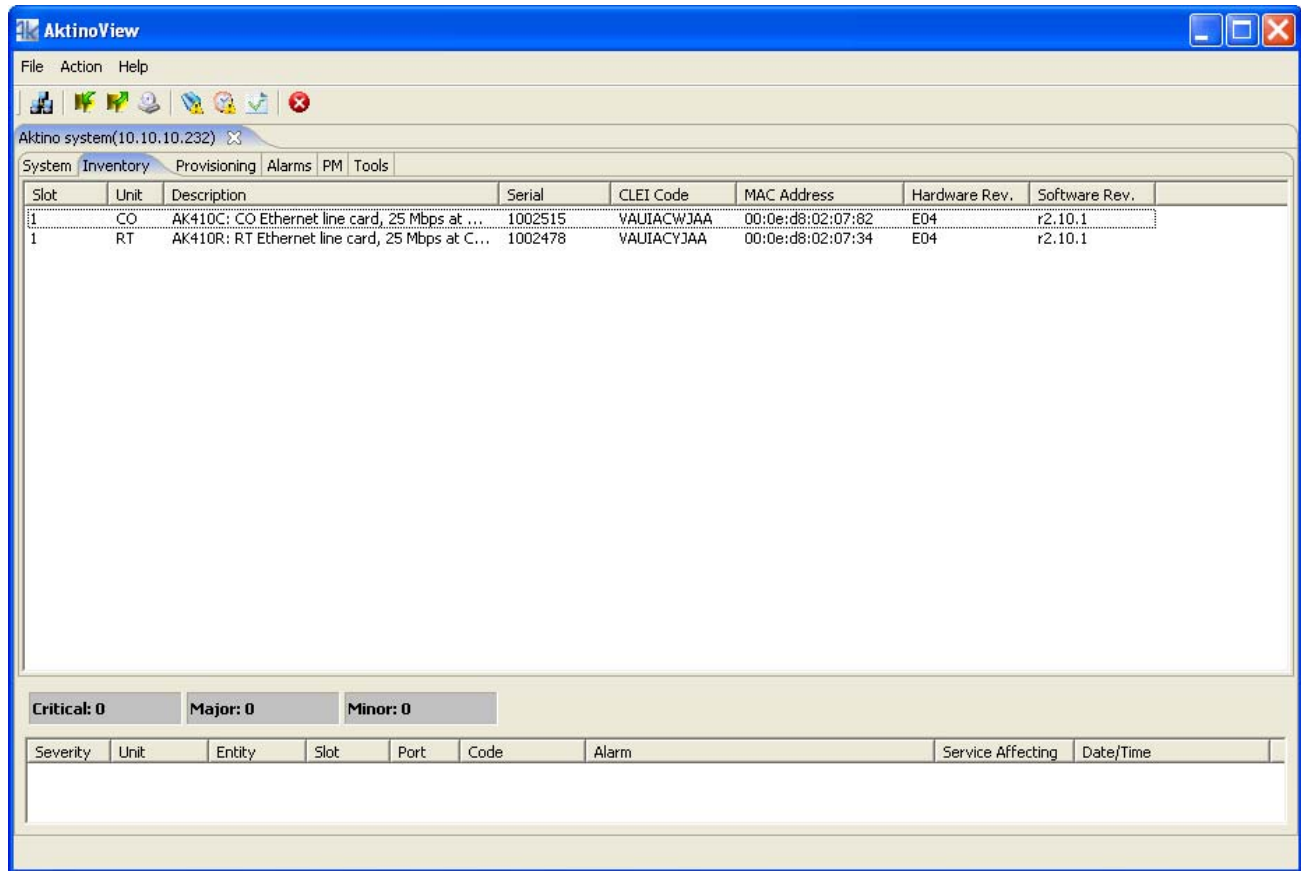
The workspace/summary area shows the CO and RT units for a quick look at the state of the system. Note that by positioning the mouse over items in the overview, a tool tip popup appears with details of the current state. This area is also used to display provisioning and performance monitoring info depending on the tab item selected.

Alarm summary

A summary of the number of alarms is provided at the lower part of the window.

Inventory Screen

Selecting the Inventory tab displays information on the system.



<u>Parameter</u>	<u>Values</u>
Unit	CO or RT unit
Description	Unit description
Serial	Serial number of unit
CLEI Code	Telcordia assigned CLEI code
MAC Address	Each unit has a MAC address
Hardware Version	Hardware version of the unit
Software Version	Software version of the unit

Provisioning Equipment Screen

Selecting the Equipment tab under Provisioning allows equipment provisioning of the system. Right click on unit to bring up Equipment popup. See Table 4 for parameters and values.

Slot	Unit	System ID	Contact	Location	Time	IP Address	Subnet Mask	Gateway Add...	RT Proxy IP	Allow CPE Mgmt Access
1	CO	Aktino system			10/19/2007 12:45:55	10.10.10.232	255.255.255.0	10.10.8.62		
1	RT				10/19/2007 12:45:56		255.255.0.0	10.10.10.251		YES

Table 4 Provisioning Equipment Parameters

<u>Parameter</u>	<u>Values</u>
System ID	String describing the System
Contact	String describing contact
Location	String describing location
Management IP Address	IP address of the Aktino unit
Subnet Mask	Subnet mask for the Aktino unit
Gateway Address	Gateway address for the Aktino unit
RT Proxy IP (CO only)	Proxy IP address for RT - Used to access RT directly
Allow CPE Mgmt Access (RT only)	YES, NO
Repeater Type (CO only)	None, Span 1, Span 2 If repeater application, indicate which span
Other Span IP Address (CO Only)	If repeater application, indicate other span IP address (do not use the same IP address as management port)
Span 2 Mgmt. IP Address (CO only)	If Span 2, indicate management IP address (do not use the same IP address as management port)
Date and Time (CO only)	Pull down buttons allow manual setting of time and date. "PC Time" sets the Aktino system to the maintenance computer's time and date. Note that the RT's time and date is updated and periodically synchronized with the CO.

Provisioning Ethernet Screen

Selecting the Ethernet tab under Provisioning allows Ethernet port provisioning of the system. Right click on the unit to bring up Ethernet provisioning popup. See Table 5 for parameters and values. Note that some of the parameters changed on the CO are also reflected on the RT.

Slot	Unit	Port	Circuit ID	Speed	Duplex	Flow Control	Priority Precedence	Port Priority	State
1	CO	1		100	FULL	YES	DiffServ, VLAN, Port	1 (Low)	UP
1	CO	2		AUTO	AUTO	YES	DiffServ, VLAN, Port	1 (Low)	UP
1	CO	3		AUTO	AUTO	YES	DiffServ, VLAN, Port	1 (Low)	UP
1	CO	4		AUTO	AUTO	YES	DiffServ, VLAN, Port	1 (Low)	UP
1	RT	1		AUTO	AUTO	YES	DiffServ, VLAN, Port	1 (Low)	UP
1	RT	2		AUTO	AUTO	YES	DiffServ, VLAN, Port	1 (Low)	UP
1	RT	3		AUTO	AUTO	YES	DiffServ, VLAN, Port	1 (Low)	UP
1	RT	4		AUTO	AUTO	YES	DiffServ, VLAN, Port	1 (Low)	UP

Table 5 Ethernet Provisioning Parameters

Parameter	Values
Unit	CO or RT
Port	Ethernet Port on CO or RT
Circuit ID	Circuit ID for each Ethernet port
Port Speed [Mbps]	AUTO- Set Port speed to detected speed 10- Sets port to 10Mbps 100- Sets port to 100Mbps
Duplex	AUTO FULL HALF
Flow Control	YES- Port sends pause frame when input queue is near full NO- No pause frames are sent For Aktino unit software R3.2 or newer, use the Ethernet Services, Type of Service tab to provision for port QOS/Lossless setting
Priority Precedence	VLAN, Diffserv, Port VLAN, Port DiffServ, Port Port only
Priority	Sets port input queue priority
State	UP- CO Ethernet port is in service DOWN- CO Ethernet port is out of service

Ethernet

Slot:

Unit:

Port:

Circuit ID:

Speed:

Duplex:

Flow Control:

Priority Precedence:

Port Priority:

State:

OK Apply Cancel

Provisioning AUX Alarms Screen

Selecting the AUX Alarms tab under Provisioning allows external alarm provisioning of the system. These parameters determine how the AUX1 and AUX2 input pins on the Aktino units react. Note that the alarm input pins are Normally Open (NO). Right click on the Index to bring up the Aux Alarm configuration popup. See Table 6 for parameters and values.

