



# **AK5000 System**

## **Installation and User's Guide**

## **Publication Information**

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### **AK5000 System Installation and User's Guide**

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# Chapter 1

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## AK5000 System

## 1.1 Introduction

The Metro Ethernet compliant AK5000 point-to-multipoint system enables the transport of high-quality, high-bandwidth Carrier Ethernet services over bonded copper pairs. The AK5000 system consists of the AK500S Multi-Slot shelf, AK590CC Management/Ethernet Aggregator/Uplink card, FlexStream 100 CO Line Cards and Compact Remote Units (CRU and FlexStream 800 CO Line Cards and Compact Remote Units.

Environmentally hardened for any deployment scenario, this pay as you grow system accommodates any combination of up to 16 AK500 Series or AK600 Series CO Line Cards. When used with AK500 Series or AK600 Series Compact Remote Units, the AK5000 facilitates deployment in remote cabinet locations where space is a premium.

### **FlexStream 100**

The FlexStream 100 connection is comprised of an AK500 Series Line Card and an AK500 Series Remote Unit. The FlexStream 100 products bond together 2 to 8 copper pairs capable of delivering up to 60 Mbps of carrier grade services throughout the network (12kft/3.7Km) and beyond. They provide either Symmetric or Asymmetric bandwidth and they support line powering over the same copper pairs that carry data. Along with meeting copper loop standards such as ANSI T1.417, which enables the AK500 Series products to co-exist with other services in a binder, they are compliant with IEEE 802.1/802.3 LAN standards and Metro Ethernet Forum MEF9/MEF14.

The FlexStream 100 products are designed to dynamically compensate for individual copper pair failures. If a copper pair fails, the products will automatically and optimally redistribute the data payload over the remaining pairs. This feature allows any pair to protect all the pairs in a bonded group. The result is reliability that in many cases meets and exceeds fiber Service Level Agreements (SLAs).

### **FlexStream 800**

The FlexStream 800 connection is comprised of an AK626 Line Card and AK600 Series Remote Unit. The FlexStream 800 products support ADSL2+ and VDSL2 G.vector and IEEE 802.3ah EFM bonding as well as either Symmetric or Asymmetric.

The FlexStream 800 connection bonds together 2 to 8 copper pairs creating a high bandwidth link capable of delivering 800 Mbps of carrier-grade services throughout the network (12kft/3.7Km) and beyond. If a copper pair fails, the products will automatically and optimally redistribute the data payload over the remaining pairs.

Each AK626 Point to Multipoint Line Card can support up to 4 bonding groups. Each bonding group can support up to 8 copper pairs delivering up to 1Gbps of aggregate bandwidth. The AK626 Line Card can be configured for all VDSL2 profiles up to 17a.

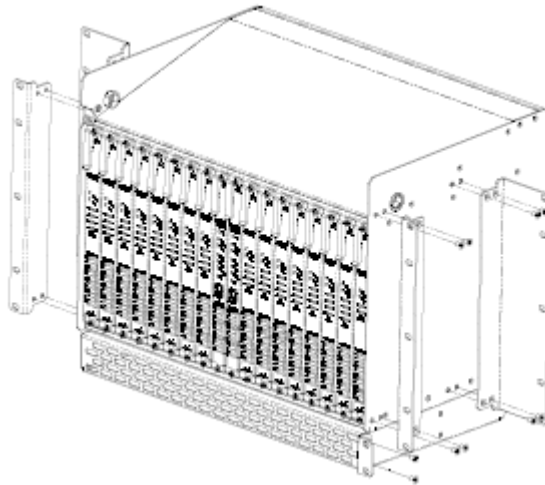
**Note:** Read Chapter 5 Safety and Warnings before proceeding.

## 1.2 Chassis Installation

### Mounting the AK500S Shelf

The AK500S Multi-Slot shelf includes screws and flanges for both 19 inch and 23 inch mountings. Mounting holes are provided for a flush or mid-mount. Note that the mid-mount flanges can be mounted forward or backward for either a 5 or 6 inch recess. Figure 1 shows examples of 19 inch flanges attached to the flush position and 23 inch flanges attached to the mid-mount position. It is not necessary for the flange to be bonded with the frame; the AK500S Ground Lug on the back of the AK500S shelf provides proper grounding. An AK500BAF Baffle must be installed under the AK500S shelf, if mounted on the ground or on top of another piece of equipment (as shown in Figure 1). If an AK500S shelf is mounted directly above another AK500S, it is not necessary to install and AK500BAF since the top of the AK500S acts as a baffle.

Install the included filter (see Figure 9)



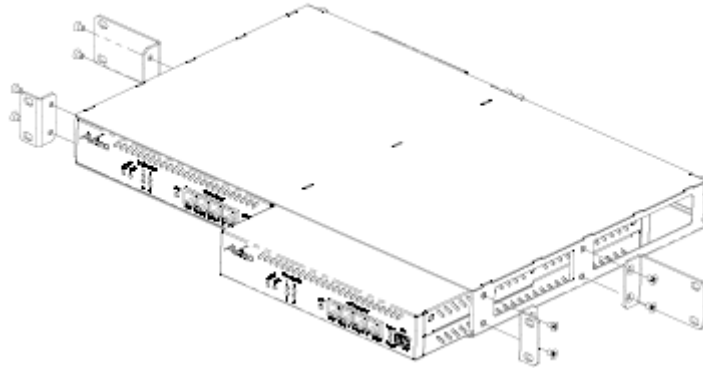
**Figure 1 AK500S Mounting showing AK500BAF Baffle Mounting the Compact Units**

### Mounting the Compact Remote Units

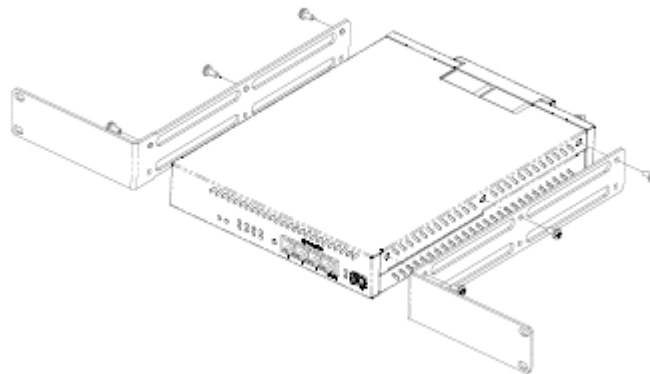
The AK500 CRUs can be mounted with the AKCURB Rack Bracket (see Figure 2), with AKCUF19 or AKCUF23 Rack Flange mounts (see Figure 3), or with the AKCUWB wall mounting bracket (see Figure 4).



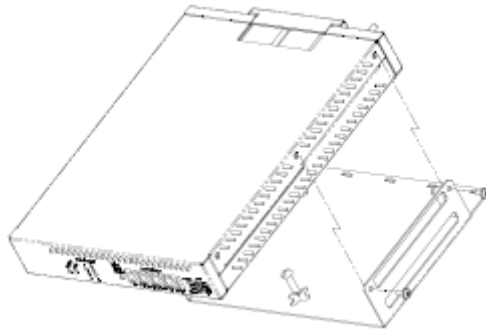
**Note:** The fan filter for both the AK500S and Compact Remote Units should be replaced every six months. Care should be taken when replacing filters to ensure collected dust on the filters does not enter into the equipment. Ordering information can be found at the end of this document.



**Figure 2 Compact Unit Bracket Mounting**



**Figure 3 Compact Unit Rack Flange Mounting**



**Figure 4 Compact Unit Wall Mounting**

### 1.2.1 Chassis Connections

### 1.2.2 AK500S Frame Ground Connections

The Ground Lug located on bottom of the back panel can accommodate up to 6 AWG wire. Use a wire gauge for grounding at least as heavy as the power wiring (within 25 feet 8 AWG is recommended, 6 AWG for longer lengths). Attach the grounding wire to the AK500S Ground Lug to a nearby grounding screw on the equipment rack or facility ground (see Figure 8).

**Note that the ground connection is required for proper system operation.**

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

### 1.2.3 AK500S Power Connections

A 40A UL listed fuse/circuit breaker must be installed ahead of this unit if the CO Line Cards are providing Line Power. If the CO Line Cards are not providing Line Power only a 20A UL listed fuse is required. Two redundant power buses are provided. The power A and B inputs are identical and can be used for redundant power configurations. Remove the nuts and split lock washers from each pair of 1/4" power studs. Crimp a two-hole compression lug onto the end of the -48V and RTN power wires, install the compression lugs onto the appropriate studs, and reinstall the split lock washers and nuts at each -48V and RTN location. The compression lug must have mounting holes centers spaced at 0.625" (5/8") with holes to accommodate a 1/4" stud. Within 25 feet, 10 AWG is recommended, 8 AWG for longer lengths (see Figure 8).

### 1.2.4 AK500S Multi-Pair Span Connection

The Multi-Pair Span (MSPAN) connectors are used to connect the CO Line Cards to the outside plant pairs (see Figure 8).

Table 1 specifies the standard female 50 pin AMP connector pin assignments. Each connector supports two CO Line Card slots. The CO MSPAN cable should have a pigtail wire from the cable shield which has a ring lug for a #4 screw to attach to the threaded ground point next to each of the MSPAN connectors. The MSPAN cable is female. Tie wrap points are available in several places on the back panel.

**Table 1 MSPAN Connector Pin Assignments**

Odd Numbered Line Card Slot	T I P	R I N G	Even Numbered Line Card Slot	T I P	R I N G
Pair 1	26	1	Pair 1	38	13
Pair 2	27	2	Pair 2	39	14
Pair 3	28	3	Pair 3	40	15
Pair 4	29	4	Pair 4	41	16
Pair 5	30	5	Pair 5	42	17
Pair 6	31	6	Pair 6	43	18
Pair 7	32	7	Pair 7	44	19
Pair 8	33	8	Pair 8	45	20
Pair 9	34	9	Pair 9	46	21
Pair 10	35	10	Pair 10	47	22
Pair 11	36	11	Pair 11	48	23
Pair 12	37	12	Pair 12	49	24

## 1.2.5 AK500S Alarm Connections

The alarm wire-wrap connections are located under the protective cover on the back panel. Loosen the captive screw of the protective cover, slide it up and lift off. Labels of the wire-wrap connections are silk screened on the protective cover. Each alarm consists of a series of three wire wrap pins (see Figure 5).



Figure 5 Alarm Wire-wrap Pins

## 1.2.6 AK500S Card Installation

### 1.2.6.1 AK590CC Common Control Card

Install the AK590CC Common Control card into slot marked CC A. Attach Ethernet data uplink cables to 10/100/1000BaseT RJ45 plugs marked 1 or 2, or insert an SFP module in the front panel slot of the AK590CC Common Control card. Generally, any 100Base FX or 1000BaseX SFP module is compatible; contact Positron Customer Service with any question regarding SFP compatibility (see Figure 6).

**WARNING:** The intra-building ports of the equipment or subassembly are suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building ports of the equipment or subassembly **MUST NOT** be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.

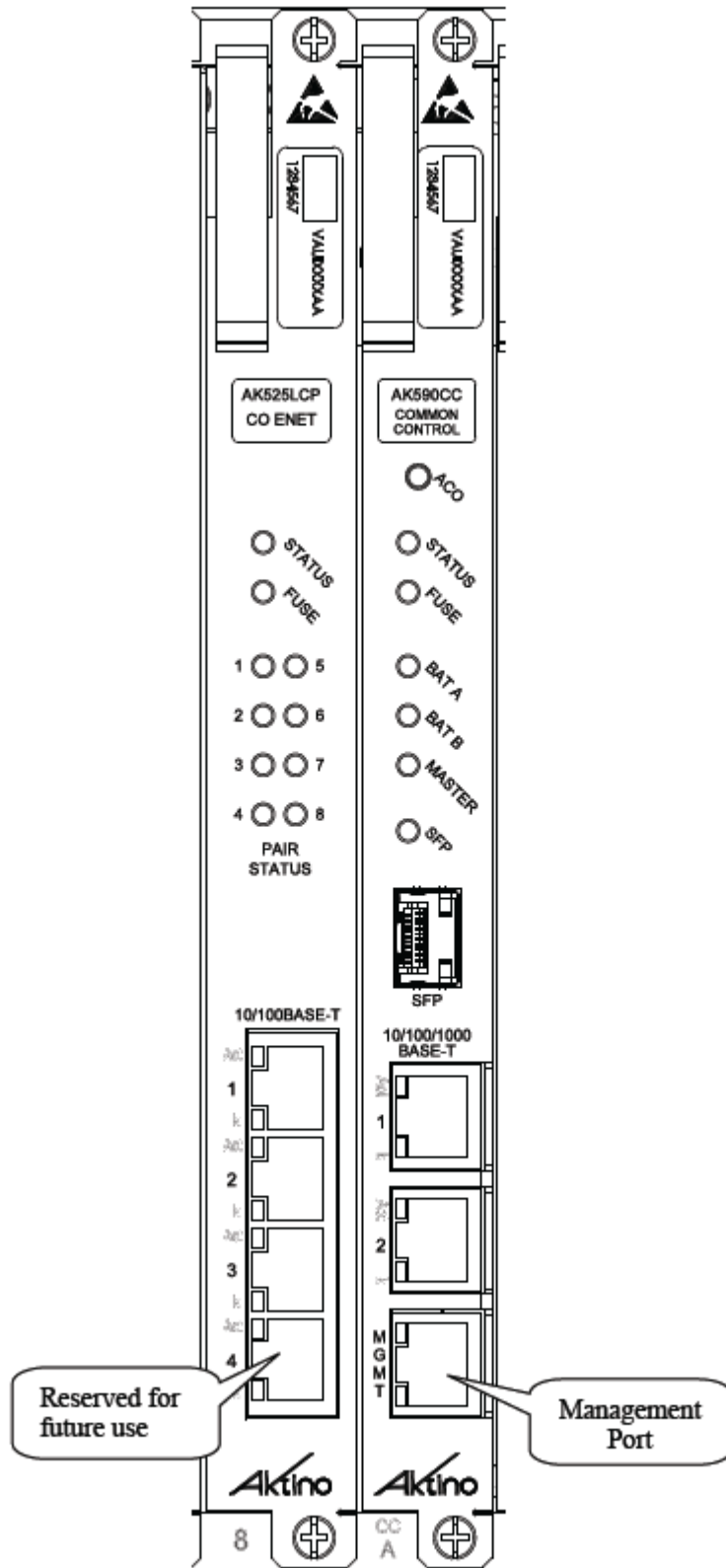


Figure 6 AK525 CO Line Card and AK590CC Common Control Card

**Table 2 AK590CC LED Indicators**

LED	Condition	Function
STATUS	Off Green Amber Red	Power Off Normal Minor Alarm Major or Critical Alarm
FUSE	Off Red	Normal Common Control Card Blown Fuse
BAT A BAT B	Off Green	DC Power is not present DC Power is present
MASTER	Green	Common Control Card is the Master Controller
SFP	Off Green	SFP Link Down SFP Link Up
10/100/1000BASE-T Act	Off Green	No Data Data
10/100/1000BASE-T LK	Off Green	Ethernet Link is Down Ethernet Link is Up

**ACO Pushbutton**

Pushbutton	Function
ACO	<p>Push Alarm Cut Off pushbutton for at least 1/2 second, deactivates audio (not visual) relay for all active alarms. The ALARM LED on the Positron card indicates ACO has been activated by the connection on the back of the unit.</p> <p>To temporarily override the Common Control Card IP Address, push and hold the ACO button until the Status LED turns off. The management IP address of the Common Control Card will revert to 192.168.10.1 for a period of 5 minutes.</p>

**1.2.6.2 AK500 Series Line Card**

Install Line the CO Cards into any numbered slot. Attach Ethernet data cables to 10/100BaseT RJ45 plugs marked 1, 2, or 3.

**Table 3 AK525 CO Line Card LED Indicators**

LED	Condition	Function
STATUS	Off Green Amber Red	Power Off Normal Minor Alarm Major or Critical Alarm
FUSE	Off Red	Normal Line Card Blown Fuse
PAIR STATUS	Off Green Blinking Green Red	Pair Disabled Pair is Up Pair is acquiring Pair Loss of Signal / Open Circuit / Short Circuit / Ground Fault
10/100BASE-T Act	Off Green	No Data Data
10/100BASE-T LK	Off Green	Ethernet Link is Down Ethernet Link is Up



### 1.2.6.3 AK600 Series Line Card

Install Line the CO Cards into any numbered slot.



Figure 7 AK626LC CO Line Card

**Table 4 AK626LC LED Indicators**

LED	Condition	Function
STATUS	Off Green Amber Red	Power Off Normal Minor Alarm Major or Critical Alarm
FUSE	Off Red	Normal Line Card Blown Fuse
PAIR STATUS	Off Green Blinking Green Red	Pair Disabled Pair is Up Pair is acquiring Pair Loss of Signal / Miswired /Open Circuit / Short Circuit /

**1.2.6.4 Blank Panels**

Blank Panels should be installed at any unpopulated slot. This will ensure that populated cards have adequate cooling air flow and will ensure that all air entering the chassis is filtered to remove dust and particles.