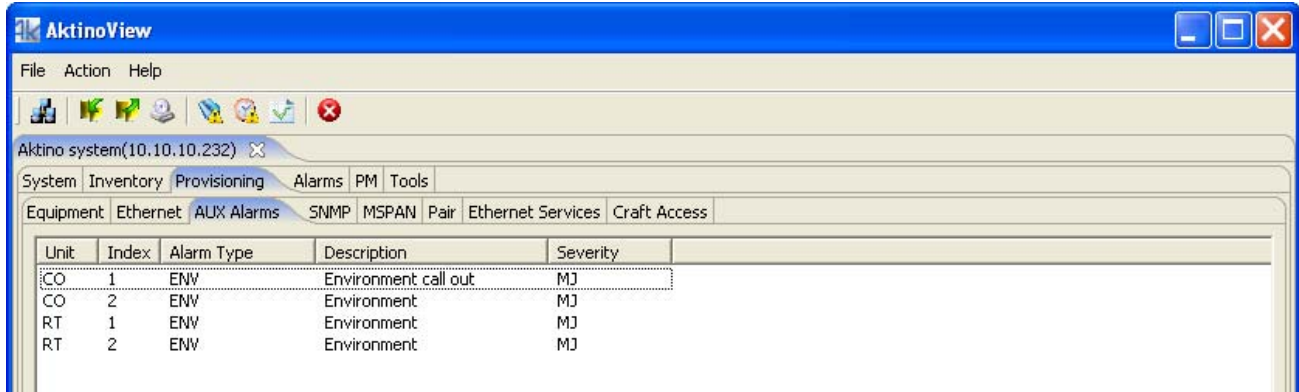
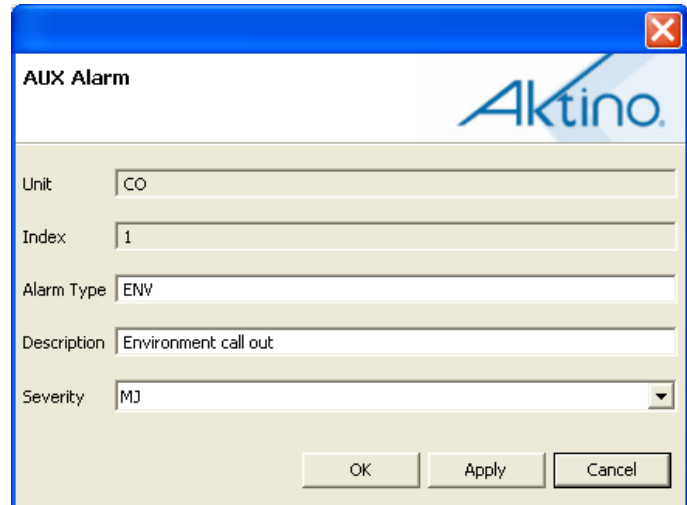


Table 6 AUX Alarm Parameters

<u>Parameter</u>	<u>Values</u>
Alarm Type	This value is reported as alarm type in the TL1 alarm message
Description	This value is reported as alarm description in the TL1 alarm message
Severity	Critical, Major, Minor



Provisioning SNMP Screen

Selecting the SNMP tab allows setting SNMP receiver parameters. Right click on the Index to bring up the SNMP configuration popup. See Table 7 below for details.

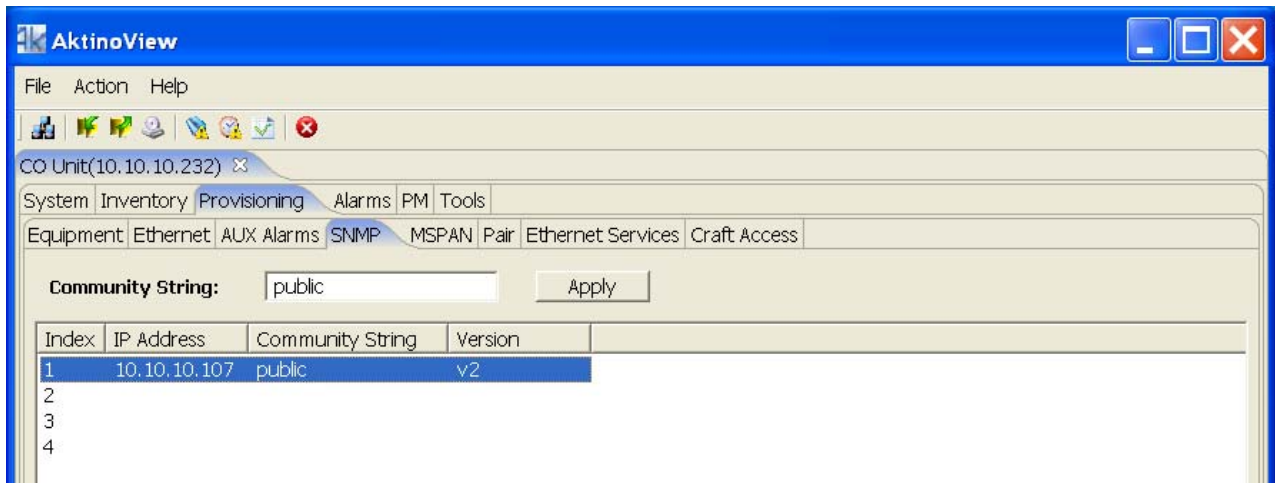


Table 7 SNMP Parameters

<u>Parameter</u>	<u>Values</u>
Community String	SNMP queries into the Aktino system must contain this community string or the query will be rejected
IP Address	SNMP Trap receiver IP Address
Community String (per index)	String that is sent with SNMP traps sent out of the Aktino system
Version	Version- SNMP V1 or V2



Provisioning MSPAN Screen

Selecting the MSPAN tab under Provisioning allows MSPAN provisioning of the system. Right click on the Parameters line to bring up the either the General or Advanced Parameters. See Table 8 and Table 9 for parameters and values.

The screenshot shows the AktinoView software interface. The main workspace is divided into two sections: General Parameters and Advanced Parameters.

General Parameters Table:

Slot	Circuit ID	Mode	MSPAN Rate Up...	MSPAN Rate Down...	Line Powering	SNR Margin (dB)	Margin Threshold (dB)	Reserve Pairs	PSD Mask	State
1		Asymmetric	15040	50048	-185V	5	3	0	AUTO Select	UP

Advanced Parameters Table:

Slot	Reed-Solomon Up...	Reed-Solomon Down...	Latency Up...	Latency Downstream	Impulse Prot. Up...	Impulse Prot. Down...	Power Back-Off Up...	Power Back-Off Down...
1	5.30	5.30	2	2	50	50	AUTO	AUTO

At the bottom of the window, there are status indicators: **Critical: 0**, **Major: 0**, and **Minor: 0**. Below these is a table with columns: Severity, Unit, Entity, Slot, Port, Code, Alarm, Service Affecting, Date/Time.

The screenshot shows the 'MSPAN - General Parameters' dialog box. The parameters are as follows:

- Slot: 1
- Circuit ID: (empty)
- Mode: Asymmetric
- MSPAN Rate (kbps): 25024
- MSPAN Rate Upstream (kbps): 15040
- MSPAN Rate Downstream (kbps): 50048
- Line Powering: -185V
- SNR Margin (dB): 5
- Margin Threshold (dB): 3
- Reserve Pairs: 0
- PSD Mask: AUTO Select
- State: UP

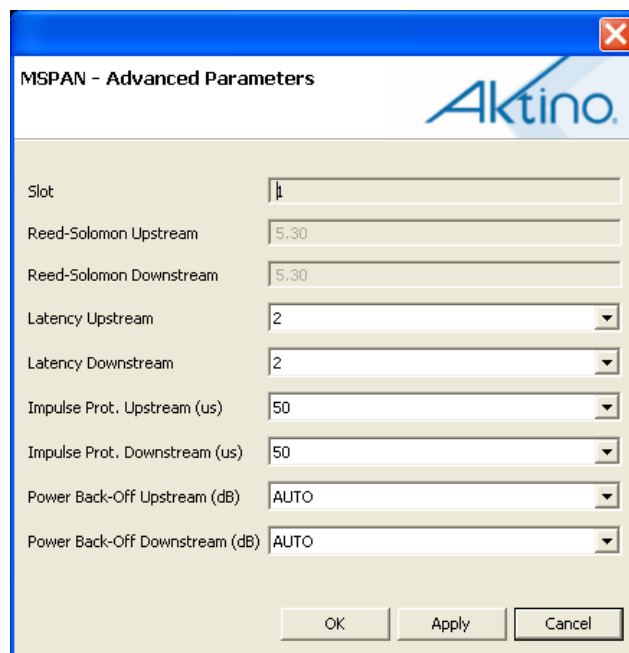
Buttons at the bottom: OK, Apply, Cancel.

Table 8 MSPAN Provisioning Parameters

<u>Parameter</u>	<u>Values</u>
Circuit ID	Circuit ID, max 48 characters
MSPAN Mode	Symmetric Asymmetric (R2.10 or higher)
MSPAN Rate Rate Upstream Rate Downstream	0 to 50240 Kbps
Line Powering	OFF- RT is local powered -135v -185v
SNR Margin [dB]	0 to 18dB. Set value is desired MSPAN margin
Margin Threshold [dB]	0 to 18 (≤ SNR Margin) If MSPAN margin falls below Margin Threshold value, an alarm is set
Reserve Pairs	1 to 13
PSD Mask	Auto-Selects mask automatically Select M1, M2, M3, M4, M5 RT Deployment M1 RT Deployment M2 Upstream 276khz Repeater Span1: M1 Repeater Span2: M1, M2, M3
State	UP- MSPAN port is in service DOWN- MSPAN port is out of service

Table 9 MSPAN Advanced Parameters

<u>Parameter</u>	<u>Values</u>
Upstream/Downstream Reed-Solomon Overhead [%]	Calculated Reed-Solomon Overhead percentage $RS\% = 2 * INP / Latency$
Upstream/Downstream Interleaver Latency [msec]	0, 2, 4, 6, 8, 12, 16, 20 msec Latency of the PHY
Upstream/Downstream Impulse Noise Protection (INP) [usec]	50, 125, 250, 500 usec Length of noise protection
Upstream/Downstream Power Back-Off [dB]	Auto, -3 to 16 dB



Provisioning Pair Screen

Selecting the PAIR tab under Provisioning allows PAIR provisioning of the system. Right click on the Pair to bring up the Pair configuration popup. See Table 10 for parameters and values.