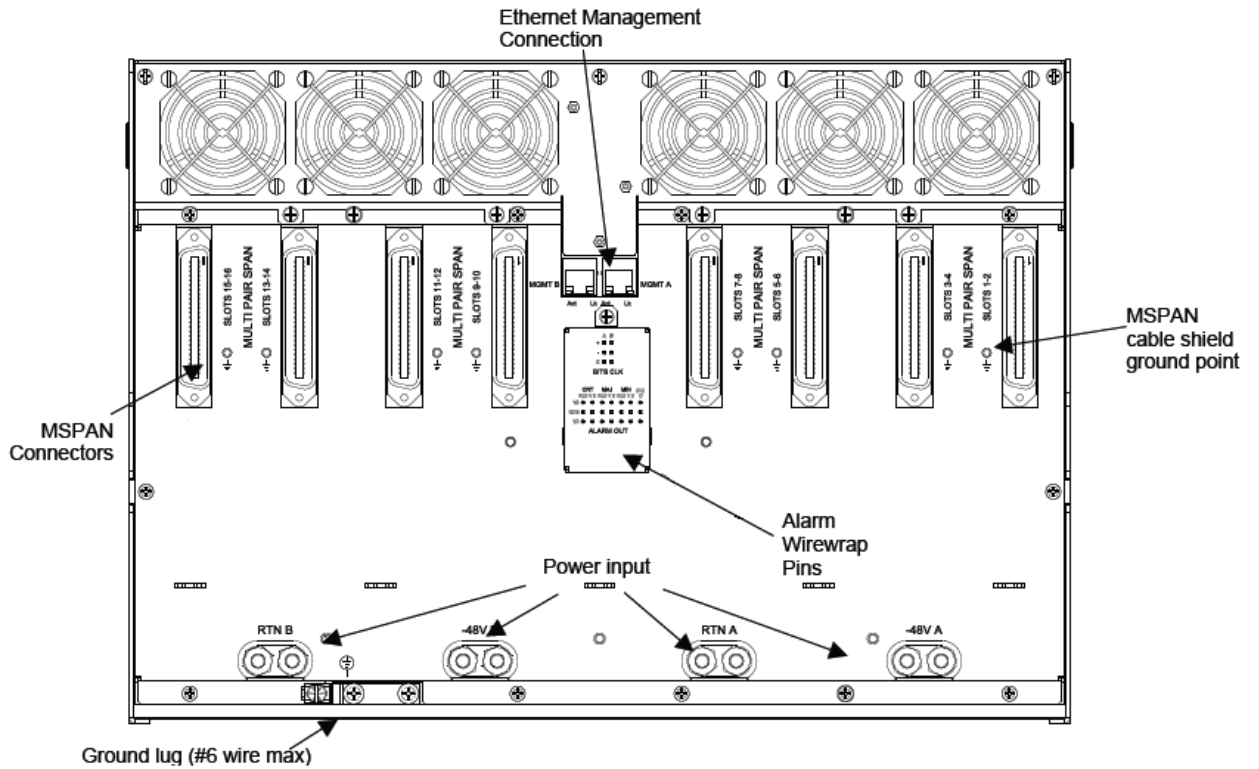


Figure 8 AK500S Shelf Rear View

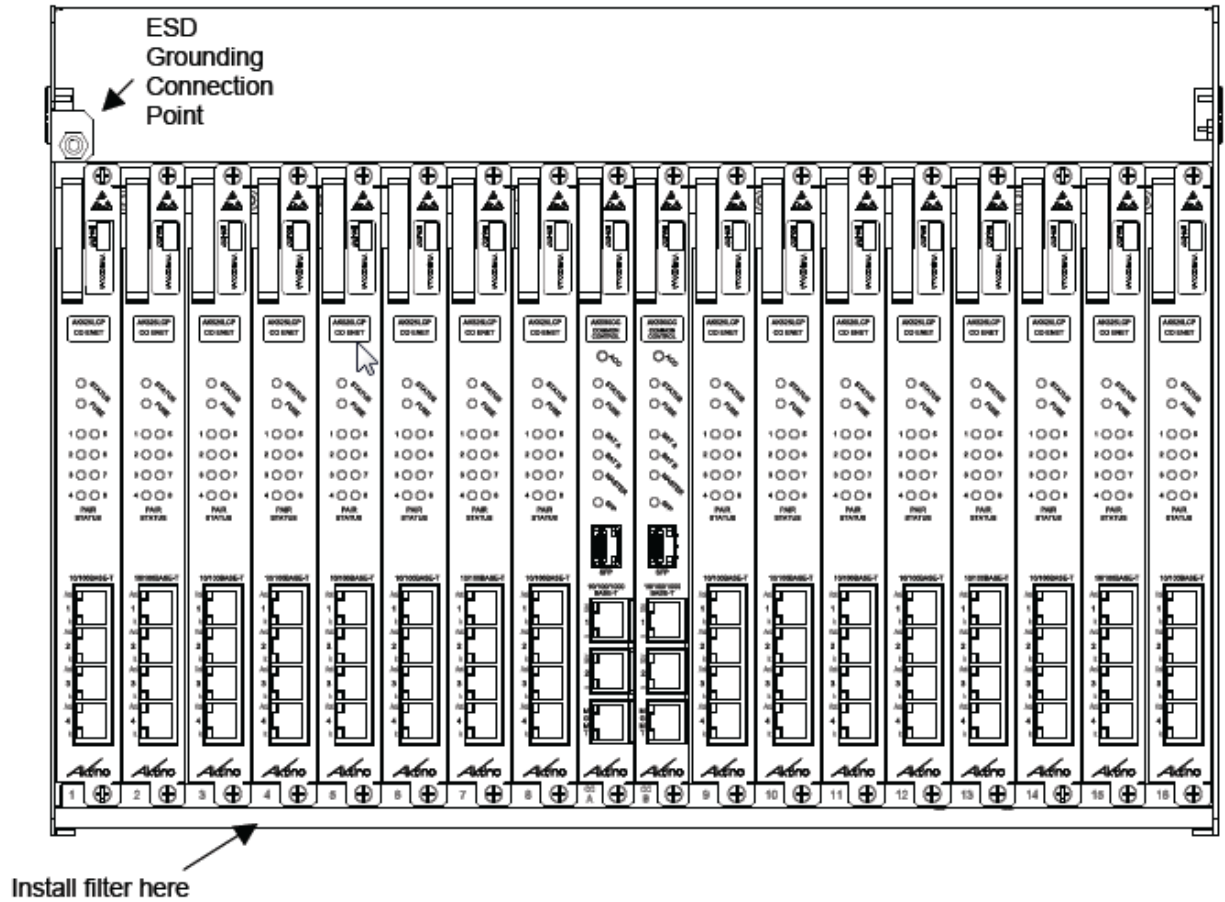


Figure 9 AK500S Shelf Front View (fully populated)

## 1.2.7 AK500 Series Compact Remote Unit Connections

### Compact Remote Unit Power Connection

The AK500 CRU can either be line powered from the AK500 CO Line Card, or locally powered with the optional AKRUPA AC adapter. For maximum reliability, both line power and local power can be used simultaneously. If locally powering, plug the AKRUPA AC adapter into the power jack on the back of the CRU (see Figure 11).

### Compact Remote Unit 12Vdc OUT

The CRU can supply 12 Vdc output to power external devices. Do not attach external voltages to these outputs (see Figure 11).

### Ethernet Data Connections

Attach Ethernet data cables to any of the three 10/100BaseT ports labeled 1 through 3 on the front panel or insert an SFP module in the front panel slot (see Figure 12).

**WARNING:** The intra-building ports of the equipment or subassembly are suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building ports of the equipment or subassembly **MUST NOT** be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.

### Multi-Pair Span (MSPAN) Connection

The MSPAN pluggable connector is used to connect the AK500 CRU to the outside plant pairs. The AK512 uses one four pair connector, the AK525 uses two four pair connectors. Insert the tip and rings into the connector as shown in Figure 10. Tighten screws on top of the connector. Insert the connector into the Multi-Pair Span plug on the back of the Compact Unit (see Figure 11).

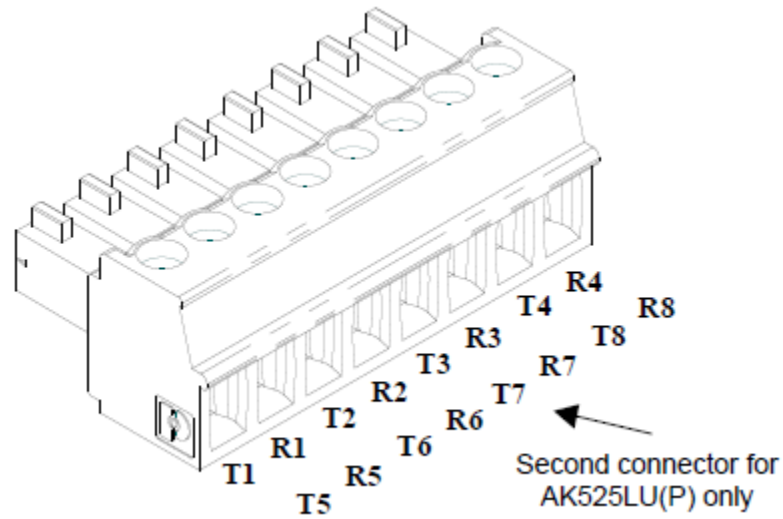


Figure 10 Compact Remote Unit MSPAN/XSPAN Connector

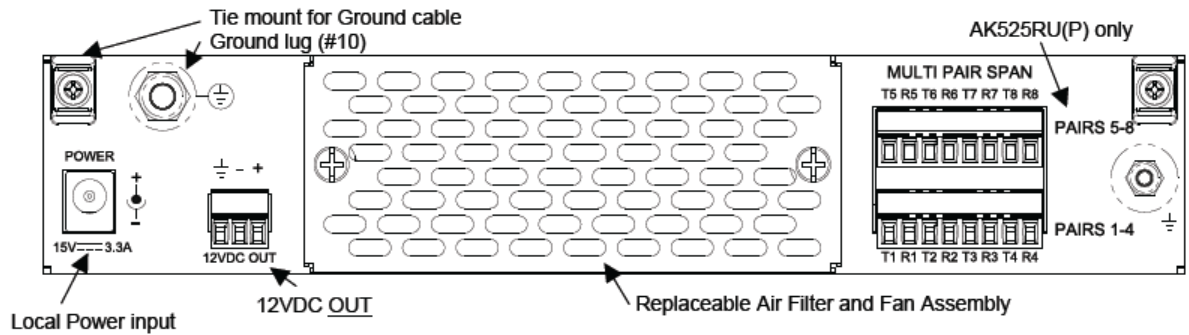


Figure 11 AK525RU Compact Remote Unit Rear View

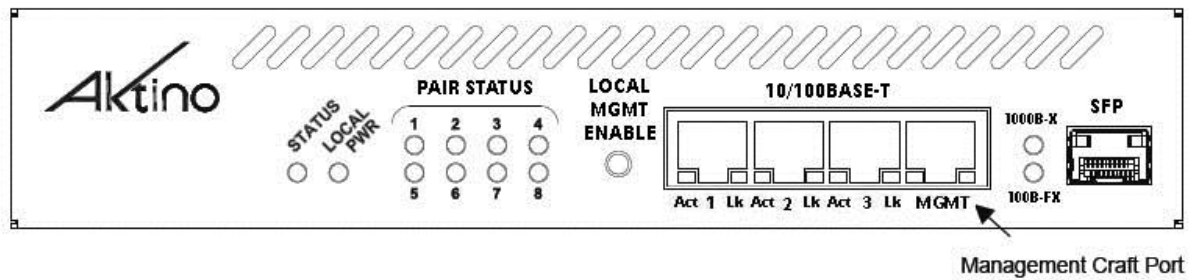


Figure 12 AK525RU Compact Remote Unit Front View

### AK500 Series CRU Front Panel Indicators

LED	Condition	Function
Status	Solid Green Solid Yellow Solid Red	Normal Minor Alarm Active Critical or Major Alarm Active
Local Power	Off Solid Green	No Local Power Unit Fuse has Blown
PAIR STATUS	Off Solid Green Flashing Green Solid Red	Pair Is Disabled Pair is Up Pair is Acquiring Pair LOS/Open Circuit/Short
1000B X	Green Off	1000B X Link Active 1000B X Link Not Active
100B X	Green Off	100B X Link Active 100B X Link Not Active

### AK500 Front Panel Features

Pushbutton	Function
LOCAL MGMT ENABLE	To temporarily override the CRU IP Address, push and hold the LOCAL MGMT ENABLE button until the Status LED turns off. The IP address of the CRU will revert to 192.168.10.2 for a period of 5 minutes.

## 1.2.8 AK600 Series Compact Remote Unit Connections

### Compact Remote Unit Power Connection

The AK622R and AK624R Compact Remote Units require local -48Vdc power. For a stand-alone power supply, see Chapter 7 for more information.

### Ethernet Data Connections

Attach Ethernet data cables to any of the three 10/100/1000BaseT ports labeled 1 or 2 on the front panel or insert an SFP module in the front panel SFP slot.

**WARNING:** The intra-building ports of the equipment or subassembly are suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building ports of the equipment or subassembly **MUST NOT** be metalically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metalically to OSP wiring.

### Multi-Pair Span (XSPAN) Connection

The Multi-Pair Span pluggable connector is used to connect the AK600 CRU to the outside plant pairs. The AK622R uses one four pair connector, the AK624R uses two four pair connectors. Insert the tip and rings into the connector as shown in Figure 10. Tighten screws on top of the connector. Insert the connector into the Multi-Pair Span plug on the back of the Compact Remote Unit (see Figure 11).



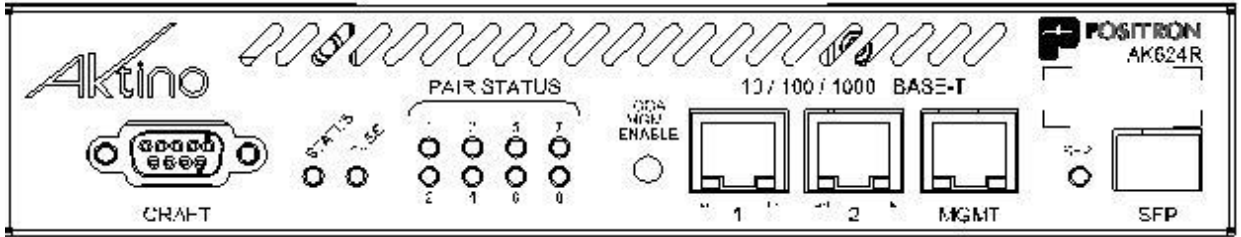


Figure 13 AK624R Compact Remote Unit Front View

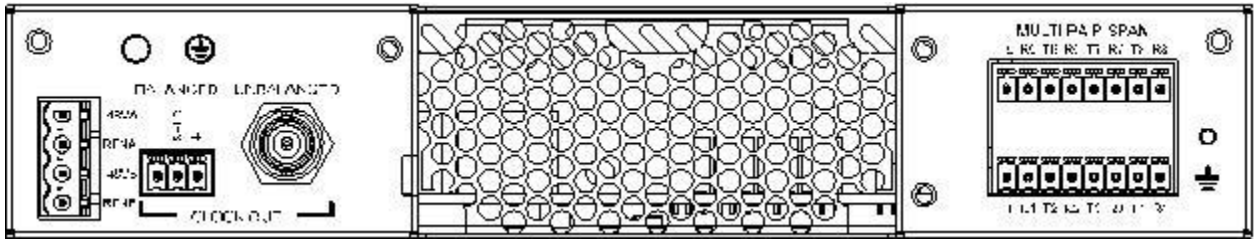


Figure 14 AK624R Compact Remote Unit Rear View

### AK600 Series CRU Front Panel Indicators

LED	Condition	Function
Status	Solid Green Solid Yellow Solid Red	Normal Minor Alarm Active Critical or Major Alarm Active
Local Power	Off Solid Green	No Local Power Unit Fuse has Blown
PAIR STATUS	Off Solid Green Flashing Green Solid Red	Pair Is Disabled Pair is Up Pair is Acquiring Pair LOS/Open Circuit/Short
10/100/1000BASE-T Act	Off Green	No Data Data
10/100/1000BASE-T LK	Off Green	Ethernet Link is Down Ethernet Link is Up
SFP	Off Green	SFP Link is Down SFP Link is Up

### AK600 Series CRU Front Panel features

Item	Function
CRAFT PORT	Serial DB-9 connector for Command Line Interface access.
LOCAL MGMT ENABLE	Push-Button to temporarily override the CRU IP Address, push and hold the LOCAL MGMT ENABLE button until the Status LED turns off. The IP address of the CRU will revert to 192.168.10.2 for a period of 5 minutes.