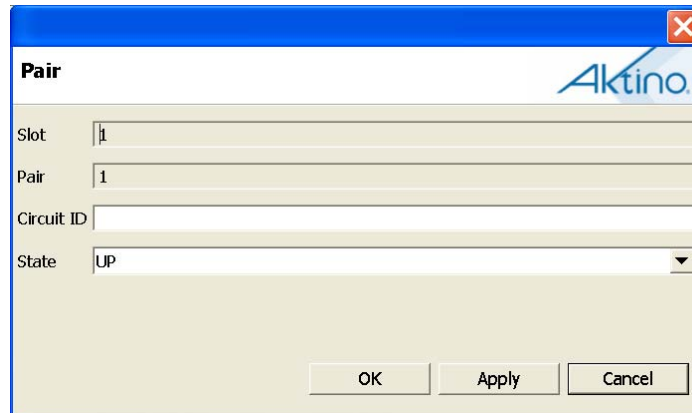
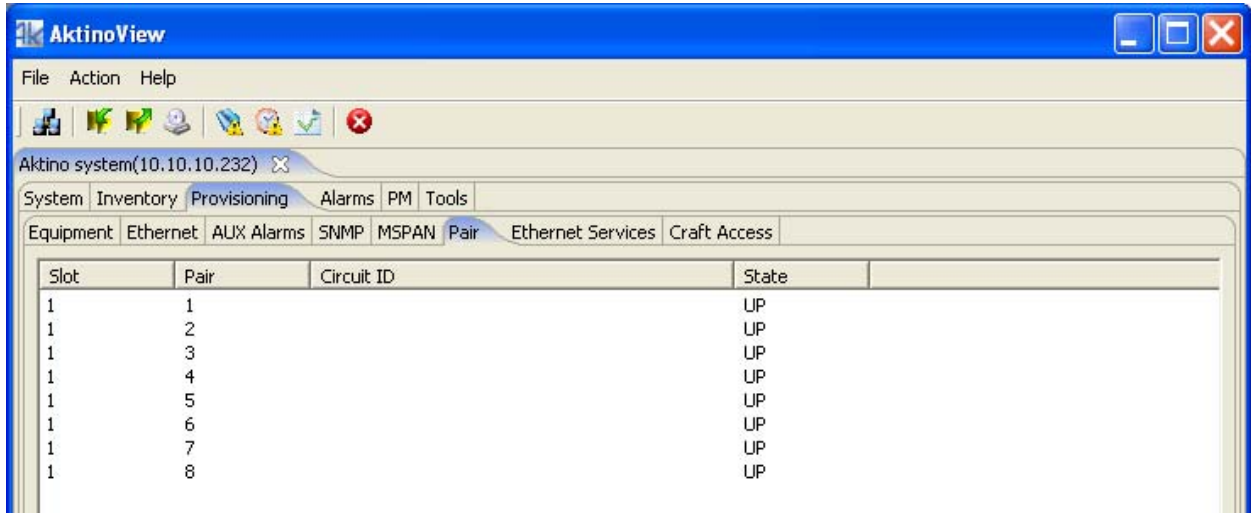


Table 10 PAIR Provisioning Parameters

<u>Parameter</u>	<u>Values</u>
Circuit ID	Circuit ID of each pair
State	UP- Puts Pair into service DOWN- Removes Pair from service

Ethernet Type of Service

Selecting the Ethernet Type of Service tab unit allows type of service provisioning of the system. Right click on the Slot to bring up the Ethernet Service configuration popup. See Table 11 for parameters and values.

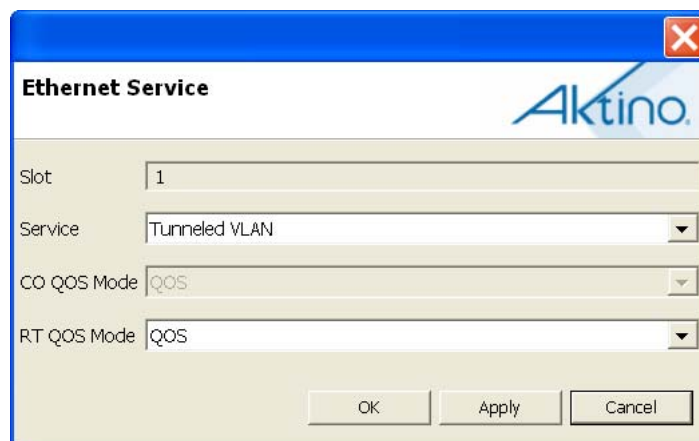
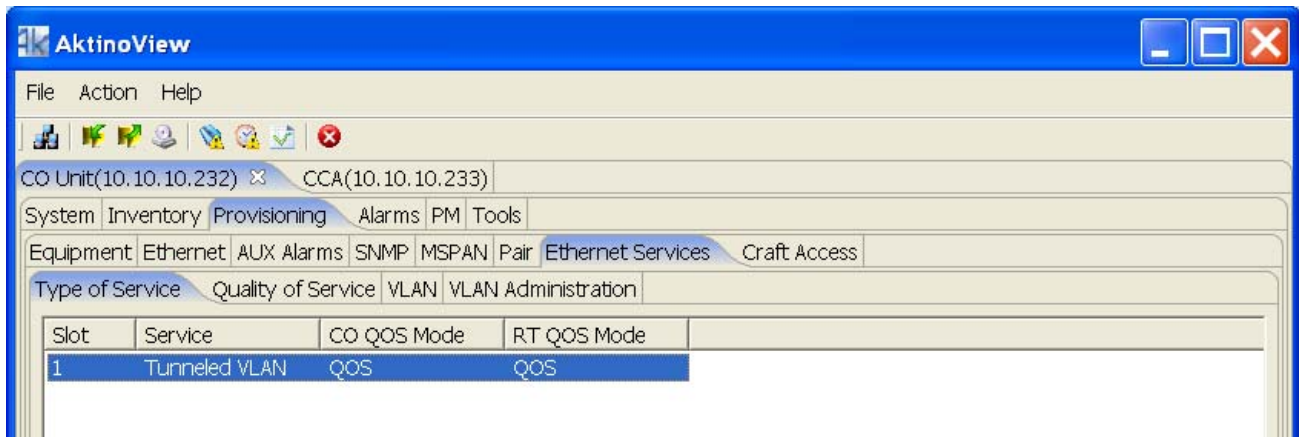


Table 11 Ethernet Type of Service

<u>Parameter</u>	<u>Values</u>
Type of Service	<p>Transparent Switch- The CO and RT units behave as an 8-port switch (four ports on each end). Frames may go from any port to any other port. Frames are transported transparently.</p> <p>Transparent Port- CO/RT 100BaseT port-1 is connected to port-1, port-2 to port-2, port-3 to port-3, and port-4 to port-4. Data between each port is not mixed.</p> <p>Tunneled VLAN- VLAN IDs are assigned to each port (i.e., port VLANs). The VLAN IDs determine which packets go to which ports. A VLAN tag is added to traffic flowing from RT to CO. The VLAN tag is stripped from traffic flowing from CO to RT.</p>
CO and RT QoS Mode	<p>QoS- Port, VLAN, or DiffServ priorities are used.</p> <p>Lossless- Pause frames are used so that no frames are dropped. This may result in treating all packets with the same priority. Not valid for CO QoS Mode when in Tunneled VLAN mode. Valid for Aktino unit running software R3.2 or newer.</p>

Quality of Service Configuration

Selecting the Quality of Service tab unit allows Global Quality of Service provisioning of the system. Right click to bring up the Ethernet Quality of Service configuration popup. See Table 12 for parameters and values.

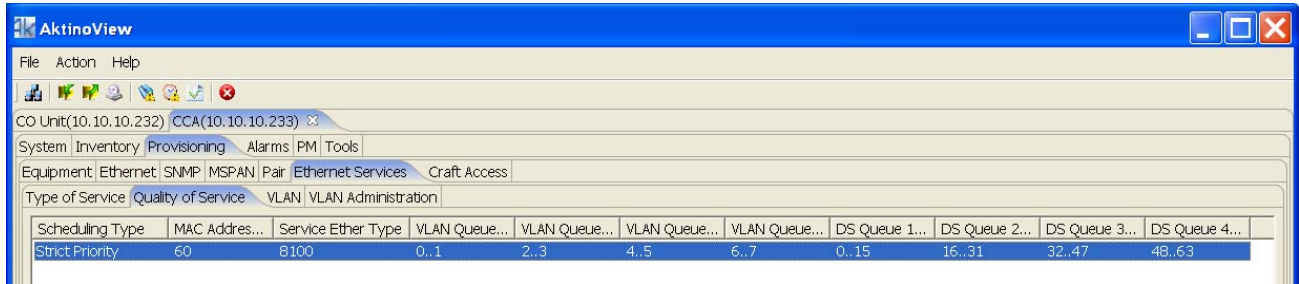
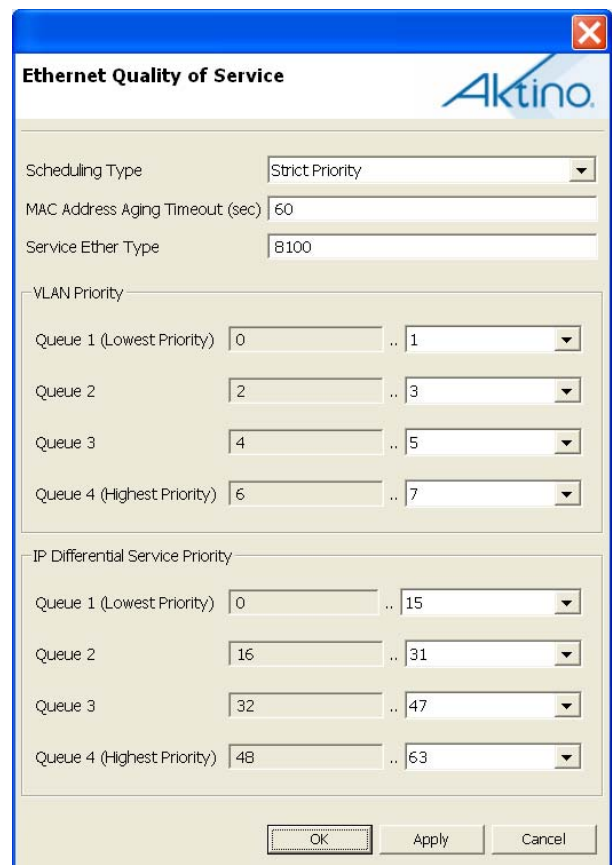


Table 12 Quality of Service Parameters

<u>Parameter</u>	<u>Values</u>
Scheduling Type	Weighted Fair Queuing Strict Priority
Mac Address Aging Threshold (sec)	Time in seconds when a Mac address is removed from the Mac address table
Service Ether Type	Value for Ether Type that is used when adding a service VLAN tag
VLAN Priority	Allows mapping the eight VLAN priority levels to four priority queues
IP DiffServ Priority	Allows mapping the 64 DiffServ priority levels to four priority queues



VLAN Configuration

Selecting the VLAN tab unit allows VLAN ID provisioning of the system. Note that this menu is only available when the type of service selected in the Equipment menu is set to Tunneled VLAN. Right click on the VLAN ID to bring up the Modify VLAN popup. Click on Create VLAN at lower left part of the window to create a VLAN. VLANs are designated as 1.x where x is the Port number. See Table 13 for parameters and values.

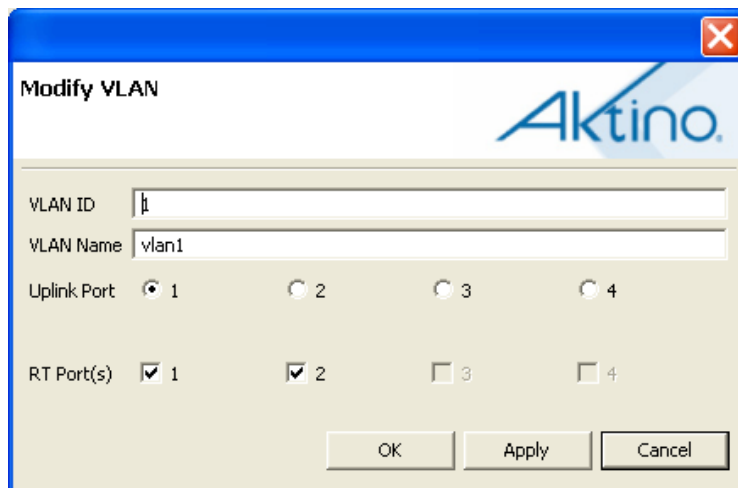
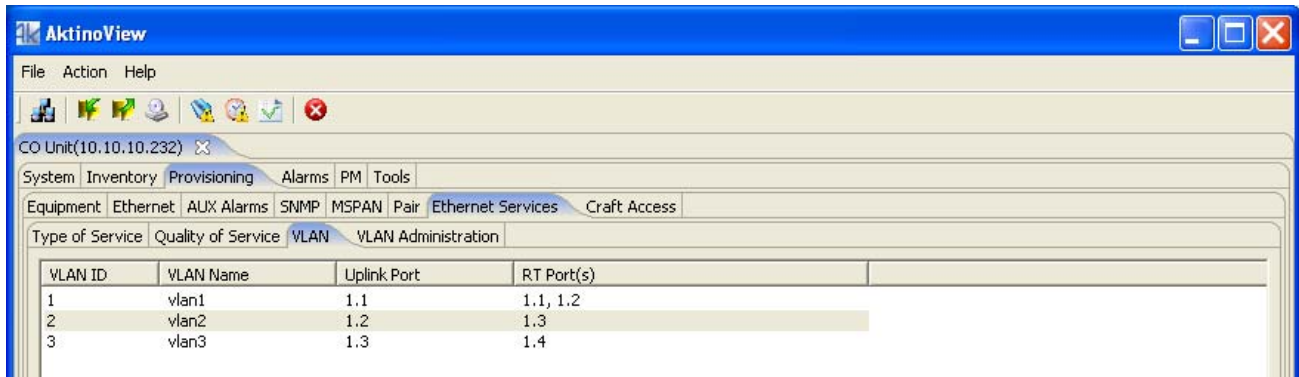


Table 13 VLAN Provisioning Parameters

<u>Parameter</u>	<u>Values</u>
VLAN ID	Enter a unique number between 1 and 4095 for the VLAN ID
VLAN Name	Allows a VLAN name to be specified
Uplink Port	Specify which CO unit Uplink port the VLAN ID is associated. Multiple VLANs can be assigned to a single CO unit uplink port.
RT Port	Specify which RT port the VLAN ID is associated. Only one VLAN can be assigned per RT port. RT Ports are not selectable if it has another VLAN associated with it.

Ethernet Service Administration Configuration

Selecting the Administration tab under Ethernet Service allows provisioning of administration of the system. Right click bring up the VLAN Administration popup. See Table 14 for details.

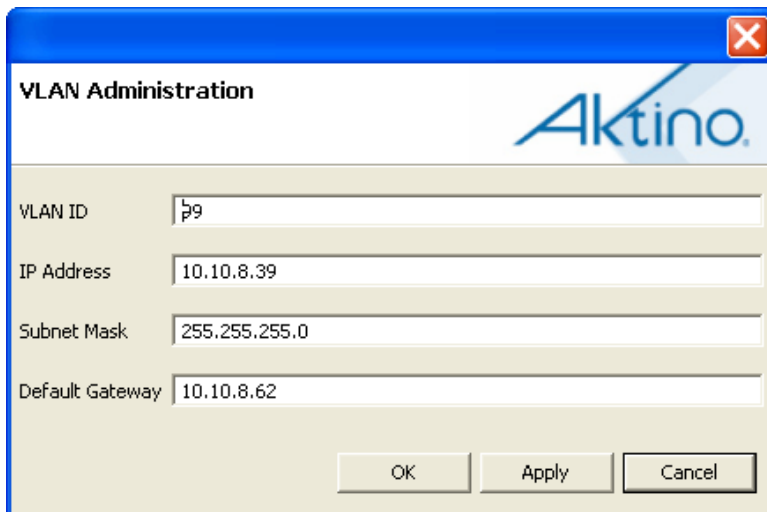
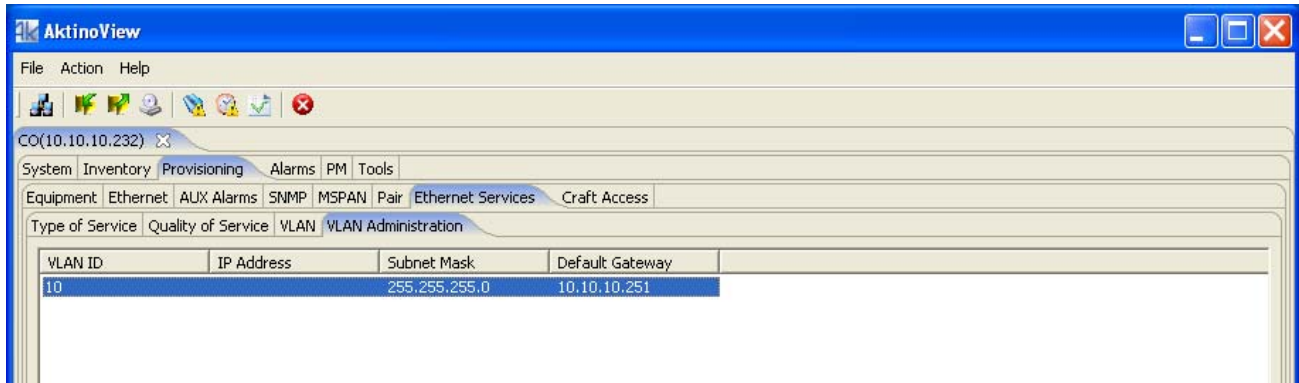
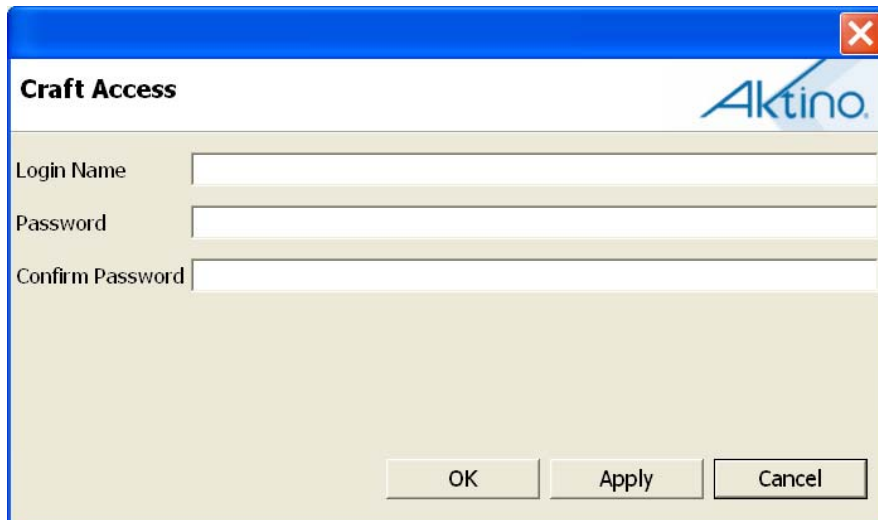
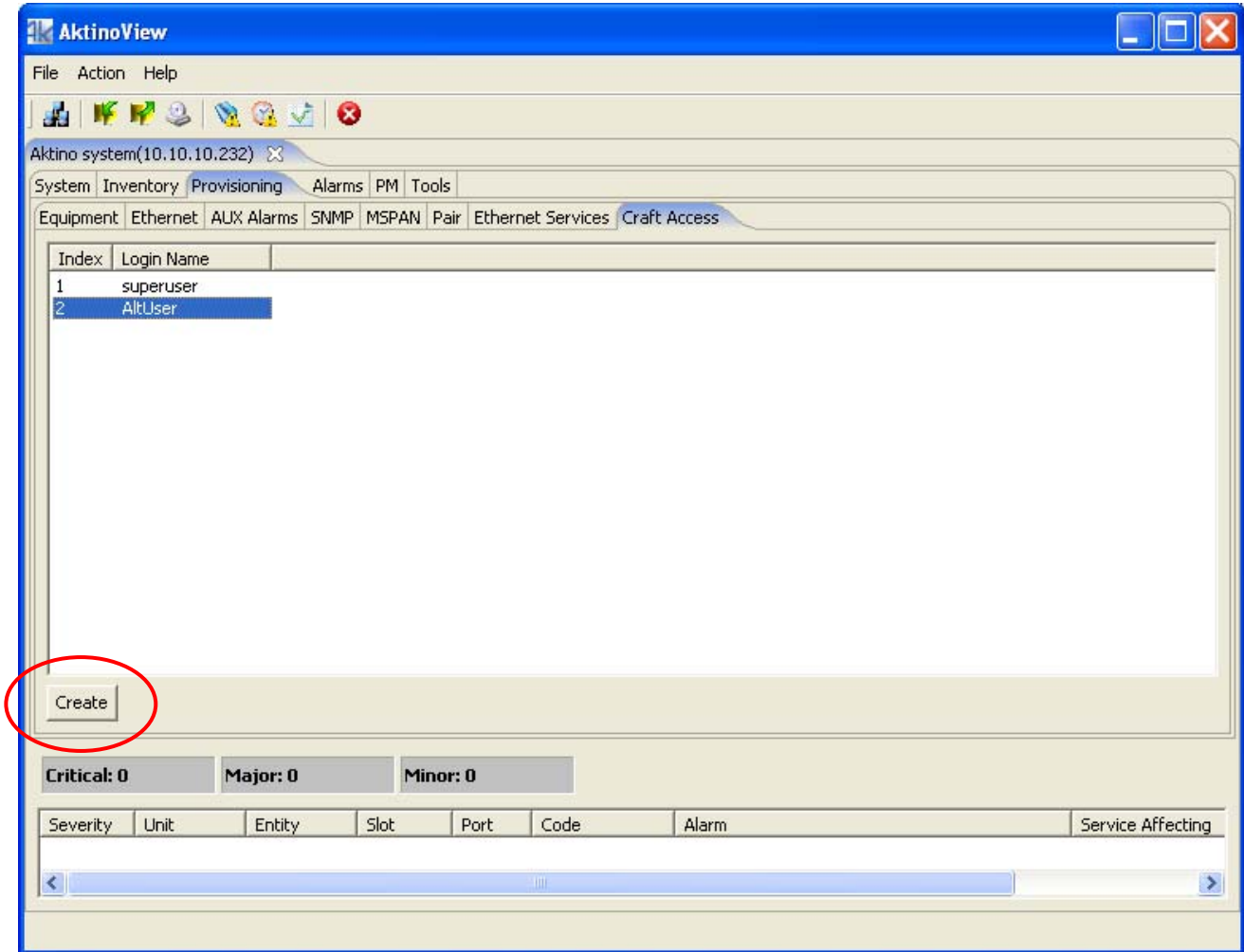