### AK600 Family CRU Rear Panel features

Item	Function
POWER CONNECTOR	A four position Phoenix connector provides power to the unit for local powering. The mating connector is capable of supporting 12 to 18 gauge wires.
CLOCK OUT	Balanced and Unbalanced connectors for clock out.
MULTIPAIR SPAN	One 4-Pair XSPAN connector for the AK622R Compact Remote Units Two 4-Pair XSPAN connectors for the AK624R Compact Remote Units
EARTH GROUND LUG	Must be directly connected to earth ground to ensure proper operation of the Line Protection circuitry
VDSL2 SHIELD LUG	Provides a return current path for the VDSL2 shield.

**WARNING:** The intra-building Clock Out ports of the equipment or subassembly (both balanced and unbalanced) must use shielded intra-building cabling/wiring that is grounded at both ends.

**WARNING:** The intra-building ports of the equipment or subassembly are suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building ports of the equipment or subassembly **MUST NOT** be metallicity connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallicity to OSP wiring.

# Chapter 2

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## AktinoView Management Software

## 2.1 Introduction

AktinoView is a Microsoft Windows software package use to manage one or more Aktino AK5000 systems.

## 2.2 Installation

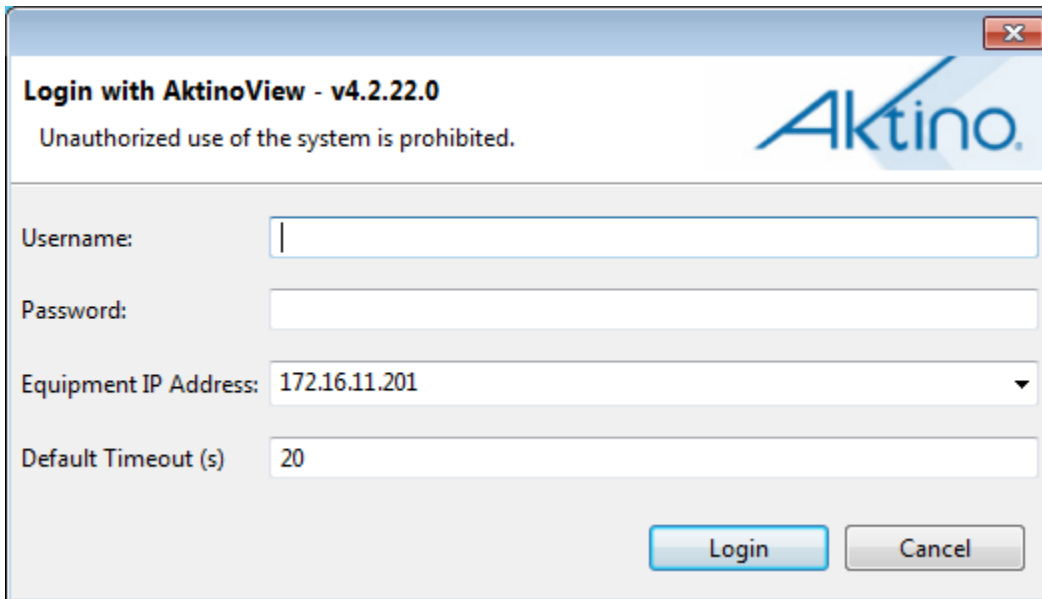
To install AktinoView proceed through the following:

- Insert the AktinoView CD into the CD ROM drive or download AktinoView from Positron's portal located at <http://www.positronaccess.com>.
- Open Windows Explorer and click on the CD drive
- Double click on install.exe in the AktinoView folder
- Follow the instructions on the screen

## 2.3 System Management

### 2.3.1 Logging in to an AK5000 System

From the Start Menu select **Aktino > AktinoView**, and you will see a dialog box similar to the following:



The screenshot shows a Windows-style dialog box titled "Login with AktinoView - v4.2.22.0". At the top right of the dialog is the Aktino logo. Below the title bar, a warning message reads "Unauthorized use of the system is prohibited." The main area of the dialog contains four input fields: "Username:" (an empty text box), "Password:" (an empty text box), "Equipment IP Address:" (a dropdown menu currently displaying "172.16.11.201"), and "Default Timeout (s):" (a text box displaying "20"). At the bottom right of the dialog are two buttons: "Login" and "Cancel".

Enter a Username and Password appropriate for the AK5000 System. The default Username is "superuser" and the default password is "superuser". Enter the system's IP address in the Equipment IP Address field, and Click **Login**. The default IP address for the CO is 192.168.10.1 and the default IP address for the CRU is 192.168.10.2.

### 2.3.2 AktinoView Main Window

Once you are logged into the system you will see three menu options:

#### File Menu

The File Menu provides two options:

**Connect to:** Allows you to connect to and manage several Aktino systems simultaneously.

**Exit:** Exits the AktinoView program.

#### Action Menu

The Action Menu provides four options:

**Refresh:** Refreshes the system.

**System Backup:** Opens a dialog box enabling you to save your System Configuration in an XML file to your PC so that you may retrieve and restore the configuration at a later date.

**System Restore:** Opens a dialog box to import and apply a previously saved System Configuration file. The process of restoring your system configuration will reboot your system.

**System Software Upgrade:** Opens a dialog box enabling you to upgrade the Aktino System software. (See Appendix A for System Software Upgrade procedures).

**Export:** Provides three options: **Alarm Log**, **Alarm History**, and **PM** (Performance Monitoring). These options allow you to export the desired information to a .CSV file.

#### Help Menu

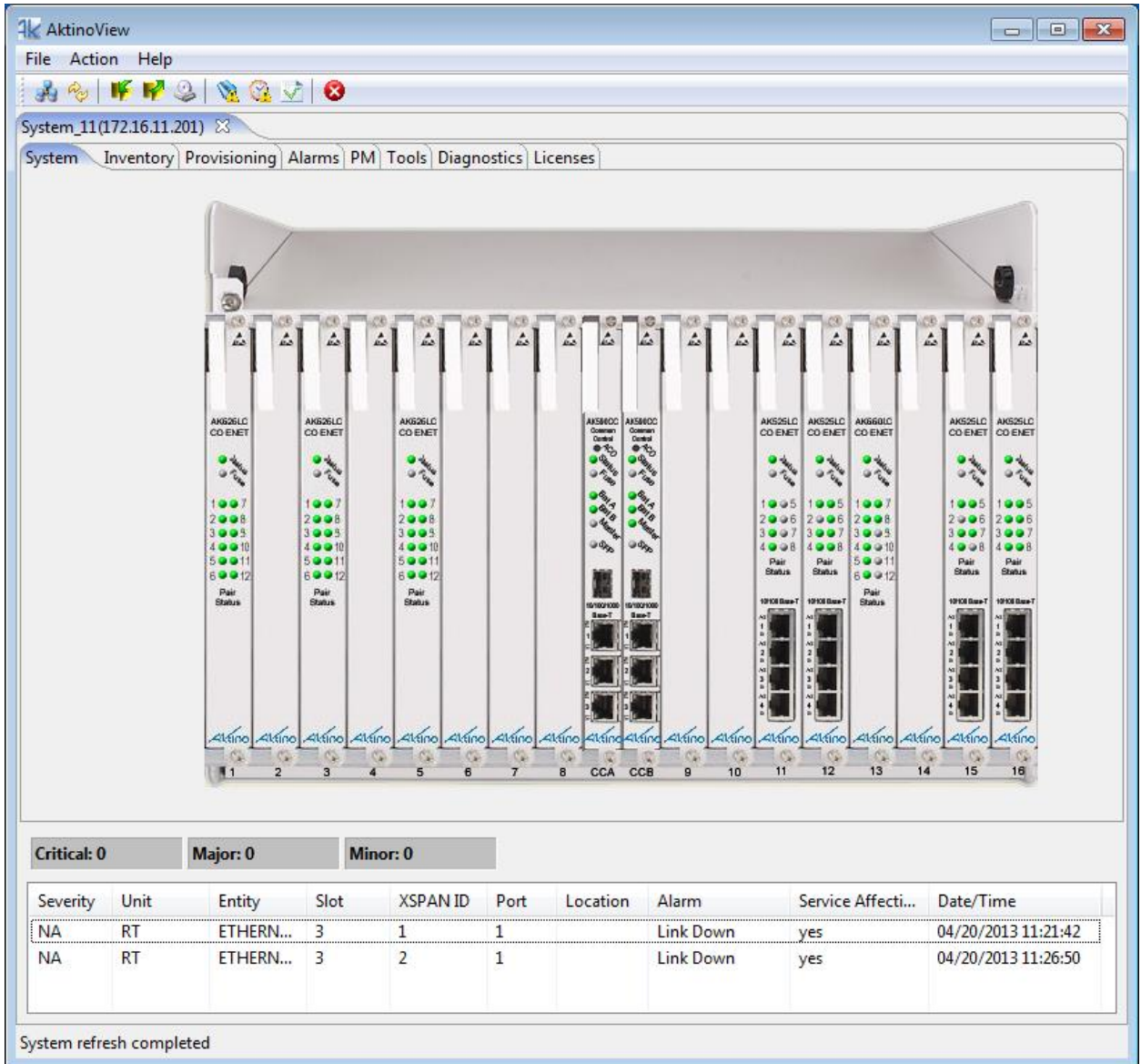
The Help Menu provides one option:.

**About:** Displays the AktinoView software version information.

AktinoView provides Quick-Launch buttons for all the menus.



Under the Menus and Quick-Launch buttons, AktinoView displays a tab for all the systems currently being managed. Each tab will display the System Name and IP address of the selected system.



When AktinoView connects to a given system, it will display several additional tabs appropriate for the selected system. In this case, AktinoView displays the following tabs for a AK5000 Chassis System: System, Inventory, Provisioning, Alarms, PM, Tools, Diagnostics, and Licenses.

AktinoView provides Slot specific menu options by right-clicking on the selected slot.

The screenshot shows the AktinoView software interface for a system named 'System\_11(172.16.11.201)'. The main display area shows a rack of 16 slots. Slots 1-4 contain AKS26LC CO ENET modules, slots 5-8 are empty, slots 9-10 contain AKS40CC modules, slots 11-12 contain AKS25LC CO ENET modules, and slots 13-16 contain AKS25LC CO ENET modules. A context menu is open over slot 3, listing the following options: Reboot, Reset PM, Export PM, Set In-Service, and Set Out-Of-Service.

Below the rack, the summary statistics are:

- Critical: 0
- Major: 0
- Minor: 0

The active alarms table is as follows:

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

System refresh completed



For Line Cards, the following options are available.

Menu Option	Function
Reboot	Reboots the selected Line Card
Reset PM	Resets the PM for the selected Line Card
Export PM	Opens a dialog box allowing you to export the Slot's PM information to a CSV file
Set In-Service	Sets the Slot In-Service
Set Out-Of-Service	Sets the Slot Out-Of-Service, alarms for the Slot will no longer be reported

For AK590CC Common Control Cards, the following options are available.

Menu Option	Function
Reboot	Reboots the Common Control Card
Reset PM	Resets the PM for the Common Control Card
System Reboot	Reboots all the CRUs, CO Line Cards, and Common Control Card
System Reset PM	Resets the PM for the entire system
System Reset Logs	Resets the Alarm Logs for the entire system
Set In-Service	Sets the Slot In-Service
Set Out-Of-Service	Sets the Slot Out-Of-Service, alarms for the Slot will no longer be reported
Switch Mastership	For a system with Redundant Common Control Cards, this switches Mastership to the Standby Common Control Card

AktinoView displays detailed connection information by double-clicking on a given slot.

The screenshot shows the AktinoView software interface. At the top, there is a menu bar (File, Action, Help) and a toolbar. Below that, the system name 'System\_11(172.16.11.201)' is displayed. The main area shows a network diagram with four Aktino devices. The top two devices are highlighted in green and labeled 'XSPAN 1' (Pair List: 1,2,3,4,5,6,7,8) and 'XSPAN 2' (Pair List: 9,10,11,12). The bottom two devices are labeled 'XSPAN 3' and 'XSPAN 4', both with empty pair lists. A table at the bottom of the interface displays connection details for the XSPAN devices.

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

System refresh completed

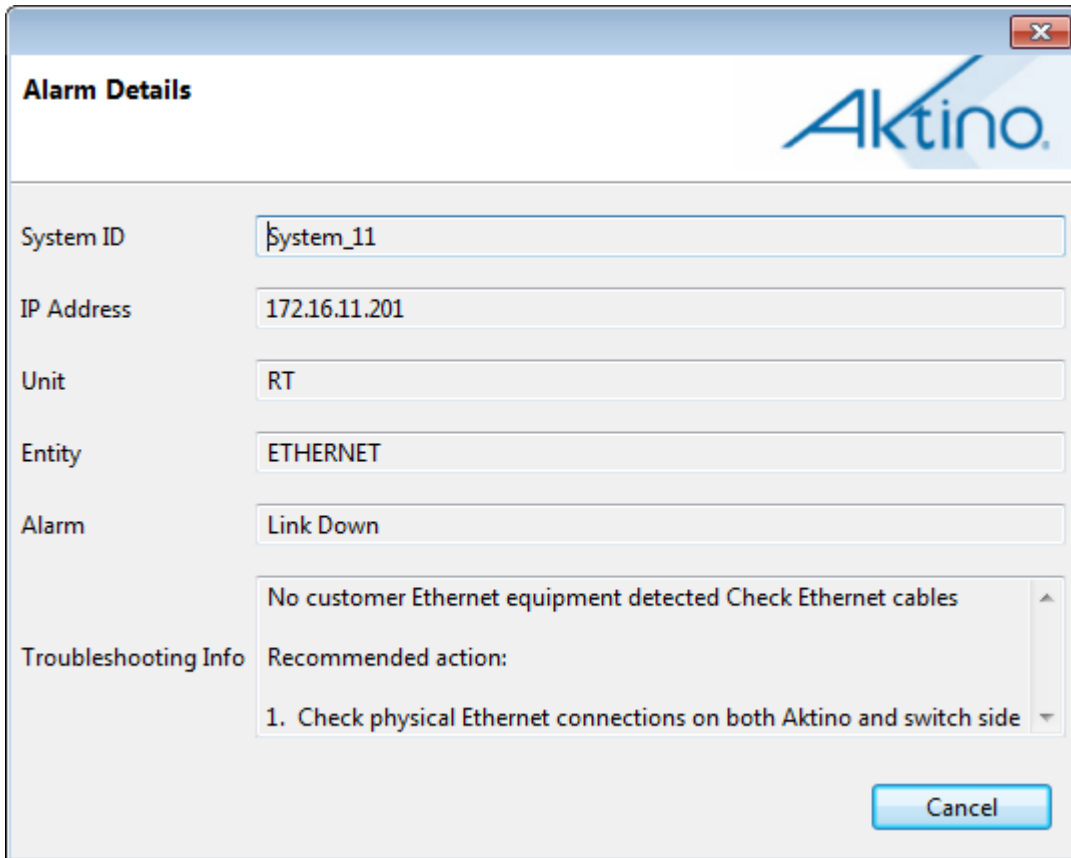
### Alarm Details

AktinoView displays detailed alarm information for each system at the bottom of the screen. It displays colored counters for the active Critical, Major, and Minor alarms, as well as detailed alarm information for each of the alarms present. The columns can be sorted and resized as desired.

**Note:** See Appendix B for more Alarm details.

Critical: 0		Major: 0		Minor: 0					
Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

Double clicking on the Alarm entry provides additional information about the alarm.



### 2.3.3 System

The System tab provides a front panel representation of the AK5000 Chassis system.

The screenshot shows the AktinoView software interface. The main window displays a front panel view of the AK5000 Chassis system with 16 slots. The modules are labeled as follows:

- Slots 1-6: AKG26LC CO ENET
- Slots 7-8: AKSMOC Control
- Slots 9-10: AKS25LC CO ENET
- Slot 11: AKG60LC CO ENET
- Slots 12-13: AKS25LC CO ENET
- Slots 14-15: AKS25LC CO ENET
- Slot 16: AKS25LC CO ENET

Each module has status indicators for 'Major Case', 'Minor Case', and 'Pair Status'. Below the front panel view, there is a summary of alarm counts:

**Critical: 0**    **Major: 0**    **Minor: 0**

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

System refresh completed

### 2.3.4 Inventory

The Inventory Tab provides a listing of all the CO Line Cards, AK590CC Common Control Cards, and Remote Units comprising the AK5000 System.

The screenshot shows the AktivoView application window with the 'Inventory' tab selected. The main table lists various hardware components. Below the table, there are summary statistics and an alarm log.

Slot	Unit	XSPA...	Description	Serial Num.	CLEI Code	MAC Address	Hardware Rev.	Software Rev.	Mastership	Options
1	CO		AK6261C: CO Ethernet Line card, 12-pairs Point-to-Multipoint VDSL2/A...	1064905		00:0e:d8:00:1:a:a2	E04	r4.2.6.7		
1	RT	1	AK624RU: RT Compact Ethernet Remote Unit, 8-Pairs VDSL2/ADSL2+	1053804		00:0e:d8:02:62:94	E00	r4.2.6.7		
1	RT	2	AK622RU: RT Compact Ethernet Remote Unit, 4-Pairs VDSL2/ADSL2+	1064029		00:0e:d8:00:18:ce	E02	r4.2.6.7		
3	CO		AK6261C: CO Ethernet Line card, 12-pairs Point-to-Multipoint VDSL2/A...	1053817		00:0e:d8:00:13:1a	E01	r4.2.6.7		
3	RT	1	AK624RU: RT Compact Ethernet Remote Unit, 8-Pairs VDSL2/ADSL2+	1012361		00:0e:d8:00:1c:9e	E04	r4.2.6.7		
3	RT	2	AK622RU: RT Compact Ethernet Remote Unit, 4-Pairs VDSL2/ADSL2+	1064026		00:0e:d8:00:18:ca	E02	r4.2.6.7		
5	CO		AK6261C: CO Ethernet Line card, 12-pairs Point-to-Multipoint VDSL2/A...	1064904		00:0e:d8:00:1:a:a4	E04	r4.2.6.7		
5	RT	3	AK624RU: RT Compact Ethernet Remote Unit, 8-Pairs VDSL2/ADSL2+	1053805		00:0e:d8:02:62:96	E00	r4.2.6.7		
5	RT	4	AK622RU: RT Compact Ethernet Remote Unit, 4-Pairs VDSL2/ADSL2+	1012652		00:0e:d8:00:1:d:b6	E05	r4.2.6.7		
11	CO		AK525LCP: CO Ethernet Line card, 25 Mbps at CSA, 45 Mbps max, line p...	1012844	CNUJAW9PAA	00:0e:d8:00:04:a8	E00	r4.2.6.7		Asymmetric, Line Powering
11	RT		AK512RU: RT Compact Ethernet Remote Unit, 12 Mbps at CSA, 20 Mbps...	1017957	COMUA10E...	00:0e:d8:02:19:32	E01	r4.2.6.7		
12	CO		AK525LCP: CO Ethernet Line card, 25 Mbps at CSA, 45 Mbps max, line p...	1012840	CNUJAW9PAA	00:0e:d8:00:04:a0	E00	r4.2.6.7		Asymmetric, Line Powering
12	RT		AK525RU: RT Compact Ethernet Remote Unit, 25 Mbps at CSA, 45 Mbps...	1041411	COMUB10ERC	00:0e:d8:02:54:c0	E09	r4.2.6.7		
13	CO		AK6601C: CO Ethernet Line card, 12-pairs Point-to-Multipoint ADSL2+	1012578		00:0e:d8:00:1:c:fe	E04	r4.2.6.7		
13	RT	4	AK624RU: RT Compact Ethernet Remote Unit, 8-Pairs VDSL2/ADSL2+	1012367		00:0e:d8:00:1:c:a8	E04	r4.2.6.7		
15	CO		AK525LCP: CO Ethernet Line card, 25 Mbps at CSA, 45 Mbps max, line p...	1017905	CNUJAX0PAA	00:0e:d8:02:18:e4	E04	r4.2.6.7		Asymmetric, 2.2 MHz, Line Powering
15	RT		AK525RU: RT Compact Ethernet Remote Unit, 25 Mbps at CSA, 45 Mbps...	1008249	COM9T10ERA	00:0e:d8:00:03:c	E01	r4.2.6.7		
16	CO		AK525LCP: CO Ethernet Line card, 25 Mbps at CSA, 45 Mbps max, line p...	1012842	CNUJAW9PAA	00:0e:d8:00:04:a4	E00	r4.2.6.7		Asymmetric, Line Powering
16	RT		AK525RU: RT Compact Ethernet Remote Unit, 25 Mbps at CSA, 45 Mbps...	1014924	COM9T10ERA	00:0e:d8:00:05:4c	E01	r4.2.6.7		
CC A	CO		AK590CCR: Common Control Card 18 Slot Chassis	1063343	COUCAD1K...	00:0e:d8:00:17:f4	R00	r4.2.6.7	Master	
CC B	CO		AK590CCR: Common Control Card 18 Slot Chassis	1063344	COUCAD1K...	00:0e:d8:00:17:ec	R00	r4.2.6.7	Standby	

Critical: 0	Major: 0	Minor: 0
-------------	----------	----------

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/23/2013 14:33:17
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/23/2013 14:33:09

System refresh completed

It also displays a Description for each of the devices, as well as their Serial Number, CLEI Code, Hardware and Software Revision Levels. It also displays any applied feature options.

See the following table for Parameters and Values:

Parameter	Values
Slot	Slot number
Unit	Location
XSPAN ID	Slot information and Indicates XSPAN group that the CRU is connected to.
Description	Detailed description
Serial	Serial Number
CLEI Code	Telcordia assigned CLEI code
MAC Address	MAC Address for the device
Hardware Rev.	Hardware Revision Level
Software Rev.	Software Revision Level
Mastership	Master or Standby
Options	Asymmetric: Support for Asymmetric Mode
	2.2 MHz: Support for 2.2 MHz Mode
	Line Powering: Support for Line Powering Mode

### 2.3.5 Provisioning

Clicking the Provisioning tab displays all the provisioning sub-sections supported by the AK5000 System.

#### 2.3.5.1 Equipment

Selecting the Equipment tab under Provisioning allows equipment provisioning of the system.

The screenshot displays the AktinoView interface for System\_11 (172.16.11.201). The 'Equipment' tab is active, showing a table of provisioning details. Below the table, there are summary statistics for alarm severity (Critical: 0, Major: 0, Minor: 0) and a detailed alarm log showing two 'Link Down' events for Ethernet entities on slots 3 and 2.

Slot	Unit	XSPAN ID	System ID	Contact	Location	Time	IP Address	Subnet Mask	Gateway Address	Redundancy
1	CO		CO	AK626						
1	RT	1	RT	AK624 CPE on Slot 1 BG1			172.16.11.101	255.255.0.0	172.16.254.254	
1	RT	2	RT	AK622 CPE on Slot 1 BG2			172.16.11.102	255.255.0.0	172.16.254.254	
3	CO		CO	AK626						
3	RT	1	RT	AK622 CPE on Slot 3 BG1			172.16.11.103	255.255.0.0	172.16.254.254	
3	RT	2	RT	AK622 CPE on Slot 3 BG2			172.16.11.104	255.255.0.0	172.16.254.254	
5	CO		CO	AK626						
5	RT	3	RT	AK624 CPE on Slot 5 BG3			172.16.11.105	255.255.0.0	172.16.254.254	
5	RT	4	RT	AK624 CPE on Slot 5 BG4			172.16.11.106	255.255.0.0	172.16.254.254	
11	CO		CO	AK525CP						
11	RT		RT	AK525RU			172.16.11.111	255.255.0.0	172.16.254.254	
12	CO		CO							
12	RT		RT				172.16.11.112	255.255.0.0	172.16.254.254	
13	CO		CO							
13	RT	4	RT				172.16.11.113	255.255.0.0	172.16.254.254	
15	CO		CO							
15	RT		RT				172.16.11.115	255.255.0.0	172.16.254.254	
16	CO		CO	AK525CP						
16	RT		RT	AK525RU			172.16.11.116	255.255.0.0	172.16.254.254	
CC A	CO		System_11	AK590CC		04/24/2013 05:35:07	172.16.11.201	255.255.0.0	172.16.254.254	Primary
CC B	CO									Secondary

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affect...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/23/2013 14:33:17
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/23/2013 14:33:09

System refresh completed

Clicking on a unit brings up the Equipment dialog box for the selected item:

AK525LC Equipment Properties


The screenshot shows a software dialog box titled "Equipment" with the Aktino logo in the top right corner. The dialog box contains the following fields and controls:

- Slot: Text input field containing "16".
- Unit: Text input field containing "CO".
- XSPAN ID: Text input field containing "0".
- System ID: Text input field containing "CO".
- Contact: Empty text input field.
- Location: Empty text input field.
- IP Address: Empty text input field.
- Subnet Mask: Empty text input field.
- Gateway Address: Empty text input field.
- Standby IP: Empty text input field.
- Redundancy: Dropdown menu.
- Regenerator Type: Dropdown menu with "None" selected.
- Other Span IP Address: Empty text input field.
- Span 2 Mgmt. IP Address: Empty text input field.
- Time: Date and time selection controls showing "04/19/2013" and "PC Time".

At the bottom of the dialog box are three buttons: "OK", "Apply", and "Cancel".



AK525RU Equipment Properties

**Equipment** 

Slot: 16

Unit: RT

XSPAN ID: 1

System ID: RT ASCII char

Contact:

Location:

IP Address: 172.16.12.116

Subnet Mask: 255.255.0.0

Gateway Address: 172.16.254.254

Standby IP:

Redundancy:

Regenerator Type: None


Other Span IP Address:

Span 2 Mgmt. IP Address:

Time: 04/19/2013 : : : PC Time

OK Apply Cancel

Master AK590CC Equipment Properties

**Equipment** 

Slot: CC A

Unit: CO

XSPAN ID: 0

System ID: System\_11

Contact: AK590CC

Location:

IP Address: 172.16.11.201

Subnet Mask: 255.255.0.0

Gateway Address: 172.16.254.254


Standby IP: 0.0.0.0

Redundancy: Primary

Time: 04/26/2013 07:05:47 PC Time

OK Apply Cancel

Standby AK590CC Equipment Properties

**Equipment** 

Slot: CC B

Unit: CO

XSPAN ID: 0

System ID:

Contact:

Location:

IP Address:

Subnet Mask:

Gateway Address:

Standby IP: 0.0.0.0

Redundancy: Secondary

Time: 04/26/2013 07:06:01 PC Time

OK Apply Cancel

See the following tables for Parameters and Values:

CO Line Card Equipment Parameters	Values
System ID	User configurable string of up to 20 characters
Contact	User configurable string of up to 64 characters
Location	User configurable string of up to 64 characters
RT Proxy IP	Proxy IP address of the CRU, used to access the CRU through the MSPAN link
Regenerator Type	For Regenerator Applications, Line Cards in an AK500S Shelf can only be Span 1
Other Span IP Address	For Regenerator Applications, indicate the Other Span IP Address (Do not use the same IP Address as the device's management port)
Span 2 Mgmt. IP Address	For Regenerator Applications, indicate the Span 2 management IP address (Do not use the same IP Address as the device's management port)

CRU Equipment Parameters	Values
System ID	User configurable string of up to 20 characters
Contact	User configurable string of up to 64 characters
Location	User configurable string of up to 64 characters
IP Address	IP Address of the unit
Subnet Mask	Subnet Mask of the unit
Gateway Address	IP Address of the Default Gateway
Allow CPE Management Access	Enable or Disable local management access for CRU

See the following tables for Parameters and Values:

CC Card Equipment Parameters	Values
System ID	User configurable string of up to 20 characters
Contact	User configurable string of up to 64 characters
Location	User configurable string of up to 64 characters
IP Address	IP Address of the unit
Subnet Mask	Subnet Mask of the unit
Gateway Address	Gateway Address of the unit
Redundancy	<p>Simplex: For systems with a single Common Control card or for systems with Redundant Common Control Cards sets Common Control Card A to the Master Common Control Card and disables LACP.</p> <p>Primary: For systems with Redundant Common Control cards selects the Common Control Card to be the Master Common Control Card and enables LACP.</p> <p>Secondary: For systems with Redundant Common Control cards selects the Common Control Card to be the Standby Common Control Card and enables LACP.</p>
Time	Set the System Time

**Scope of Redundancy and Link Aggregation:**

In order to provide Redundancy and Link Aggregation, the AK5000 requires two Redundancy-Capable AK590CC Cards. When Redundancy is enabled, both the AK590CC Ethernet Management ports and Ethernet Trunk ports are redundant and these ports will need to be connected to Ethernet Switches supporting LACP. The AK590CC LAG groups are not configurable with CCA.1 and CCB.1 comprising the first LAG group, CCA.2 and CCB.2 comprising the second LAG group, and CCA.SFP and CCB.SFP comprising the third LAG group. These LAG groups cannot be combined or mixed. Once the ports establish their LACP connections, data will be distributed over the two ports and if a cable or card failure occurs, data will be routed to other cable or card as needed.

### 2.3.5.2 SNMP

Selecting the SNMP tab allows setting SNMP receiver parameters.

The screenshot shows the AktinoView interface for configuring SNMP on System\_11. The 'SNMP' tab is selected, showing configuration fields for System ID (System\_11), Read Community String (public), Contact, and Location. Below these is a table for SNMP Trap Hosts with the following data:

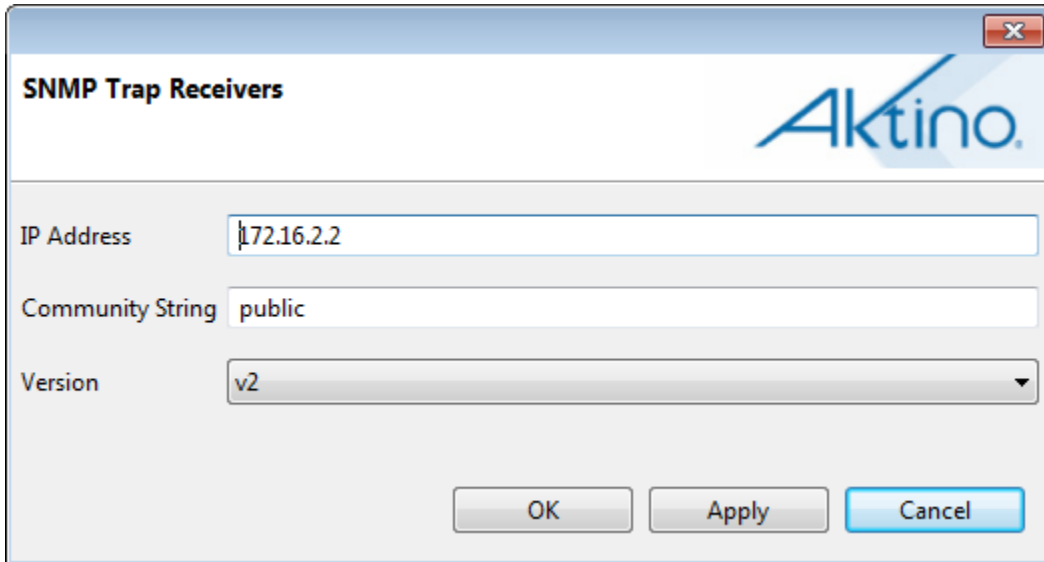
Index	IP Address	Community String	Version
1	172.16.2.2	public	v2
2			
3			
4			

At the bottom of the interface, there are status indicators for Critical: 0, Major: 0, and Minor: 0. Below these is a table of active alarms:

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

System refresh completed

Double-clicking on any Index entry brings up the SNMP Trap Receivers dialog box enabling SNMP Trap Receiver provisioning.



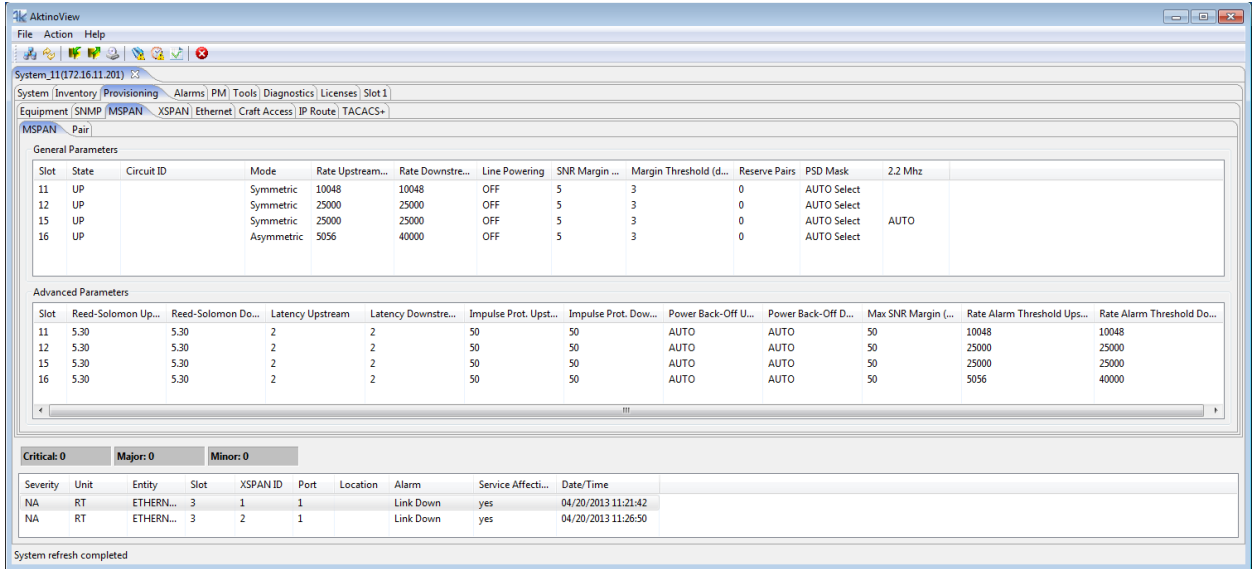
See the following tables for the Parameters and Values for both of these screens:

SNMP Parameters	Values
System ID	User configurable string of up to 20 characters
Contact	User configurable string of up to 64 characters
Location	User configurable string of up to 64 characters
Read Community String	The SNMP Read Community String for the AK5000 System

SNMP Trap Host Parameters	Values
IP Address	IP Address of the SNMP Trap Receiver
Community String	SNMP Community String of the Trap Receiver
Version	SNMP Trap Version Number (v1 or v2)

### 2.3.5.3 MSPAN

Selecting the MSPAN tab under Provisioning allows MSPAN provisioning for any of the slots in the system.