Table 14 Ethernet Service Administration

<u>Parameter</u>	<u>Values</u>
VLAN ID	VLAN ID used for management
IP Address	IP address of the Aktino unit
Subnet Mask	Subnet mask for the Aktino unit
Gateway Address	Gateway address for the Aktino unit

Provisioning Craft Access

Selecting the Craft Access tab under Provisioning allows management administration. Click on Create to bring up the Craft Access popup as shown below. Right click on Index to modify or delete.



Performance Monitoring & Alarms

Performance Monitoring screens are selected by clicking the PM or Alarm tabs at the top of the tab tree.

Alarms CO and RT Alarm Log

The Alarm Log is a list of alarms that have occurred on the CO (CO tab) and on the RT (RT tab). Select Refresh to update screen. Any of the column headings can be clicked to sort by that column. See Table 15 for descriptions of columns.

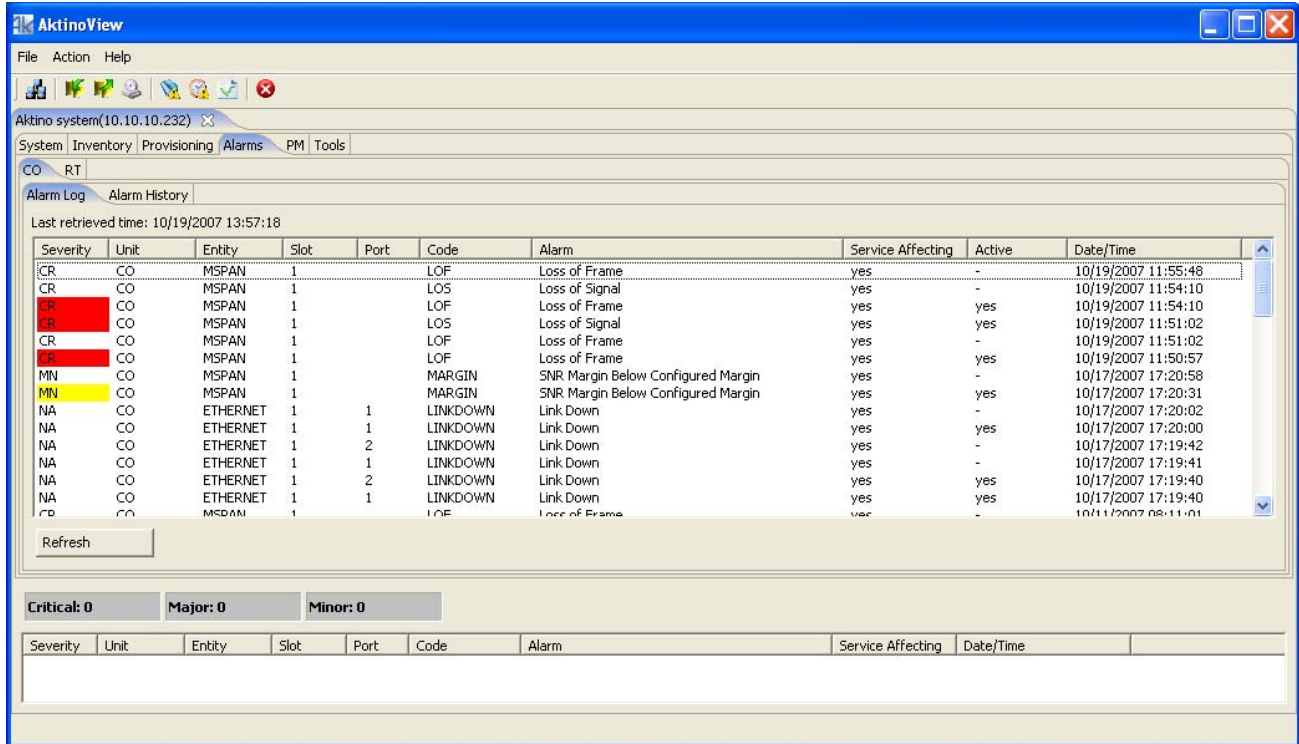


Table 15 Alarm Log

<u>Parameter</u>	<u>Definition</u>
Severity	Critical/Major/Minor state of the Alarm. Color highlighted indicates alarm active; no highlight indicates the alarm has cleared
Unit	CO or RT
Entity	Ethernet, Eqpt, Fan, Pair or MSPAN
Alarm	Alarm description

<u>Parameter</u>	<u>Definition</u>
Code	Alarm code
Service Affecting	“yes” indicates that the alarm is service affecting
Active	“yes” indicates that the alarm is currently active
Date/Time	Date/time of the event

Alarms CO and RT Alarm History

The Alarm History is a summary of alarms that have occurred on the CO (CO tab) and on the RT (RT tab). Select Refresh to update screen. Any of the column headings can be clicked to sort by that column. See Table 16 for description of columns.

Severity	Unit	Entity	Slot	Port	Code	Alarm	Service Affecting	First Time	Last Time	Occurrences
CR	CO	MSPAN	1		LOF	Loss of Frame	yes	04/09/2007 10:43:20	10/19/2007 11:55:48	11
CR	CO	MSPAN	1		LOS	Loss of Signal	yes	04/09/2007 10:43:24	10/19/2007 11:54:10	8
MM	CO	MSPAN	1		MARGIN	SNR Margin Below Configured Margin	yes	10/17/2007 17:20:31	10/17/2007 17:20:58	1
NA	CO	ETHERNET	1	1	LINKDOWN	Link Down	yes	10/17/2007 17:19:40	10/17/2007 17:20:02	2
NA	CO	ETHERNET	1	2	LINKDOWN	Link Down	yes	10/17/2007 17:19:40	10/17/2007 17:19:42	1
CS	CO	COM			SYSTEM_REB...	System Reboot	yes	09/14/2007 14:15:06	10/01/2007 11:52:42	4
CR	CO	MSPAN	1		LOSLRPAIR	Line Powering Failure	yes	04/09/2007 10:43:20	05/10/2007 09:08:16	2
MM	CO	PAIR	1	6	SHRTCKT	Short Circuit	-	05/10/2007 08:49:30	05/10/2007 08:49:35	1
MM	CO	PAIR	1	3	SHRTCKT	Short Circuit	-	04/09/2007 10:43:19	05/10/2007 08:49:35	3
MM	CO	PAIR	1	1	SHRTCKT	Short Circuit	-	04/09/2007 10:43:19	05/10/2007 08:49:35	3
MM	CO	PAIR	1	2	SHRTCKT	Short Circuit	-	04/09/2007 10:43:19	04/09/2007 10:43:39	2
MM	CO	PAIR	1	1	LOS	Loss of Signal	-	03/05/2007 16:42:24	03/05/2007 16:42:37	1
MJ	CO	MSPAN	1		RATE	MSPAN Capacity Under Configured ...	yes	03/01/2007 15:37:30	03/01/2007 15:38:08	1

Table 16 Alarm History

Parameter	Definition
Severity	Critical/Major/Minor state of the Alarm. Color highlighted indicates alarm active; no highlight indicates the alarm has cleared.
Unit	CO or RT
Entity	Ethernet, EQPT, FAN, PAIR, or MSPAN
Alarm	Alarm description
Code	Alarm code

Parameter	Definition
Service Affecting	“yes” indicates that the alarm is service affecting
First Time	Date/time of first occurrence of the event
Last Time	Date/time of last occurrence of the event
Occurrences	The number of times the alarm has occurred

PM CO and RT Ethernet Performance Monitoring

Ethernet performance monitoring shows Ethernet ports. The CO (CO tab) and RT (RT tab) have separate Ethernet performance monitoring. PM values displayed are from the IF MIB. Shown below is the Summary screen which displays all Ethernet ports, and the Ethernet Detail screen which provides more detail for each port. The MAC Addresses screen is also available.