Double-clicking on a line in either the General Parameters area or the Advanced Parameters area provides the MSPAN Parameters dialog box for both General and Advanced Parameters.

**MSPAN**

**General Parameters**

Slot: 11

Circuit ID:

Mode: Symmetric

MSPAN Rate (Kbps): 10048

Rate Upstream (Kbps): 10048

Rate Downstream (Kbps): 10048

Line Powering: OFF

SNR Margin (dB): 5

Margin Threshold (dB): 3

Reserve Pairs: 0

PSD Mask: AUTO Select

2.2 Mhz:

State: UP

**Advanced Parameters**

Reed-Solomon Upstream: 5.30

Reed-Solomon Downstream: 5.30

Latency Upstream: 2

Latency Downstream: 2

Impulse Prot. Upstream (µs): 50

Impulse Prot. Downstream (µs): 50

Power Back-Off Upstream (dB): AUTO

Power Back-Off Downstream (dB): AUTO

Max SNR Margin (dB): 50

Rate Alarm Threshold (Kbps): 10048

Rate Alarm Threshold Upstream (Kbps): 10048

Rate Alarm Threshold Downstream (Kbps): 10048

Configure Rate Alarm Threshold

OK Apply Cancel

See the following table for Parameters and Values:

MSPAN General Parameters	Values
State	Sets the MSPAN State: Up - MSPAN is in service Down - MSPAN is out of service
Circuit ID	User configurable string of up to 48 characters
Mode	Sets the MSPAN Mode: Symmetric Asymmetric (for AK5000 System versions r3.10 or higher)
MSPAN Rate (kbps)	Sets the MSPAN Rate in Symmetric Mode
Rate Upstream	Sets the Upstream MSPAN Rate in Asymmetric Mode
Rate Downstream	Sets the Downstream MSPAN Rate in Asymmetric Mode
Line Powering	Sets Line Powering to: Off, -135v, or -185v
SNR Margin	Sets the SNR Margin: 0 to 18dB
Margin Threshold	Sets the SNR Margin Threshold. If the SNR Margin falls below this threshold, an Alarm will be generated
Reserve Pairs	Sets the number of Reserve Pairs
PSD Mask	Sets the PSD Mask: Auto - Select the PSD Mask automatically Select - M0, M1, M2, M3, M4 or M5
2.2 Mhz	If the 2.2 Mhz feature is enabled: Select - Auto, or No
State	Sets the MSPAN State: Up - MSPAN is in service Down - MSPAN is out of service

**Note:** PSD Masks attempt to equalize the upstream and downstream MSPAN rates and are optimized for particular loop lengths.

PSD Mask	Best for Loop Lengths (26 AWG)
M1	0 to 6500 feet
M2	6500 to 9500 feet
M3	9500 to 11500 feet
M4	11500 to 13500 feet
M5	Greater than 13500 feet

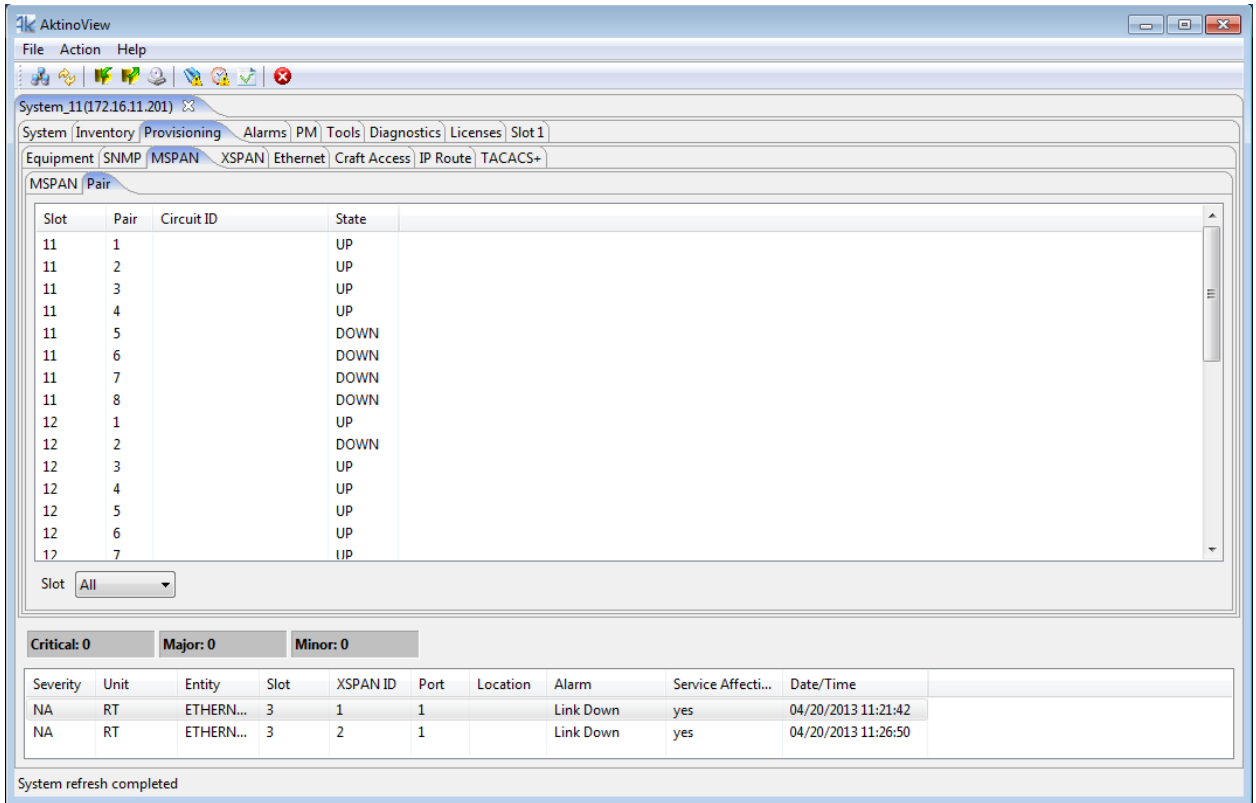
PSD Mask	Best for Loop Lengths (24 AWG)
M1	0 to 8667 feet
M2	8667 to 12667 feet
M3	12667 to 15333 feet
M4	15333 to 18000 feet
M5	Greater than 18000 feet

See the following table for Advanced Parameters and Values:

MSPAN Advanced Parameters	Values
Reed-Solomon Upstream	Calculated Reed-Solomon Overhead percentage Upstream: $RS\% = 2 * INP / Latency$
Reed-Solomon Downstream	Calculated Reed-Solomon Overhead percentage Downstream: $RS\% = 2 * INP / Latency$
Latency Upstream	Sets the Upstream Latency: 0, 1, 2, 4, 8, 12, 16, 20, 32msec
Latency Downstream	Sets the Downstream Latency: 0, 1, 2, 4, 8, 12, 16, 20, 32msec
Impulse Protection Upstream	Length of Upstream Impulse Noise Protection: 50, 125, 250, 500, 750, 1000, 2000, 4000 $\mu$ sec
Impulse Protection Downstream	Length of Downstream Impulse Noise Protection: 50, 125, 250, 500, 750, 1000, 2000, 4000 $\mu$ sec
Power Back-Off Upstream	Auto, -3 to 16dB
Power Back-Off Downstream	Auto, -3 to 16dB
Rate Alarm Threshold	MSPAN Rate Alarm Threshold for Symmetric Mode
Rate Alarm Threshold Upstream	MSPAN Upstream Rate Alarm Threshold for Asymmetric Mode
Rate Alarm Threshold Downstream	MSPAN Downstream Rate Alarm Threshold for Asymmetric Mode

**2.3.5.4 Pair**

Selecting the Pair tab under the Provisioning tab allows Pair provisioning of the system.



Double-clicking on the Pair brings up the Pair configuration dialog box. Note that the AK512 products have a maximum of four pairs and the AK525 products have a maximum of eight pairs.

The screenshot shows a dialog box titled "Pair" with the Aktino logo in the top right corner. The dialog contains the following fields and controls:

- Slot:** A text input field containing the value "11".
- Pair:** A text input field containing the value "1".
- Circuit ID:** An empty text input field.
- State:** A dropdown menu currently displaying "UP".
- Buttons:** Three buttons at the bottom: "OK", "Apply", and "Cancel".

See the following table for Pair Provisioning Parameters and Values:

Pair Parameters	Values
Circuit ID	User configurable string of up to 48 characters
State	Sets the Pair State: Up - Pair is in service Down - Pair is out of service

### 2.3.5.5 XSPAN

Selecting the XSPAN tab under XSPAN allows XSPAN provisioning for any XSPAN slot in the system.

**General and Rate Parameters**

Slot	XSPAN ID	Circuit ID	Assigned Pairs	Auto US0	State	Standard	Rate Alarm Threshold U...	Rate Alarm Threshold D...	Target SNR Upstrea...	Target
1	1		1,2,3,4,5,6,7,8	NO	UP	VDSL2	0	0	6.0	6.0
1	2		9,10,11,12	NO	UP	VDSL2	0	0	6.0	6.0

**VDSL2 and ADSL2+ Parameters**

Slot	XSPAN ID	VDSL2 Band...	VDSL2 US0 ...	VDSL2 Limit M...	VDSL2 Profile	VDSL2 Max Tx Power Do...	VDSL2 Max Rx Power Up...	ADSL2+ US0 M...	ADSL2+ Max Tx P...
1	1	Annex_A	EU_32	Not_Applicable	17a	14.5	3.1	ANNEX_A	14.5
1	2	Annex_A	EU_32	Not_Applicable	17a	14.5	3.1	ANNEX_A	14.5

**Delay Parameters**

Slot	XSPAN ID	Min INP Upstream (*250 μs)	Min INP Downstream (*250 μs)	Max Delay Upstream (ms)	Max Delay Downstream (ms)	Min Delay U
1	1	1.0	1.0	4	4	0
1	2	1.0	1.0	4	4	0

**INP Parameters**

Slot	XSPAN ID	State Upstream	State Downstre...	Min INP SHINE Upstream (*...	Min INP SHINE Downstream...	Min INP REIN Upstream (*25...	Min INP REIN Downstream (...)
1	1	FORBIDDEN	FORBIDDEN	2	2	0	0
1	2	FORBIDDEN	FORBIDDEN	2	2	0	0

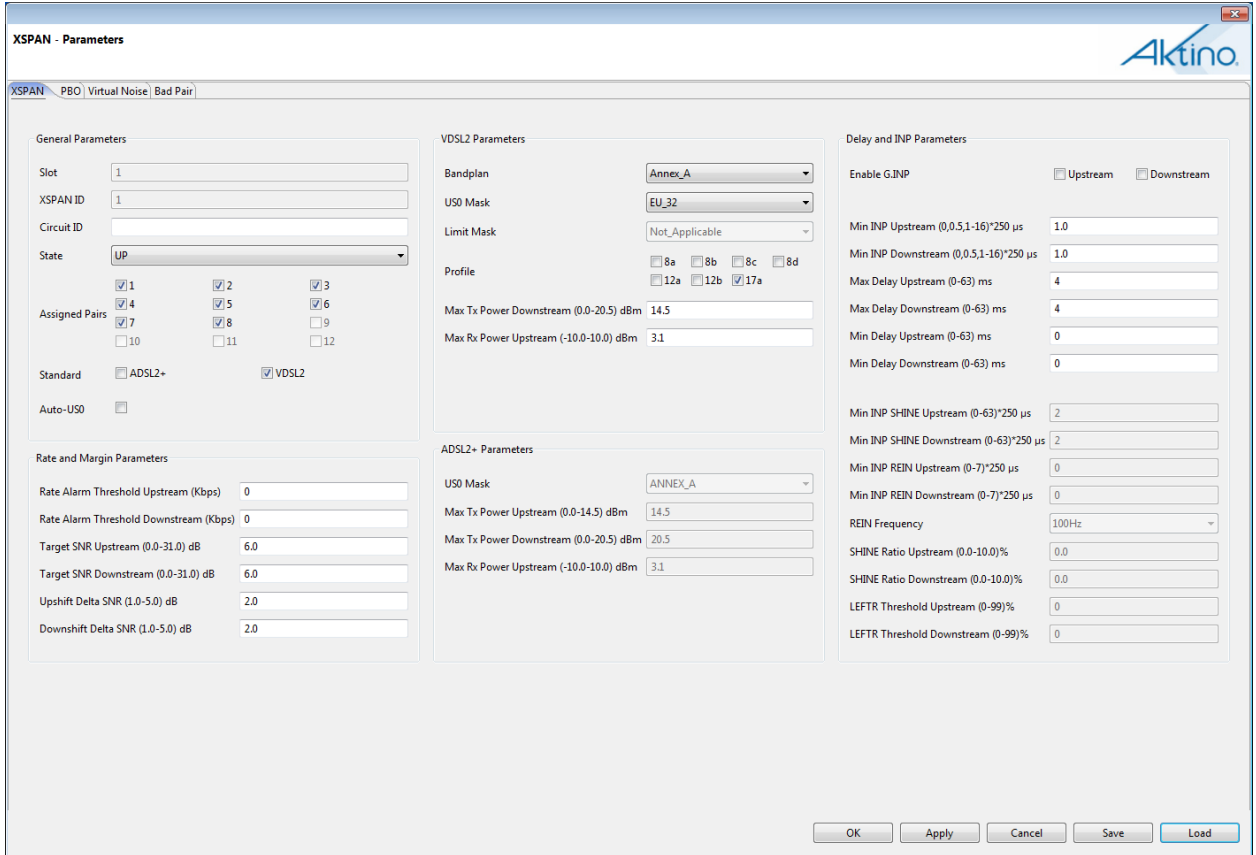
Slot: All

**Critical: 0 Major: 0 Minor: 0**

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

System refresh completed

Double clicking on a line in either the General and Rate Parameters, VDSL and ADSL2+ Parameters, Delay Parameters, or INP Parameters provides the a provisioning dialog box for those areas.



**Note:** Tabs for configuring PBO, Virtual Noise, and Bad Pair are accessible through the XSPAN - Parameters screen.

See the following tables for XSPAN Provisioning Parameters and Values:

General Parameters	Values
Slot	Displays the slot to be provisioned
XSPAN ID	Displays the XSPAN Group to be provisioned
Circuit ID	User configurable string of up to 48 characters
State	Sets the XSPAN State: Up - XSPAN is in service Down - XSPAN is out of service
Assigned Pairs	If checked, the Pair will be assigned to this XSPAN Group. A Pair can be assigned to only a single XSPAN ID.
Standard	Selects whether the XSPAN Group will support ADSL2+, VDSL2, or both
Auto -US0	If selected, the system will automatically select the US0 Mask based on the loop length up to and including the US0 Mask selected for the Band plan under the VDSL2 Parameters.