The screenshot shows the AktinoView Summary screen for Ethernet performance monitoring. The interface includes a menu bar (File, Action, Help), a toolbar, and navigation tabs (System, Inventory, Provisioning, Alarms, PM, Tools). The 'CO' tab is selected, and the 'Ethernet' sub-tab is active. The 'Summary' sub-tab is selected, displaying a table of Ethernet ports.

Slot	Unit	Port	Time	State	Resolved	Speed	Duplex	In Frames	Out Frames	In Errors	Discarded Pkts	Filtered Pkts
1	CO	1	10/19/2007 13:48:27	UP	YES	100	FULL	0	0	0	0	0
1	CO	2	10/19/2007 13:48:27	UP	YES	100	FULL	0	0	0	0	0
1	CO	3	10/19/2007 13:48:27	UP	YES	100	FULL	0	0	0	0	0
1	CO	4	10/19/2007 13:48:27	UP	YES	100	FULL	0	0	0	0	0

Slot	Unit	Port	Time	In Octets	Bad Octets	Undersize	Oversize	Fragments	Align Errors	Jabber	Collision
1	CO	1	10/19/2007 13:48:27	0	0	0	0	0	0	0	0
1	CO	2	10/19/2007 13:48:27	0	0	0	0	0	0	0	0
1	CO	3	10/19/2007 13:48:27	0	0	0	0	0	0	0	0
1	CO	4	10/19/2007 13:48:27	0	0	0	0	0	0	0	0

At the bottom, there is a 'Refresh' button, a dropdown menu set to 'now', and a 'Slot' dropdown menu set to '1'.

The screenshot shows the AktinoView Detail screen for Ethernet performance monitoring. The interface is similar to the Summary screen, but the 'Detail' sub-tab is selected, displaying a table of Ethernet ports with more detailed performance metrics.

Slot	Unit	Port	Time	Unicast Pkts	Broadcasts	Multicasts	Pause	Octets	64 Octets	127 Octets	255 Octets	511 Octets	1023 Octets	Max Octets
1	CO	1	10/19/2007 13:49:51	0	0	0	0	0	0	0	0	0	0	0

Slot	Unit	Port	Time	Unicast Pkts	Broadcasts	Multicasts	Pause	Octets	64 Octets	127 Octets	255 Octets	511 Octets	1023 Octets	Max Octets
1	CO	1	10/19/2007 13:49:51	0	0	0	0	0	0	0	0	0	0	0

At the bottom, there is a 'Refresh' button, a dropdown menu set to 'now', and a 'Slot' dropdown menu set to '1'.

The screenshot shows the AktinoView MAC Addresses screen for Ethernet performance monitoring. The interface is similar to the Summary and Detail screens, but the 'MAC Addresses' sub-tab is selected, displaying a table of Ethernet ports with MAC addresses.

Slot	Port	MAC Address

At the top, it says 'Last retrieved time: 10/19/2007 13:50:38'.

PM CO and RT MSPAN Performance Monitoring

The MultiPair Span Performance Monitoring (PM) information is displayed when clicking on the MultiPair Span icon on the tree. PM is available for either the CO (CO tab) or RT (RT tab) side. The display shows current MultiPair Span Rate in kbps and current MultiPair Span Margin in dB at the top of the window. Ninety six fifteen minute time period bins and seven 24 hour time period bins display the MultiPair Span's performance monitoring. See Table 17 for details.

The screenshot shows the AktinoView interface with the PM tab selected. The main display area shows the following parameters:

- Capacity (Kbps): 57644
- Rate (Kbps): 50048
- Margin (dB): 8.44
- State: DATA
- PSD Mask: M1
- TX Utilization (%): 0.0
- RX Utilization (%): 0.0

Below these parameters are two performance tables:

15 Minutes

Ending Time Period	CRC	ES	SES	UAS	Min Capacity	Max Capacity	Min Rate	Max Rate	Min Margin	Max Margin	TX Util (%)	RX Util (%)	EFS (%)
10/19/2007 13:52	0	0	0	0	57564	57684	50048	50048	8.38	8.45	0.00	0.00	100.00
10/19/2007 13:45	0	0	0	0	57576	57692	50048	50048	8.38	8.45	0.00	0.00	100.00
10/19/2007 13:30	0	0	0	0	57564	57684	50048	50048	8.36	8.45	0.00	0.00	100.00
10/19/2007 13:15	0	0	0	0	57548	57672	50048	50048	8.36	8.44	0.00	0.00	100.00
10/19/2007 13:00	0	0	0	0	57560	57684	50048	50048	8.36	8.45	0.00	0.00	100.00

24 Hours

Ending Time Period	CRC	ES	SES	UAS	Min Capacity	Max Capacity	Min Rate	Max Rate	Min Margin	Max Margin	TX Util (%)	RX Util (%)	EFS (%)
10/19/2007	1	1	0	124	0	57792	0	50048	0.00	8.89	0.00	0.00	98.24

Table 17 MSPAN PM Parameters

<u>Parameter</u>	<u>Definition</u>
Capacity [Kbps]	Displays the current MSPAN capacity at the provisioned System Margin value
Rate [Kbps]	Displays the current actual MSPAN rate
Margin [db]	Displays the current MSPAN margin value
State	TRAINING- MSPAN is training up, no data is being transported DATA- MSPAN is up, data is being transported LOS- Loss of Sync
PSD Mask	Selected PSD mask
Tx Utilization [%]	% of Ethernet frames being transmitted in the MSPAN vs. MSPAN provisioned rate
Rx Utilization [%]	% of Ethernet frames being received from the MSPAN vs. MSPAN provisioned rate

Table 18 MSPAN PM Parameters (continued)

<u>Abbreviation</u>	<u>Parameter</u>	<u>Units</u>	<u>Definition</u>
CRC error	CRC	n/a	This is an uncorrectable error on the MSPAN. There should be corresponding ES on pairs.
Error Seconds	ES	Seconds	A count of seconds in the interval that have at least one crc.
Severely Error Seconds	SES	Seconds	A count of seconds in the interval that have: 44 or more crc's or MSPAN loss of signal (LOS) or MSPAN loss of frame (LOF)
Unavailable Seconds	UAS	Seconds	10 consecutive SES result in a UAS. The SES counter will get reset to 0 upon reaching 10 ses and the UAS counter will start at 10 seconds.
Capacity Minimum	CapMin	Kbps (Kilo bits per Sec)	Minimum capacity during a given 15 minute period
Capacity Maximum	CapMax	Kbps (Kilo bits per Sec)	Maximum capacity during a given 15 minute period
Rate Minimum	RateMin	Kbps (Kilo bits per Sec)	Minimum rate during a given 15 minute period
Rate Maximum	RateMax	Kbps (Kilo bits per Sec)	Maximum rate during a given 15 minute period
Margin Maximum	MargMin	dB	Minimum margin during a given 15 minute period
Margin Maximum	MargMax	dB	Maximum margin during a given 15 minute period
Transmit Utilization	TxUtil	%	Actual Data payload as a percentage of the total available TX MSPAN rate.
Receive Utilization	RxUtil	%	Actual Data payload as a percentage of the total available RX MSPAN rate.
Error Free Seconds	EFS	%	EFS is the percentage of error free seconds over either a 15 minute or 24 hour bin.

PM CO and RT Pair Summary Performance Monitoring

A summary of all pairs for either CO (CO tab) or RT (RT tab) side can be displayed by clicking Summary under Pair PM. See Table 18 for definitions of the pair summary screen.

Time Period	Slot	Unit	Pair	Remote Pair	Capacity	Rate	Margin	Voltage	Line Current	Ground Current
06/20/2008 09:44:05	1	CO	1	1	5904	5328	9.39	189.77	35.69	0.50
06/20/2008 09:44:06	1	CO	2	2	5784	5192	9.27	189.77	35.69	0.50
06/20/2008 09:44:06	1	CO	3	3	5752	5184	9.28	189.77	35.18	0.50
06/20/2008 09:44:07	1	CO	4	4	5948	5420	9.36	189.77	35.18	0.50
06/20/2008 09:44:07	1	CO	5	5	5804	5240	9.22	189.77	35.18	0.50
06/20/2008 09:44:08	1	CO	6	6	5804	5232	9.23	188.10	35.18	0.50
06/20/2008 09:44:08	1	CO	7	7	5888	5408	9.23	188.10	35.18	0.50
06/20/2008 09:44:09	1	CO	8	8	5952	5460	9.22	188.10	35.18	0.50

Table 18 Summary PM Monitoring Parameters

<u>Parameter</u>	<u>Definition</u>
Remote Pair	Remote unit's pair number that is attached to the CO pair number
Capacity	Displays the pair's capacity at the provisioned System Margin value
Rate	Displays the current actual pair rate (kbps)
Margin	Displays the pair's margin value (db)
Voltage (CO only)	Displays the detected voltage sealing current or line powering voltage
Current (CO only)	Displays the detected current
Ground current (CO only)	Displays the current to ground (Acceptable range is 0 to 1.0mA)

PM CO and RT Pair Current 15 Minutes and 24 Hours Performance Monitoring

The current fifteen minute time period and current 24 hour time period pair performance monitoring is display under PM CO (CO tab) or RT (RT tab) Current 15 Minutes and Current 24 Hours tabs. Select Refresh to update screen. See Table 19 for definitions of the current pair screen.