Rate and Margin Parameters	Values
Rate Alarm Threshold Upstream (kbps)	Configures the Upstream XSPAN Rate Alarm Threshold for the XSPAN ID. Disabled = 0
Rate Alarm Threshold Downstream (kbps)	Configures the Downstream XSPAN Rate Alarm Threshold for the XSPAN ID. Disabled = 0
Target SNR Upstream (0-31) dB	Sets the Upstream SNR Margin the XSPAN Group will attempt to achieve
Target SNR Downstream (0-31) dB	Sets the Downstream SNR Margin the XSPAN Group will attempt to achieve
Upshift Delta SNR (1-5) dB	The delta between the XSPAN Target Margin and the current actual margin required to trigger a rate upshift
Downshift Felts SNR (1-5) dB	The delta between the XSPAN Target Margin and the current actual margin required to trigger a rate downshift



VDSL2 Parameters	Values
Bandplan	Selects the VDSL2 Band plan for the XSPAN Group: Annex_A, Annex_B-997, or Annex_B-998
US0 Mask	Selects the VDSL2 US0 mask for the XSPAN Group (Annex_A only)
Limit Mask	Selects the VDSL2 limit mask for the XSPAN group (annex B only)
Profile	Selects the range of supported VDSL2 profiles when bringing up the span
Max Tx Power Downstream (0.0-20.5)dBm	Sets the maximum amount of downstream transmit power for the XSPAN Group
Max Rx Power Upstream (-10-10.0)dBm	Sets the maximum amount of receive transmit power for the XSPAN Group

ADSL2+ Parameters	Values
US0 Mask	Selects the ADSL2+ US0 mask for the XSPAN Group
Max Tx Power Upstream (0.0-14.5)dBm	Sets the maximum amount of upstream transmit power for the XSPAN Group
Max Tx Power Downstream (0.0-20.5)dBm	Sets the maximum amount of downstream transmit power for the XSPAN Group
Max Rx Power Upstream (-10.0-10)dBm	Sets the maximum amount of receive transmit power for the XSPAN Group

Delay and INP Parameters	Values
Enable G.INP	Check to enable Upstream/Downstream G.INP noise protection
Min INP Upstream (0,0.5,1-16)*125 $\mu$ s	If G.INP is disabled, sets the minimum duration of Upstream Impulse Noise Protection from 0 to 4000 $\mu$ sec
Min INP Downstream (0.0.5,1-16)*125 $\mu$ s	If G.INP is disabled, sets the minimum duration of Downstream Impulse Noise Protection from 0 to 4000 $\mu$ sec
Max Delay Upstream (0-63) ms	Sets the maximum Upstream delay
Max Delay Downstream (0-63) ms	Sets the maximum Downstream delay
Min Delay Upstream (0-63) ms	Sets the minimum Upstream delay
Min Delay Downstream (0-63) ms	Sets the minimum Downstream delay
Min INP SHINE Upstream (0-63)*250 $\mu$ s	If G.INP is enabled, sets the minimum upstream Single High Impulse Noise Event protection duration from 0 to 15750 $\mu$ s
Min INP SHINE Downstream (0-63)*250 $\mu$ s	If G.INP is enabled, sets the minimum downstream Single High Impulse Noise Event protection duration from 0 to 15750 $\mu$ s
Min INP REIN Upstream (0-7)*250 $\mu$ s	If G.INP is enabled, sets the minimum upstream Repetitive Electrical Impulse Noise event duration from 0 to 1750 $\mu$ s
Min INP REIN Downstream (0-7)*250 $\mu$ s	If G.INP is enabled, sets the minimum downstream Repetitive Electrical Impulse Noise event duration from 0 to 1750 $\mu$ s
REIN Frequency	Sets the Repetitive Electrical Impulse Noise frequency to either 100Hz or 120Hz
SHINE Ratio Upstream (0.0-10.0)%	A decimal between 0.0 and 10.0, in increments of 0.1 The expected % of data rate to be affected by SHINE (Single High Impulse Noise Event)
SHINE Ratio Downstream (0.0-10.0)%	A decimal between 0.0 and 10.0, in increments of 0.1 The expected % of data rate to be affected by SHINE (Single High Impulse Noise Event)
LEFTR Threshold Upstream (0-99)%	Sets the upstream LEFTR (Low Error-Free Throughput Rate) threshold. If the measured EFTR (Error Free Throughput Rate) falls below the configured % of the expected through rate, an LEFTR defect will not be generated.
LEFTR Threshold Downstream (0-99)%	Sets the downstream LEFTR (Low Error-Free Throughput Rate) threshold. If the measured EFTR (Error Free Throughput Rate) falls below the configured % of the expected through rate, an LEFTR defect will not be generated.

2.3.5.5.1 Pair

Selecting the Pair tab under the XSPAN tab allows Pair provisioning of all the XSPAN Pairs in the system.

The screenshot shows the AktinoView software interface. The main window is titled "System\_11(172.16.11.201)". The navigation tabs include System, Inventory, Provisioning, Alarms, PM, Tools, Diagnostics, Licenses, and Slot 1. Under the Provisioning tab, there are sub-tabs for Equipment, SNMP, MSPAN, XSPAN, Ethernet, Craft Access, IP Route, and TACACS+. The XSPAN sub-tab is active, and the "Pair" sub-tab is selected. The main area displays a table of XSPAN Pairs with the following data:

Slot	XSPAN ID	Pair	Circuit ID	State	Target Rate Upstream (Kbps)	Target Rate Downstream (Kbps)
1	1	1		UP	50000	100000
1	1	2		UP	50000	100000
1	1	3		UP	50000	100000
1	1	4		UP	50000	100000
1	1	5		UP	50000	100000
1	1	6		UP	50000	100000
1	1	7		UP	50000	100000
1	1	8		UP	50000	100000
1	2	9		UP	50000	100000
1	2	10		UP	50000	100000
1	2	11		UP	50000	100000
1	2	12		UP	50000	100000
3	1	1		UP	50000	100000
3	1	2		UP	50000	100000
3	1	3		UP	50000	100000
3	1	4		UP	50000	100000
3	1	5		UP	50000	100000
3	1	6		UP	50000	100000
3	1	7		UP	50000	100000
3	1	8		UP	50000	100000
3	2	9		UP	50000	100000
3	2	10		UP	50000	100000
3	2	11		UP	50000	100000
3	2	12		UP	50000	100000
5	3	1		UP	50000	100000
5	3	2		UP	50000	100000
5	3	3		UP	50000	100000

Below the table, there is a "Slot" dropdown menu set to "All". At the bottom, there is a summary section for alarms:

Critical: 0    Major: 0    Minor: 0

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

System refresh completed

Double clicking on a Pair brings up the following Pair provisioning screen:

The screenshot shows a 'Pair' provisioning dialog box with the following fields and values:

- Slot: 1
- XSPAN ID: 1
- Pair: 1
- Circuit ID: (empty)
- State: UP
- Target Rate Upstream (Kbps): 50000
- Target Rate Downstream (Kbps): 100000

Buttons at the bottom: OK, Apply, Cancel.

See the following table for XSPAN Pair provisioning Parameters and Values:

XSPAN Pair Parameters	Values
Slot	Displays the slot to be provisioned
XSPAN ID	Displays the XSPAN Group to be provisioned
Pair	Displays the Pair to be provisioned
Circuit ID	User configurable string of up to 48 characters
State	Sets the Pair State: Up - Pair is in service Down -Pair is out of service
Target Rate Upstream (kbps)	Configure a rate between 256 and 60000 Kbps.
Target Rate Downstream (kbps)	Configure a rate between 256 and 100000 Kbps.

2.3.5.5.2 PBO

Selecting the PBO tab under the XSPAN tab allows Power Back-Off provisioning of the system

System refresh completed

Upstream Power Back-Off Parameters											
Slot	XSPAN ID	State	A US1 (dBm/Hz)	A US2 (dBm/Hz)	A US3 (dBm/Hz)	B US1 (dBm/Hz)	B US2 (dBm/Hz)	B US3 (dBm/Hz)	KLREF1 (dB)	KLREF2 (dB)	KL
1	1	Disabled	47.3	54.0	54.0	21.14	16.29	16.29	18.0	0.0	0.0
1	2	Disabled	47.3	54.0	54.0	21.14	16.29	16.29	0.0	0.0	0.0
1	3	Disabled	47.3	54.0	54.0	21.14	16.29	16.29	0.0	0.0	0.0
1	4	Disabled	47.3	54.0	54.0	21.14	16.29	16.29	0.0	0.0	0.0
3	1	Disabled	47.3	54.0	54.0	21.14	16.29	16.29	0.0	0.0	0.0
3	2	Disabled	47.3	54.0	54.0	21.14	16.29	16.29	0.0	0.0	0.0
3	3	Disabled	47.3	54.0	54.0	21.14	16.29	16.29	0.0	0.0	0.0
3	4	Disabled	47.3	54.0	54.0	21.14	16.29	16.29	0.0	0.0	0.0
5	1	Disabled	47.3	54.0	54.0	21.14	16.29	16.29	0.0	0.0	0.0

Downstream Power Back-Off Parameters									
Slot	XSPAN ID	State	ESEL (dB)	ESCMA	ESCMB	ESCMC	MUS (dBm/Hz)	FMIN (*4.3125 kHz)	FMAX
1	1	Disabled	27.0	0.421875	0.8125	0.44140625	-101.5	32	512
1	2	Disabled	27.0	0.421875	0.8125	0.44140625	-101.5	32	512
1	3	Disabled	27.0	0.421875	0.8125	0.44140625	-101.5	32	512
1	4	Disabled	27.0	0.421875	0.8125	0.44140625	-101.5	32	512
3	1	Disabled	27.0	0.421875	0.8125	0.44140625	-101.5	32	512
3	2	Disabled	27.0	0.421875	0.8125	0.44140625	-101.5	32	512
3	3	Disabled	27.0	0.421875	0.8125	0.44140625	-101.5	32	512
3	4	Disabled	27.0	0.421875	0.8125	0.44140625	-101.5	32	512
5	1	Disabled	27.0	0.421875	0.8125	0.44140625	-101.5	32	512

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

Double clicking on a slot brings up the following Power Back-Off provisioning screen:

Power Back-Off is used to minimize interference into other systems in the same cable binder. On shorter loops you may not need the full transmit power so you back off to minimize this interference. Power Back-Off is applied in terms of a Mask. A Mask specifies the maximum power system can transmit at a given frequency. Upstream Power Back-Off is applied as described in g.993.2 amendment 2, section 7.2.1.3.

The Upstream Power Back-Off mask is computed according to the formula:

$$UPBOMASK(f) = -A - (B * \sqrt{f}) + 10 * \log(KLREF / k_l0 * \sqrt{f}) + 3.5 \text{ dBm/Hz}$$

where A, B, and KLREF are configurable parameters for each of the Upstream bands US1 - US3, f is frequency in MHz, and k<sub>l0</sub> is the electrical loop length. The electrical loop length k<sub>l0</sub> can be obtained in one of several different methods. Select which method by selecting the appropriate k<sub>l0</sub> mode (KLF parameter).

See the following table for the Upstream Power Back-Off provisioning Parameters and Values:

Power Back-Off Parameters	Values
Slot	Displays the slot to be provisioned
XSPAN ID	Displays the XSPAN Group to be provisioned
Upstream Power Back-Off	Values
Enable Power Back-Off	Selecting Enables Upstream Power Back-Off
A (40.00-80.96) dBm/Hz	A decimal between 40.00 and 80.96, in increments of 0.01
B(0.00-40.96) dBm/Hz	A decimal between 0.00 and 40.96, in increments of 0.01
KLREF (0, 1.8-63.5) dB	0 or a decimal between 1.8 and 63.5, in increments of 0.1  Setting kl0ref to 0 will configure the system to use the Reference PSD UPBO method. Setting kl0ref > = 1.8 will result in the system using the equalized FEXT UPBO method.
KLF	Select:  MAX_OF(KLO_CO,KLO_CPE). Use the bigger of the kl0 computed by the CO and the one computed by the CPE (CRU).  MIN_OF (KLO_CO,KLO_CPE). Use the smaller of the kl0 computed by the CO and the one computed by the CPE.  KLO_CO. Use kl0 computed by CO.  KLO_CPE. Use kl0 computed by CPE (CRU).  PBO KL. Use the user-configured value KL.
KL (0.0-128.0)dB	A decimal between 0.0 and 128.0

Downstream Power Back-Off is applied as described in section 7.3.1.2.13 and Appendix II of g.997.1. Downstream power back off is normally used when the VDSL2 CO is placed a remote cabinet site and can potentially interfere with signals from a CO in the same cable bundle. The downstream Power Back-Off configuration parameters are used to determine a mask to be applied to the system. The exchange PSD (EPSD), e-side cable parameters ESCMA, ESCMB, ESCMC and the electrical length of the exchange side cable ESEL are used to

create a channel model for the E-side cable. The predicted downstream signal at the cabinet exchange will then be given by:

$$PEPSD(f) = EPSD(f) - (ESCMA + ESCMB*\sqrt{f} + ESCMC*f)*ESEL$$

Other remaining parameters are then used per the procedure in g.997.1 to come up with the final downstream Power Back-Off mask.

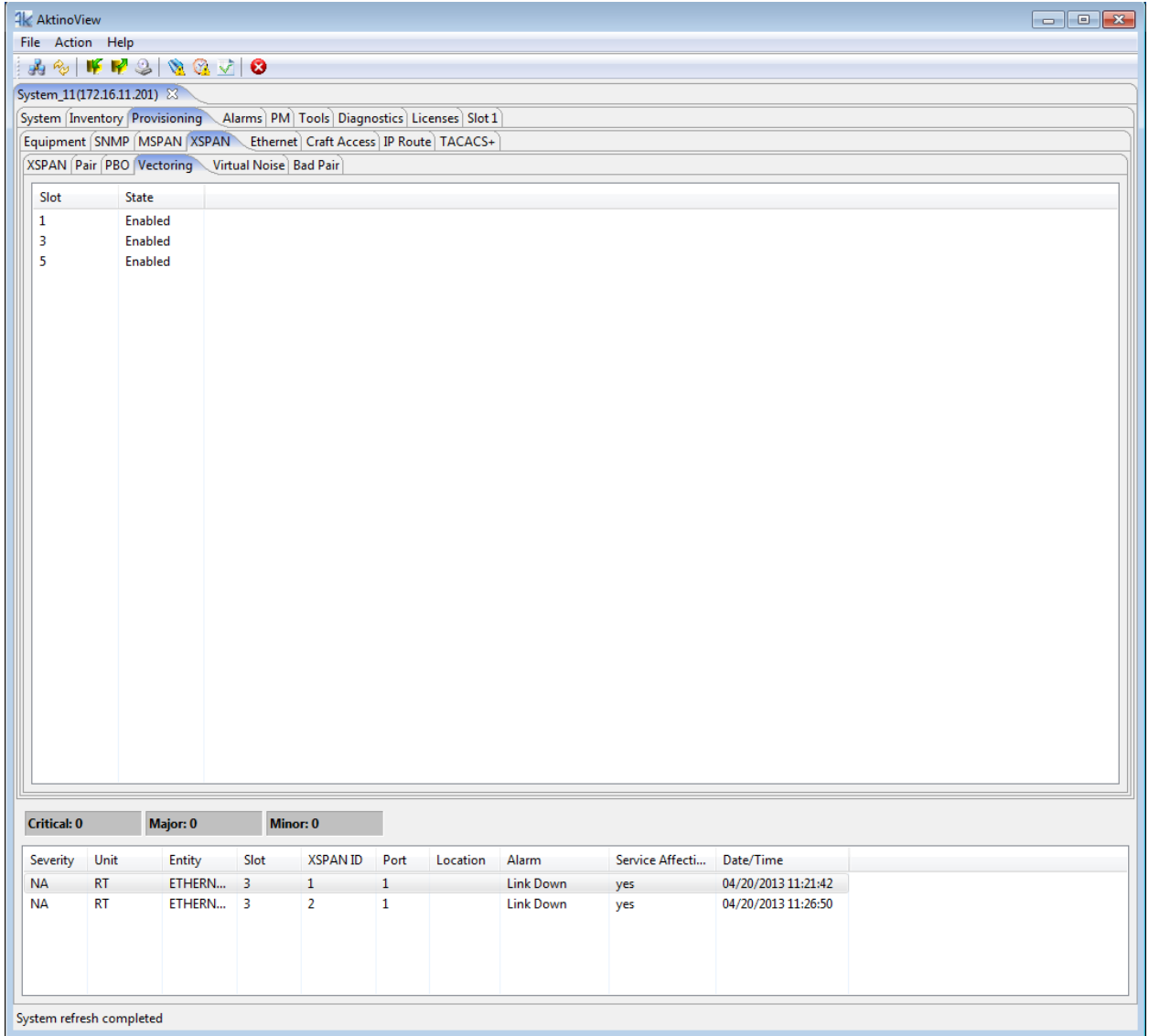
See the following table for the Downstream Power Back-Off provisioning Parameters and Values:

Downstream Power Back-Off	Values
Enable Power Back-Off	Selecting Enables Downstream Power Back-Off
ESEL (0-255.5)dB	Electrical length of e-side cables. Valid configuration is 0 to 255.5 dB in steps of 0.5 dB.
ESCMA (-1.0-1.5)	E-side cable parameter. Valid configuration is -1 to 1.5.
ESCMB (-1.0-1.5)	E-side cable parameter. Valid configuration is -1 to 1.5.
ESCMC (-1.0-1.5)	E-side cable parameter. Valid configuration is -1 to 1.5.
MUS (0-127.5)dBm/Hz	Minimum usable receive PSD. Valid configuration is -127.5 dBm/Hz to 0 in 0.5 dBm.
FMIN (0-2048)*4.3125 kHz	Minimum frequency from which DPBO shall be applied. Valid configuration is 0 to 8832 kHz in 4.3125 kHz increments.
FMAX (32-6956)*4.1325 kHz	Maximum frequency from which DPBO shall be applied. Valid configuration is 138kHz to 29997.75 kHz in 4.3125 kHz increments.
EPSD	Exchange PSD. Select one of three masks: ADSL2+ Annex A ADSL2 Annex A ADSL2+ Annex B

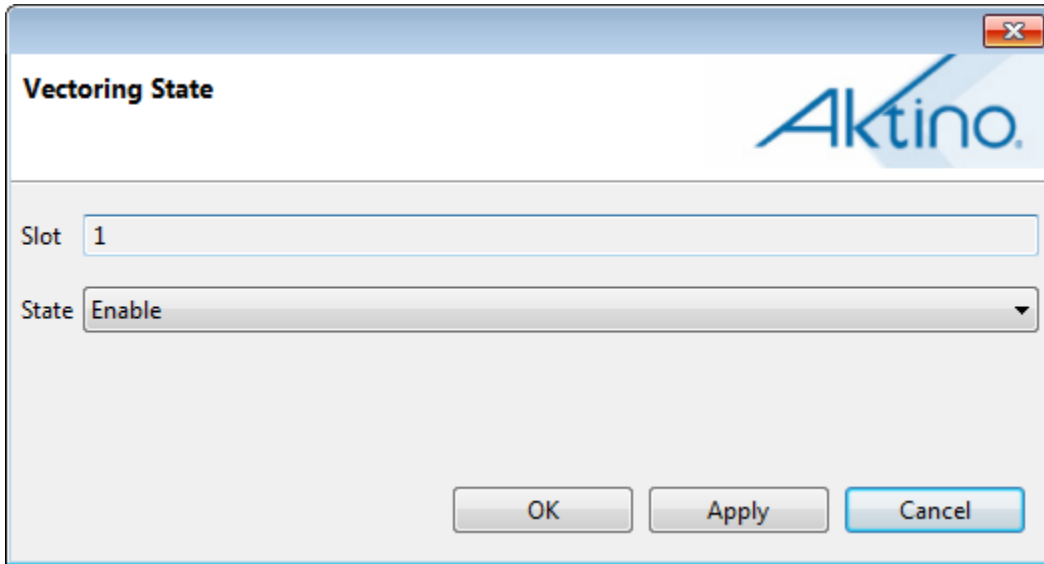


### 2.3.5.5.3 Vectoring

Selecting the Vectoring tab under the XSPAN tab allows Vectoring provisioning of the system.