Time Period	Slot	Unit	Pair	CS	ES	SES	UAS	Min Capacity	Max Capacity	Min Rate	Max Rate	Min Margin	Max Margin	EFS (%)
06/20/2008 09:46:05	1	CO	1	0	0	0	0	5900	5916	5328	5336	9.31	9.45	100.00
06/20/2008 09:46:05	1	CO	2	0	0	0	0	5768	5784	5184	5200	9.14	9.30	100.00
06/20/2008 09:46:06	1	CO	3	0	0	0	0	5728	5760	5184	5200	9.11	9.30	100.00
06/20/2008 09:46:06	1	CO	4	0	0	0	0	5932	5948	5408	5420	9.27	9.47	100.00
06/20/2008 09:46:07	1	CO	5	0	0	0	0	5792	5816	5240	5252	9.09	9.27	100.00
06/20/2008 09:46:07	1	CO	6	0	0	0	0	5792	5812	5220	5224	9.19	9.34	100.00
06/20/2008 09:46:08	1	CO	7	0	0	0	0	5884	5900	5404	5404	9.20	9.30	100.00
06/20/2008 09:46:08	1	CO	8	0	0	0	0	5936	5956	5460	5460	9.17	9.27	100.00

Table 19 Current 15 Minutes & 24 Hours Pair PM

<u>Parameter</u>	<u>Definition</u>
CS	Corrected Seconds- Number of seconds in which one or more errors were corrected by error correction algorithms.
ES	Errored Seconds
SES	Severely Errored Seconds
UAS	UnAvailable Seconds
Min Capacity	Minimum Capacity (kbps)
Max Capacity	Maximum Capacity (kbps)
Min Rate	Minimum Rate (kbps)
Max Rate	Maximum Rate (kbps)
Min Margin	Minimum Margin (db)
Max Margin	Maximum Margin (db)
EFS%	Error Free Seconds %

PM CO and RT Pair History Performance Monitoring

Ninety six fifteen minute time period bins and seven 24 hour time period bins display the history of the pair's performance monitoring. Select Refresh to update screen. Select the Pair by the pull down menu indicated. See Table 19 above for definitions of the pair history screen.

The screenshot shows the AktinoView application window. The main content area displays performance metrics for a CO Unit (10.10.10.232) and an RT Pair (CCA(10.10.10.233)). The 'Pair' tab is selected, showing a summary of capacity, rate, margin, voltage, current, and ground current. Below this, there are two tables: one for 15-minute intervals and one for 24-hour intervals. At the bottom, there is a 'Refresh' button, a 'now' dropdown for refresh frequency, and a 'Pair' dropdown menu. A callout box points to these controls with the text 'Select refresh frequency and pair'.

Summary:

Capacity (Kbps):	5908	Rate (Kbps):	5336	Margin (dB):	9.38
Line Voltage (V):	189.77	Current (mAmp):	35.69	Ground Current (mAmp):	0.5
State:	ACTIVE	Remote Pair:	1		

15 Minutes:

Ending Time Period	CS	ES	SES	UAS	Min Capacity	Max Capacity	Min Rate	Max Rate	Min Margin	Max Margin	EPS (%)
06/20/2008 09:46	0	0	0	0	5900	5916	5328	5336	9.31	9.45	100.00
06/20/2008 09:45	0	0	0	0	5892	5920	5316	5348	9.23	9.48	100.00
06/20/2008 09:30	1	0	0	0	5896	5916	5324	5352	9.23	9.53	100.00
06/20/2008 09:15	0	0	0	0	5896	5924	5324	5352	9.23	9.52	100.00
06/20/2008 09:00	0	0	0	0	5896	5920	5328	5352	9.22	9.50	100.00
06/20/2008 08:45	0	0	0	0	5896	5916	5328	5348	9.28	9.47	100.00
06/20/2008 08:30	0	0	0	0	5896	5916	5332	5360	9.23	9.45	100.00
06/20/2008 08:15	0	0	0	0	5896	5920	5328	5352	9.25	9.48	100.00

24 Hours:

Ending Time Period	CS	ES	SES	UAS	Min Capacity	Max Capacity	Min Rate	Max Rate	Min Margin	Max Margin	EPS (%)
06/20/2008	1	0	0	0	5892	5924	5316	5368	9.19	9.55	100.00
06/19/2008	1	0	0	101	0	5924	0	5464	0.00	9.50	99.61

Refresh: Refresh Frequency: Slot: Pair:

Critical: 0 Major: 0 Minor: 0

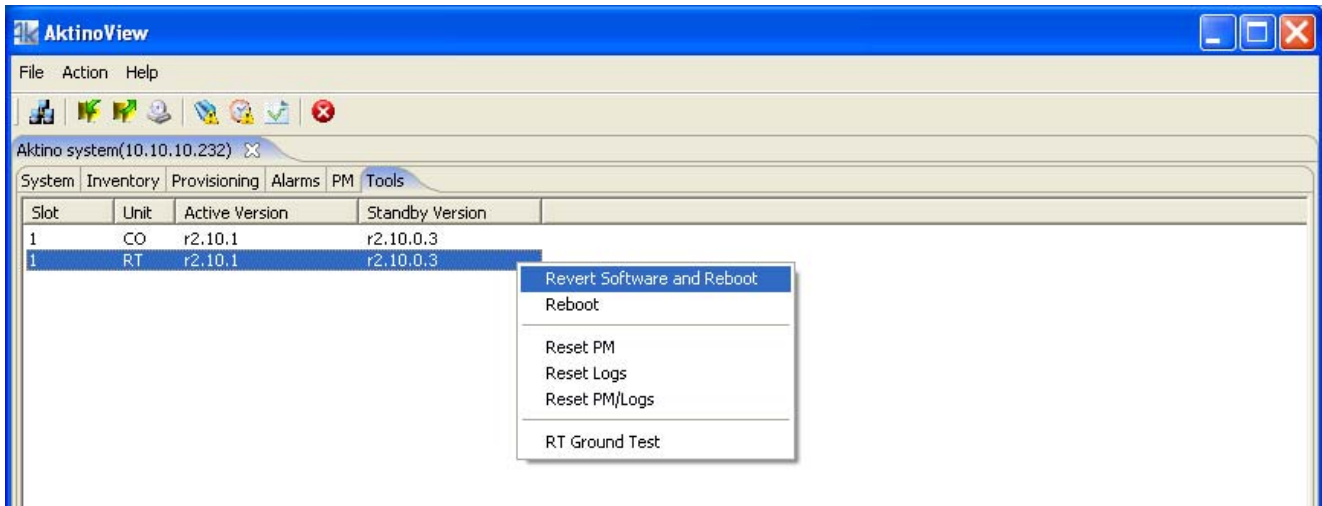
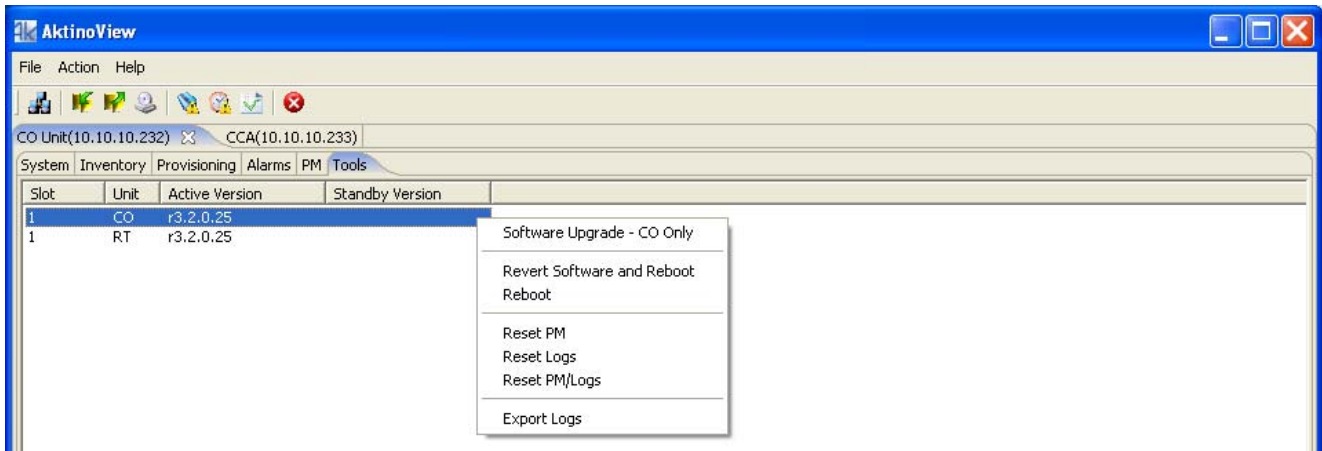
Severity	Unit	Entity	Slot	Port	Code	Service Affecting	Date/Time

Tools & Menu Bar

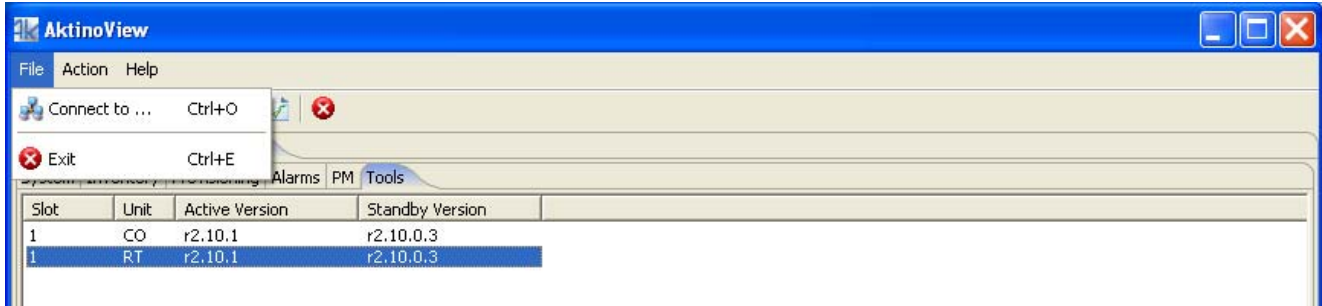
The top of the AktinoView window contains a menu bar with drop down menus. In addition, the same functionality is available on the Tools tab.