Double clicking on a slot brings up the following Vectoring State provisioning screen:



See the following table for Vectoring State provisioning Parameters and Values:

Vectoring State Parameters	Values
Slot	Displays the slot to be provisioned
State	Allows the State to be Disabled or Enabled

**Note:** Changing the Vectoring configuration will result in the Line Card rebooting to apply the new configuration. Vectoring can only be enabled for FlexStream 800 Line Cards when the VDSL2 Standard is the only Standard configured for all of the Bonding Groups (the ADSL2+ Standard must be unchecked on each Bonding Groups).

2.3.5.5.4 Virtual Noise

Selecting the Virtual Noise tab under the XSPAN tab allows Virtual Noise provisioning of the system.

System refresh completed

Double clicking on a slot brings up the following Virtual Noise provisioning screen:

**Upstream Virtual Noise**

Mode:  ADSL2+  VDSL2

Breakpoints: 8

Index	Tone Number	Noise Level (dBm/Hz)
1	32	-114.0
2	64	-110.0
3	128	-110.0
4	256	-110.0
5	512	-95.0
6	1024	-85.0
7	2048	-80.0
8	4095	-75.0
9		
10		
11		
12		
13		
14		
15		
16		

**Downstream Virtual Noise**

Mode:  ADSL2+  VDSL2

Breakpoints: 8

Index	Tone Number	Noise Level (dBm/Hz)	Index	Tone Number	Noise Level (dBm/Hz)
1	32	-114.0	17		
2	64	-110.0	18		
3	128	-110.0	19		
4	256	-110.0	20		
5	512	-95.0	21		
6	1024	-85.0	22		
7	2048	-80.0	23		
8	4095	-75.0	24		
9			25		
10			26		
11			27		
12			28		
13			29		
14			30		
15			31		
16			32		

Buttons: OK, Apply, Cancel, Save, Load

DSL systems are prone to retrains due to disturbances in the copper loop plant. A retrain causes the link to be down for tens of seconds and therefore can be quite disruptive to the service. Virtual noise is a technique sometimes used to stabilize DSL systems, at the expense of lower data rates. This technique adds “virtual” noise to the system, lowering the SNR (signal to noise ratio) and resulting in a more conservative bit loading and data rate in the system.

Virtual noise can be enabled independently in the upstream or downstream, and can be enabled when the system is in ADSL2+, VDSL2, or both.

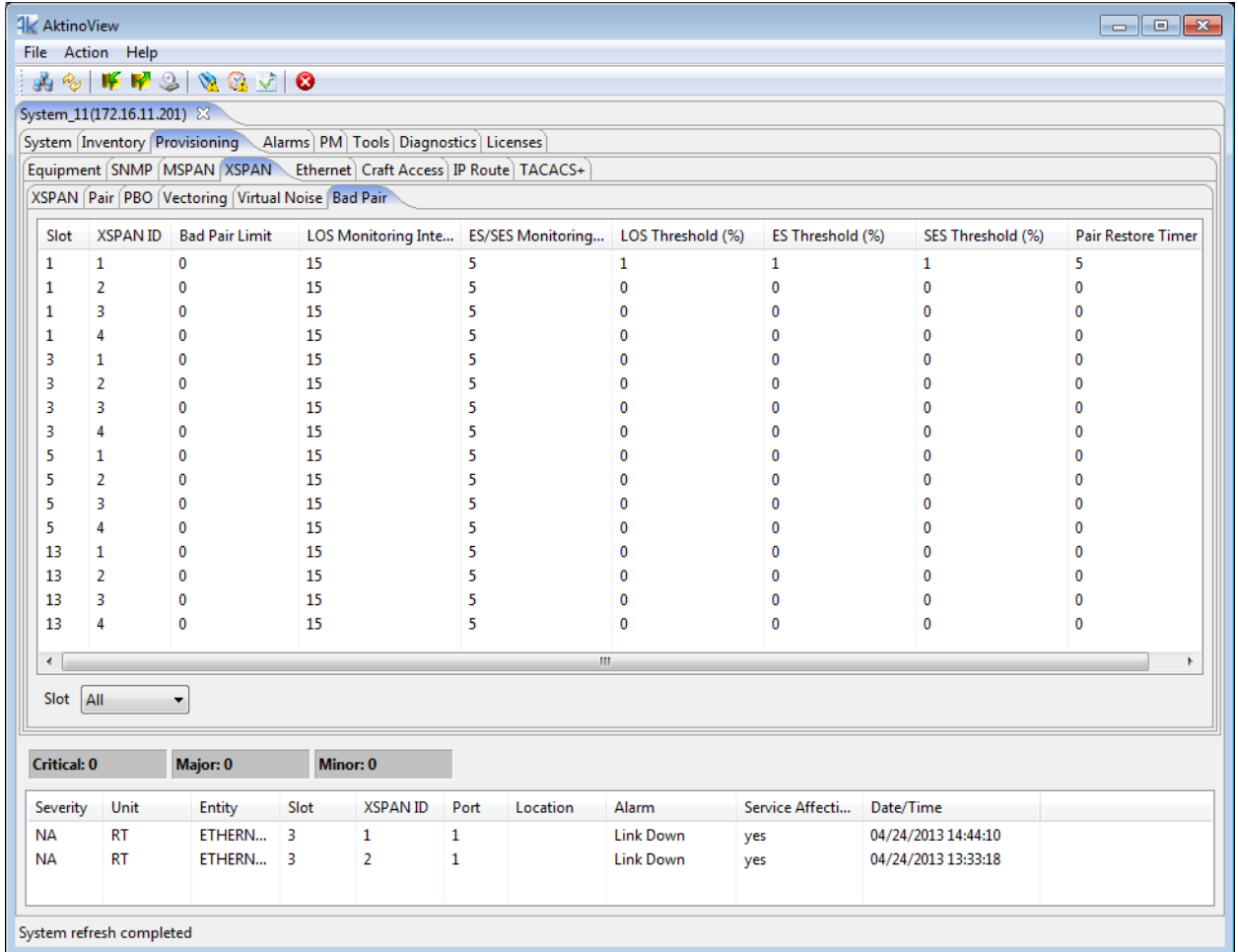
When enabled, virtual noise is specified by a set of breakpoints. Each breakpoint consists of a tone number ( $t_i$ ) and a noise PSD ( $PSD_i$ ) expressed in dBm/Hz. The virtual noise profile is a set of breakpoints represented by:  $[(t_1, PSD_1), (t_2, PSD_2), \dots (t_n, PSD_n)]$ . The breakpoints shall be defined so that the tones are monotonically increasing, that is,  $t_i < t_{(i+1)}$ . The PSDs are allowed a range from -40 dBm/Hz to -140 dBm/Hz. In VDSL2 mode, the maximum number of breakpoints allowed is 32 in the downstream and 16 in the upstream. In ADSL2 mode, the max number allowed is 16 for both upstream and downstream.

See the following table for Virtual Noise provisioning Parameters and Values:

Virtual Noise Parameters	Values
Slot	Displays the slot to be provisioned
XSPAN ID	Displays the XSPAN Group to be provisioned
Upstream Virtual Noise	Values
Mode	Enable Virtual Noise going Upstream when checking ADSL2+ and/or VDSL2
Breakpoints	Number of breakpoints (an integer between 0 and 16). This field only accepts characters from 0 to 9 and the backspace character. The entered value must always be less than or equal to 16.
Index	Index number of the specific Tone Number and Noise Level going Upstream.
Tone Number	An integer between 0 and 4095
Noise Level (dBm/Hz)	A decimal between -140.0 and -40.0, in increments of 0.5
Downstream Virtual Noise	Values
Mode	Enable Virtual Noise going Downstream when checking ADSL2+ and/or VDSL2
Breakpoints	Number of breakpoints (an integer between 0 and 32) This field only accepts characters from 0 to 9 and the backspace character. The entered value must always be less than or equal to 32.
Index	Index number of the specific Tone Number and Noise Level going Downstream.
Tone Number	An integer between 0 and 4095
Noise Level (dBm/Hz)	A decimal between -140.0 and -40.0, in increments of 0.5

2.3.5.5.5 Bad Pair

Selecting the Bad Pair tab under the XSPAN tab allows Bad Pair provisioning of the system.



**Scope of Bad Pair Handling:**

A bad pair is defined here as one that is experiencing severe impairments and as a result is causing significant XSPAN degradation in terms of errors & downtime. It should be noted that a large percentage of these bad pair situations can be prevented by performing the appropriate loop qualification testing before installation. The implementation of any measures to mitigate the effects of a bad pair does not obviate the need to pre-qualify pairs before deployment of the service.

## Pair Removal Criteria

During monitoring mode, pair CRC's of each pair can be monitored and a high pair CRC count, both absolute and relative to the other pairs, can be used to identify and remove a problem pair or pairs. It is important to apply the proper relative criteria to prevent indiscriminate removal of pairs when the problem is not a bad pair problem but a bad XSPAN link problem. Other criteria can also be used that may indicate a problem pair, including low pair capacity relative to the other pairs. Monitoring can be performed for a configurable time interval during which the system will not fast retrain. The system will remove the problem pairs, up to the limit configured by the user. This monitoring can be performed while the system IS already in data mode passing data traffic, albeit at a lower rate. After the monitoring is complete and the problem pairs possibly removed, the system can turn MIMO ON and rate-shift to the appropriate rate.

Criteria for Pair Removal:

1) Errored Frames %.

Pairs are candidates for removal only if the % of (vdsl) frames that are Errored (that is, has a CRC) within the monitoring period exceeds the configured %.

2) Pair SES or UAS %.

Pairs that have SES or UAS exceeding this threshold during the monitoring period shall be candidates for removal.

Pairs that exceed either criterion, up to a maximum configurable number, will be removed from service. Pairs with the highest number of Errored frames or SES/UAS shall be removed first.



Double clicking on a slot brings up the following Bad Pair provisioning screen:

The screenshot shows a software window titled "XSPAN - Parameters" with the "Aktino" logo in the top right corner. The window has a tabbed interface with "Bad Pair" selected. The parameters are as follows:

Parameter	Value
Slot	1
XSPAN ID	4
Bad Pair Limit	0
LOS Monitoring Interval (min)	15
ES/SES Monitoring Interval (min)	5
LOS Threshold (%)	0
ES Threshold (%)	0
SES Threshold (%)	0
Pair Restore Timer (min)	0

At the bottom of the window, there are five buttons: OK, Apply, Cancel, Save, and Load.

See the following table for Bad Pair provisioning Parameters and Values:

Parameters	Values
Slot	Displays the selected Slot
XSPAN ID	Displays the selected XSPAN ID
Bad Pair Limit	The maximum number of bad pairs that can be removed at any one time.
LOS Monitoring Interval (min)	Time interval to count LOS (Unavailable Seconds)
ES/SES Monitoring Interval (min)	Time interval to count Errored Seconds / Severely Errored Seconds
LOS Threshold (%)	The percent of Unavailable Seconds required marking this pair as a candidate from removal.
ES Threshold (%)	The percent of Errored Seconds required marking this pair as a candidate from removal.
SES Threshold (%)	The percent of Severely Errored Seconds required marking this Pair as a candidate from removal.
Pair Restore Timer (min)	Length of time before removed pairs are put back into service.

## 2.3.5.6 Ethernet

### 2.3.5.6.1 Type of Service

Selecting the Ethernet Type of Services tab allows type of service provisioning for each of the slots in the system.

The screenshot shows the AktinoView interface for system configuration. The main window displays the 'Ethernet' configuration page for 'System\_11(172.16.11.201)'. The 'Type of Service' tab is selected, showing a table with the following data:

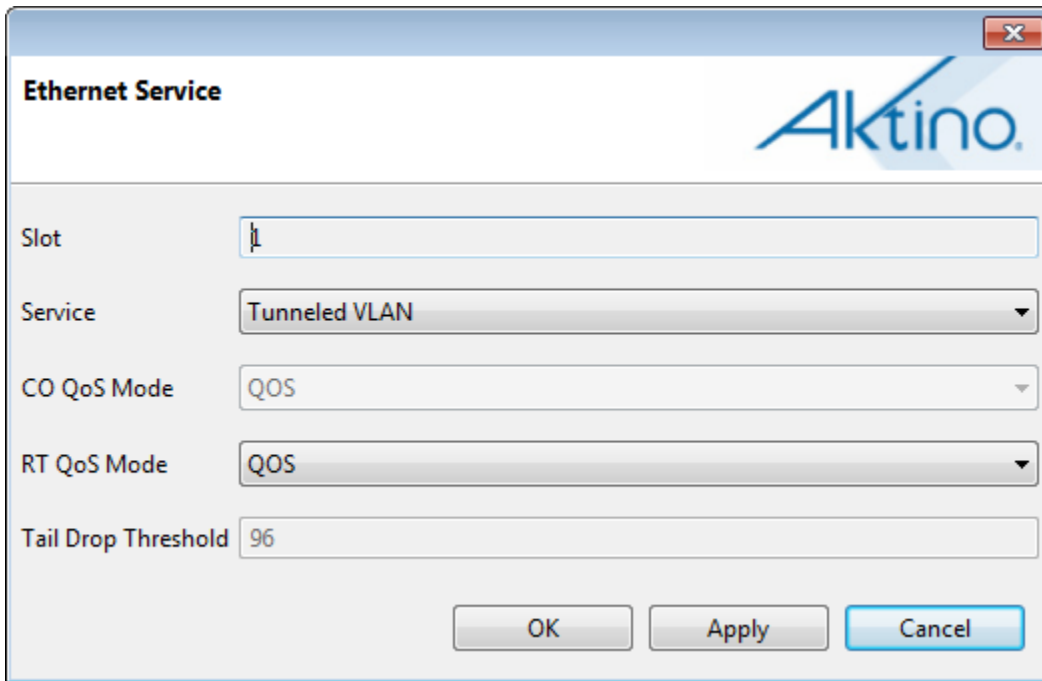
Slot	Service	CO QoS Mode	RT QoS Mode	Tail Drop Threshold
1	Tunneled VLAN	QOS	QOS	96
3	Tunneled VLAN	QOS	QOS	96
5	Tunneled VLAN	QOS	QOS	96
11	Tunneled VLAN	QOS	QOS	96
12	Tunneled VLAN	QOS	QOS	96
13	Tunneled VLAN	QOS	QOS	96
15	Tunneled VLAN	QOS	QOS	96
16	Tunneled VLAN	QOS	QOS	96

Below the table, there are status indicators: Critical: 0, Major: 0, Minor: 0. An alarm log table is also present:

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

At the bottom of the window, a status bar indicates 'System refresh completed'.

Double-clicking on a slot brings up the Ethernet Service provisioning dialog box:



The image shows a software dialog box titled "Ethernet Service" with the Aktino logo in the top right corner. The dialog contains several configuration fields: "Slot" is a text input field with the value "1"; "Service" is a dropdown menu set to "Tunneled VLAN"; "CO QoS Mode" is a dropdown menu set to "QOS"; "RT QoS Mode" is a dropdown menu set to "QOS"; and "Tail Drop Threshold" is a text input field with the value "96". At the bottom of the dialog are three buttons: "OK", "Apply", and "Cancel".