Right clicking on a slot number under the Tools tab brings up the indicated menu.

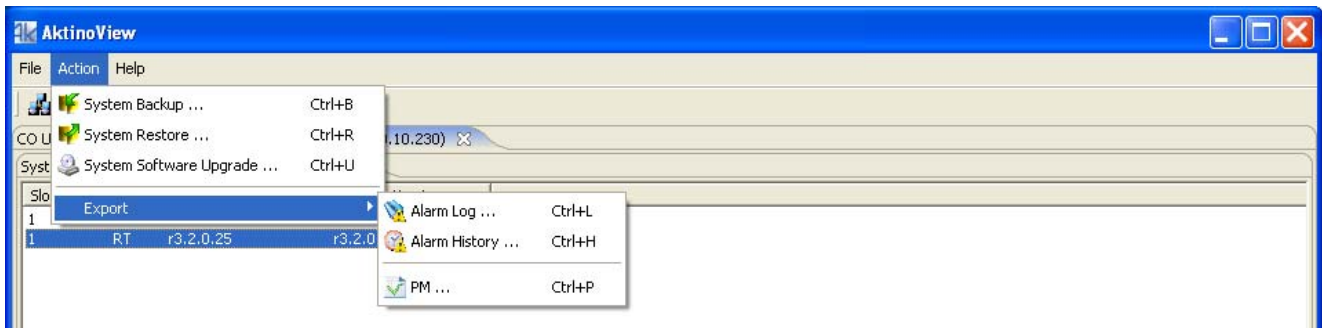
- Software Upgrade- CO Only upgrades the CO unit only
- Software Upgrade- RT only upgrades the RT unit only. This is available only when connected to the RT directly.
- Revert Software and Reboot takes the Standby Version shown and makes it the Active Version, then reboots
- Reboot will reboot the selected unit
- Reset PM, Logs, or PM/Logs will zero the Performance Monitoring on the card
- Export logs creates a file with the units system logs (CO only)
- RT Ground Test runs a test to determine if the Remote Unit is chassis grounded (RT only)



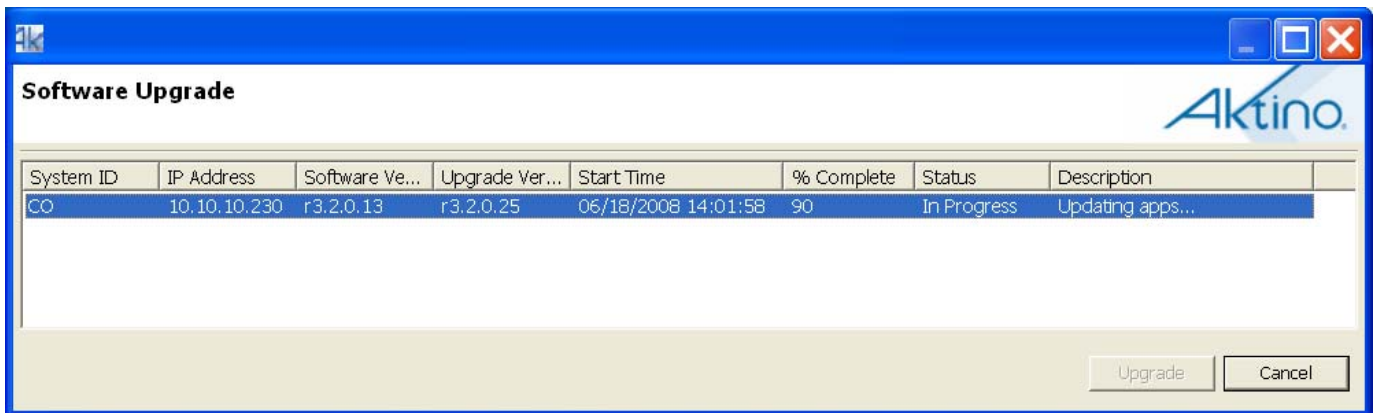
File, then Connect to ... allows connection to other Aktino systems.



The Action Menu allows System Backup and Restore. This saves and restores the systems settings. Alarm log, alarm history, and Performance Monitoring (PM) can be exported using the Action pulldown as shown below. The output is in comma separated values Excel spreadsheet format.



This popup appears when System Software Upgrade is selected from the Action Menu (shown below).



Technical Specifications

System

- Bandwidth: 45 Mbps over 14 pairs at CSA reaches with Full Disturbers
- System Latency: 2 ms min
- Resiliency: Carrier grade automatic pair failure protection
- BER: 10^{-12}

Interfaces

Ethernet

- Number of ports: 4 per card
- Interface: 10/100BaseT, Auto-negotiating, Auto MDIX
- Connector: RJ45
- Compliance: IEEE802.3

Outside Plant Pairs

- Technology: MIMO on DMT
- Number of pairs: 1 to 14
- Connector: 50-pin Telco
- Sealing current: Meets G991.2
- Compliance: T1.417 (Spectral), IEEE 802.3ah EFM

Management interfaces

- Craft EIA-232 DB9
- Modem EIA-232 DB9
- 10/100BaseT RJ45

Layer 2 Features

- VLAN Tagging: IEEE802.1q support
- Stacked VLAN Tagging
- Priorities: IEEE802.1p, Port, or DiffServ
- Dynamic Bridging: 2K MAC addresses

Electrical Specifications

- CO Unit
 - Power input: -42 to -56.7 Vdc
 - Max heat dissipation: 55-65 watts
- RT Unit
 - Line powered by CO unit or
 - Local power input: -42 to -56.7 Vdc
 - Max heat dissipation: 55 watts

Regulatory Approval

- NEBS Level 3
- UL60950
- FCC Part 15 Class A

Environmental

- Operating temperature: -40 to +65 deg C
- Storage temperature: -40 to +70 deg C
- Relative humidity: Up to 95%, non-condensing

Mechanical

- Chassis Dimensions: 1.75" high (1RU) x 17.1" wide x 12.0" deep
- Weight: Approximately 11 pounds

Alarm contacts

- Critical, Major, Minor, SysID
- Visual, Audio, Alarm CutOff Pushbutton
- AUX Input Alarms (2 inputs)

Front Panel Indicators

- Alarm, Status, LOS, Loopback
- MSPAN Outside Plant Pair Status (up to 14)

Network Management

- CLI, SNMP, TL1 (LFACS/TIRKS/NMA OSMINE)
- AktinoView GUI
- VLAN Management
- Aktino EMS

Warranty and Customer Service

Aktino will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found in your Aktino customer web portal

www.aktino.com/Support/Customer_Login.aspx.

Aktino Sales Pricing/Availability:

949-258-0545

Aktino Technical Support

Pre-Sales Applications/Post-Sales Technical

Assistance: 949-258-0545

7 days/week, 24 hours/day

Aktino Repair

Return for Repair/Upgrade:

949-258-0545

Repair and Return Address

Contact Customer Service prior to returning equipment to Aktino.

Aktino, Inc.

18851 Von Karman Ave., Suite 201

Irvine, CA 92612

Equipment name	Description	CLEI Code
Kits		
AK4000C	CO Ethernet Kit consisting of AK400C (50Mbps at CSA, line powering) and AK100S shelf	Kit
AK4001C	CO Ethernet Kit consisting of AK401C (50Mbps at CSA) and AK100S shelf	Kit
AK4000R	RT Ethernet Kit consisting of AK400R (50Mbps at CSA) and AK100S shelf	Kit
AK4010C	CO Ethernet Kit consisting of AK410C (25Mbps at CSA, 45Mbps max, line powering) and AK100S shelf	Kit
AK4011C	CO Ethernet Kit consisting of AK411C (25Mbps at CSA, 45Mbps max) and AK100S shelf	Kit
AK4010R	RT Ethernet Kit consisting of AK410R (25Mbps at CSA, 45Mbps max) and AK100S shelf	Kit
AK4020C	CO Ethernet Kit consisting of AK420C (10Mbps at CSA, 20Mbps max, line powering) and AK100S shelf	Kit
AK4021C	CO Ethernet Kit consisting of AK421C (10Mbps at CSA, 20Mbps max) and AK100S shelf	Kit
AK4020R	RT Ethernet Kit consisting of AK420R (10Mbps at CSA, 20Mbps max) and AK100S shelf	Kit
Line cards		
AK400C	CO Ethernet line card, 50Mbps at CSA, line powering	VAUIAG8J
AK401C	CO Ethernet line card, 50Mbps at CSA	VAUIAG9J
AK400R	RT Ethernet line card, 50Mbps at CSA	VAUIAHAJ
AK410C	CO Ethernet line card, 25Mbps at CSA, 45Mbps max, line powering	VAUIACWJ
AK411C	CO Ethernet line card, 25Mbps at CSA, 45Mbps max	VAUIACXJ
AK410R	RT Ethernet line card, 25Mbps at CSA, 45Mbps max	VAUIACYJ
AK420C	CO Ethernet line card, 10Mbps at CSA, 20Mbps max, line powering	VAUIAFZJ
AK421C	CO Ethernet line card, 10Mbps at CSA, 20Mbps max	VAUIAF0J
AK420R	RT Ethernet line card, 10Mbps at CSA, 20Mbps max	VAUIAF1J
Common Products		
AK100S	One slot 1RU high chassis with AK100F fan module	VAMB410F
AK100F	Fan module for AK100S chassis	VAEQAACB
AK100FL6	Filter 6 pack for AK100S chassis	NA
AK100B	Hinge Bracket for AK100S chassis	NA
AKRTPS	RT Power Supply (formerly AK100PSC)	NA
AK100TR	Tracer board	NA