See the following table for Ethernet Type of Service Parameters and Values:

Type of Service Parameters	Values
Service	<p>Transparent Switch - The CO and RT units behave as a 6-port switch (three ports on each end). Frames may go from any port to any other port. Frames are transported transparently.</p> <p>Transparent Port - CO/RT 1000BaseT Port-1 is connected to Port-1, Port-2 to Port-2, and Port-3 to Port-3 Data between each port is not mixed. SFP module cannot be used in this mode.</p> <p>Tunneled VLAN - VLAN IDs are assigned to each port. The VLAN IDs determine which packets go to which ports.</p>
Co QoS Mode	<p>QoS - Port, VLAN, and DiffServ priorities are used as the flow control mechanism. Pause frames are not sent for flow control</p> <p>Lossless - Pause frames are used as the flow control mechanism. The Port, VLAN, and DiffServ priorities are also active</p>
RT QoS Mode	<p>QoS - Port, VLAN, and DiffServ priorities are used as the flow control mechanism. Pause frames are not sent for flow control</p> <p>Lossless - Pause frames are used as the flow control mechanism. The Port, VLAN, and DiffServ priorities are also active</p>
Tail Drop Threshold	<p>The Tail Drop Threshold is the number of 256-Byte buffers each Line Card reserves for its priority queues. Since downstream traffic can arrive at gigabit speed, each Line Card buffers Ethernet frames as they wait to be sent over the MSPAN. Each Line Card provides 384 buffers which are shared by all its priority queues. The default Tail Drop configuration provides the four busiest priority queues with 96 buffers each. If only two priority queues are used, increasing the Tail Drop threshold to 192 provides better throughput.</p>

2.3.5.6.2 Quality of Service

Selecting the Quality of Service tab allows for the Quality of Service provisioning of the system.

The screenshot shows the AktinoView software interface for system management. The main window displays several configuration tabs under the 'Quality of Service' section:

- VLAN Priority Map:** A table showing scheduling types and VLAN PCP queues for different slots and units.
- IP DSCP Priority Map:** A table showing DSCP In queues for different slots and units.
- Queue Configurations:** A table showing scheduling weights and VLAN configurations for different slots and units.

At the bottom of the interface, there is an alarm log table with the following data:

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

System refresh completed

Double-clicking on the VLAN Priority, IP Differential Service Priority, or Queue Scheduling entry brings up the Ethernet Quality of Service provisioning dialog box:

**Ethernet Quality of Service**

Slot: 1  
 Unit: RT  
 XSPAN ID: 2  
 Scheduling Type: Strict Priority  
 MAC Address Aging Timeout (sec):  
 Service Ether Type: 8100

VLAN Priority Map			IP DSCP Priority Map		Queue Configurations		
VLAN PCP	..	Queue	IP DSCP values assigned to each Queue		Scheduling	Weight %	VLAN PCP
0	..	1	Queue 1	0, 1, 2, 3, 4, 5, 6, 7	Queue 1	Strict Priority	0
1	..	2	Queue 2	8, 9, 10, 11, 12, 13, 14, 15	Queue 2	Strict Priority	1
2	..	3	Queue 3	16, 17, 18, 19, 20, 21, 22, 23	Queue 3	Strict Priority	2
3	..	4	Queue 4	24, 25, 26, 27, 28, 29, 30, 31	Queue 4	Strict Priority	3
4	..	5	Queue 5	32, 33, 34, 35, 36, 37, 38, 39	Queue 5	Strict Priority	4
5	..	6	Queue 6	40, 41, 42, 43, 44, 45, 46, 47	Queue 6	Strict Priority	5
6	..	7	Queue 7	48, 49, 50, 51, 52, 53, 54, 55	Queue 7	Strict Priority	6
7	..	8	Queue 8	56, 57, 58, 59, 60, 61, 62, 63	Queue 8	Strict Priority	7
			Default Queue	1			

Buttons: OK, Apply, Cancel, Save, Load

See the following table for Quality of Service Parameters and Values:

QoS Parameters	Values
Scheduling Type	Weighted Fair Queuing Strict Priority Strict Priority & Weighted Fair Queuing
MAC Address Aging Timeout	Time in seconds after which MAC Addresses are removed from the MAC Address table.
Service Ether Type	Value for Ether Type Field that is used when adding a service VLAN tag.
VLAN Priority Map	Allows for the mapping of 802.1p p-bits for each of the AK5000 System's eight priority queues.
IP Differential Service Priority	Allows for the mapping of IP DiffServ ranges for each of the AK5000's eight system priority queues. The priorities range in values are from 0 to 63. If any values are left out, the system automatically adds the values to the Default Queue. The system needs to have all 64 DSCP priorities assigned to one of the 8 system queues.
Queue Scheduling	<p><u>Scheduling</u>: Allows configuration of each of the AK5000's eight priority queues to either Weighted Fair Queuing or Strict Priority.</p> <p><u>Weight</u>: Allows for a numeric value of 1 to 100%. The total of all queues must add to 100%.</p> <p><u>VLAN PCP</u>: Assigns the VLAN P-Bit (Priority) to each of the system's 8 different queues. Allows for a numeric value from 0 to 7 for each of the queues.</p>
Save and Load	Allows the user to Save a configuration to a file so that they can be Loaded at a later time.

2.3.5.6.3 Ports

The Ports screen displays the provisioning for the Ethernet ports in the system. Double-clicking on any Port enables the provisioning of that Port.

The screenshot shows the AktinoView application window for System\_11 (172.16.11.201). The 'Ports' tab is selected, displaying a table of port configurations. Below the table, there are summary statistics for Critical, Major, and Minor alarms, and a detailed alarm log table.

Slot	Unit	XSPAN...	Port	State	Circuit ID	Speed	Duplex	Flow Control	Priority Precedence	Port Priority	Ingress Rate Limit ...	VLAN Tr
1	RT	1	1	DOWN	Testing	AUTO	AUTO		VLAN, Port	1 (Low)		YES
1	RT	1	2	UP	Testing	AUTO	AUTO		VLAN, Port	1 (Low)		YES
1	RT	1	SFP	DOWN		1000	AUTO		VLAN, Port	1 (Low)		NO
1	RT	2	1	UP	Testing	AUTO	AUTO		VLAN, Port	1 (Low)		YES
1	RT	2	2	DOWN		AUTO	AUTO		VLAN, Port	1 (Low)		YES
1	RT	2	SFP	DOWN		100	AUTO		VLAN, Port	1 (Low)		YES
3	RT	1	1	UP	Testing	AUTO	AUTO		VLAN, Port	1 (Low)		YES
3	RT	1	2	UP		AUTO	AUTO		VLAN, Port	1 (Low)		YES
3	RT	1	SFP	DOWN		1000	AUTO		VLAN, Port	1 (Low)		YES
3	RT	2	1	UP	Testing	AUTO	AUTO		VLAN, Port	1 (Low)		YES
3	RT	2	2	DOWN		AUTO	AUTO		VLAN, Port	1 (Low)		YES
3	RT	2	SFP	DOWN		1000	AUTO		VLAN, Port	1 (Low)		YES
5	RT	3	1	UP	Testing 1	AUTO	AUTO		VLAN, Port	1 (Low)		YES
5	RT	3	2	DOWN	Testing 2	AUTO	AUTO		VLAN, Port	1 (Low)		YES
5	RT	3	SFP	UP	123456789012345678901...	1000	AUTO		VLAN, Port	1 (Low)		YES
5	RT	4	1	UP		AUTO	AUTO		VLAN, Port	1 (Low)		YES
5	RT	4	2	DOWN		AUTO	AUTO		VLAN, Port	1 (Low)		YES
5	RT	4	SFP	DOWN		100	AUTO		VLAN, Port	1 (Low)		YES
11	CO	1	DOWN			AUTO	AUTO		VLAN, Port	1 (Low)		
11	CO	2	DOWN			AUTO	AUTO		VLAN, Port	1 (Low)		
11	CO	3	DOWN			AUTO	AUTO		VLAN, Port	1 (Low)		
11	RT	1	DOWN			AUTO	AUTO		VLAN, Port	1 (Low)		YES
11	RT	2	DOWN			AUTO	AUTO		VLAN, Port	1 (Low)		YES
11	RT	3	DOWN			AUTO	AUTO		VLAN, Port	1 (Low)		YES
11	RT	SFP	DOWN			100	AUTO		VLAN, Port	1 (Low)		NO

Slot: All

Critical: 0 Major: 0 Minor: 0

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

System refresh completed



**Ethernet** Aktino.

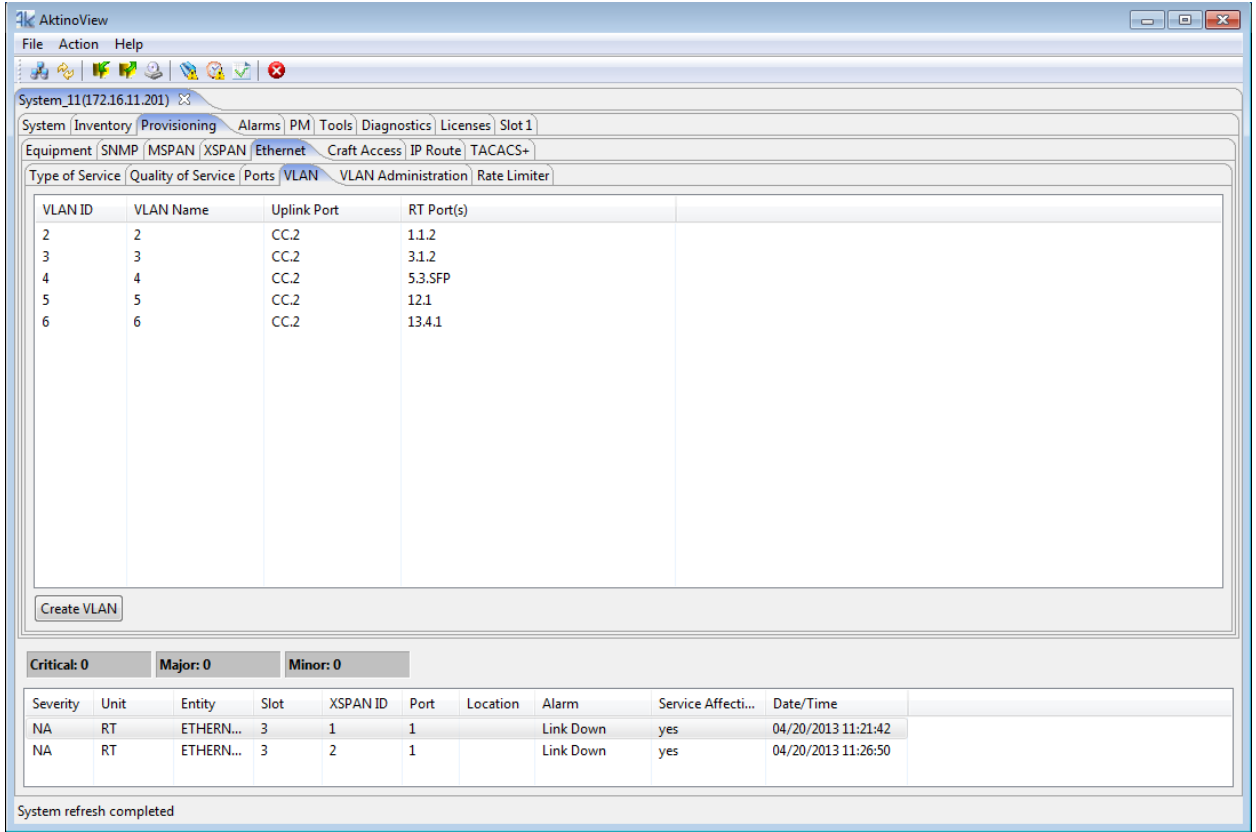
Slot	1
Unit	RT
XSPAN ID	1
Port	1
Circuit ID	Testing
Speed	AUTO
Duplex	AUTO
Flow Control	
Priority Precedence	VLAN, Port
Port Priority	1 (Low)
Ingress Rate Limit (Mbps)	
VLAN Trust Mode	YES
Untagged VLAN ID	0
Loopback Enabled	
State	DOWN
Frame Type	ALL

See the following table for the Parameters and Values:

Ethernet Parameters	Values
Circuit ID	User configurable string of up to 48 characters
Speed	Sets the Ethernet Speed for the selected port
Duplex	Sets the Ethernet Duplex for the selected port
Priority Precedence	Sets the order in which the priority level is determined: VLAN DiffServ, Port VLAN, Port DiffServ, Port Port Only
Port Priority	Sets the default port priority level
Ingress Rate Limit (Mbps)	Sets an ingress Rate Limit for the Ethernet data, where "0" means no Ingress Rate Limit is set
VLAN Trust Mode	For CRUs in Tunneled VLAN mode only: YES - CRU Ingress packets which have a VLAN ID matching a provisioned VLAN ID will be passed through transparently, otherwise the packet is dropped. CRU Egress packets are passed through transparently.  NO - CRU Ingress packets have the VLAN ID assigned to the port added to the packet (the outer VLAN ID if a VLAN ID is already present). CRU Egress packets have the outer VLAN ID stripped.
Untagged VLAN ID	For CRUs in Tunneled VLAN mode only: For ingress frames that are untagged, the VLAN ID entered will be added to CRU Ingress untagged packets, then checked for VLAN membership. If set to "0", untagged CRU ingress frames will be dropped.
Loopback Enabled	Yes - Ethernet Loopback enabled No - Ethernet Loopback disabled
State	Up - Ethernet Port is in service Down - Ethernet Port is out of service
Frame Type	All – Allows both tagged and untagged frames  Tagged – Allows only tagged frames. Untagged frames will be discarded.  Untagged – Allows untagged frames only. Tagged frames will be discarded.

2.3.5.6.4 VLAN

Selecting the VLAN tab allows the VLAN provisioning of the system. Note that this menu is available when at least one Slot in the System is provisioned for Tunneled VLAN service.



Click the **Create VLAN** button to add a VLAN to the system.

**Create VLAN**

VLAN ID:

VLAN Name:

Uplink Port:  1  2  SFP

RT Port(s)	Slot	XSPAN ID	1	2	3	SFP
	Slot 1	XSPAN ID 1	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 1	XSPAN ID 2	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 1	XSPAN ID 3	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 1	XSPAN ID 4	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 3	XSPAN ID 1	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 3	XSPAN ID 2	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 3	XSPAN ID 3	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 3	XSPAN ID 4	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 5	XSPAN ID 1	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 5	XSPAN ID 2	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 5	XSPAN ID 3	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 5	XSPAN ID 4	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 11	MSPAN ID 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Slot 12	MSPAN ID 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Slot 13	XSPAN ID 1	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 13	XSPAN ID 2	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 13	XSPAN ID 3	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 13	XSPAN ID 4	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 15	MSPAN ID 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Slot 16	MSPAN ID 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

OK Apply Cancel

See the following table for the VLAN Parameters and Values:

VLAN Parameters	Values
VLAN ID	Enter a VLAN ID from 1 to 4092
VLAN Name	User configurable string of up to 31 characters
Uplink Port	Specify the Uplink Port on the Common Control Card this VLAN ID is assigned to
RT Port(s)	Specify the CRU Port(s) this VLAN ID is assigned to

Once a VLAN ID is created, double-click on the VLAN ID to bring up the Modify VLAN dialog box. **Note:** If multiple VLANs are required through a CRU Ethernet Port, the port must be set to "VLAN Trust Mode" = Yes.

**Modify VLAN**

VLAN ID: 2

VLAN Name: 2

Uplink Port:  1  2  SFP

RT Port(s)	Slot	XSPAN ID	1	2	3	SFP
	Slot 1	XSPAN ID 1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	Slot 1	XSPAN ID 2	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 1	XSPAN ID 3	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 1	XSPAN ID 4	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 3	XSPAN ID 1	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 3	XSPAN ID 2	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 3	XSPAN ID 3	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 3	XSPAN ID 4	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 5	XSPAN ID 1	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 5	XSPAN ID 2	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 5	XSPAN ID 3	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 5	XSPAN ID 4	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 11	MSPAN ID 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Slot 12	MSPAN ID 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Slot 13	XSPAN ID 1	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 13	XSPAN ID 2	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 13	XSPAN ID 3	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 13	XSPAN ID 4	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Slot 15	MSPAN ID 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Slot 16	MSPAN ID 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Buttons: OK, Apply, Cancel

2.3.5.6.5 VLAN Administration

Selecting the VLAN Administration tab allows you to provision a management VLAN. The VLAN can be transparently passed through to RT ports to allow other equipment to use the same management VLAN.

The screenshot shows the AktinoView interface for system 'System\_11 (172.16.11.201)'. The 'VLAN Administration' tab is active, displaying a table with the following configuration:

VLAN ID	IP Address	Subnet Mask	Default Gateway	Uplink Port	RT Ports
112	192.168.10.11	255.255.255.0	172.16.254.254	CC.1	16.SFP

Below the table, there are status indicators: Critical: 0, Major: 0, Minor: 0. An alarm log at the bottom shows two 'Link Down' events:

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

System refresh completed

Click the **VLAN Admin** button to bring up the following dialog box:

**VLAN Administration**

VLAN ID:

IP Address:

Subnet Mask:

Default Gateway:

Uplink Port:  1       2       SFP

	Slot 1	XSPAN ID 1	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> SFP
	Slot 1	XSPAN ID 2	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> SFP
	Slot 1	XSPAN ID 3	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> SFP
	Slot 1	XSPAN ID 4	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> SFP
	Slot 3	XSPAN ID 1	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> SFP
	Slot 3	XSPAN ID 2	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> SFP
	Slot 3	XSPAN ID 3	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> SFP
	Slot 3	XSPAN ID 4	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> SFP
	Slot 5	XSPAN ID 1	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> SFP
	Slot 5	XSPAN ID 2	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> SFP
	Slot 5	XSPAN ID 3	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> SFP
	Slot 5	XSPAN ID 4	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> SFP
RT Port(s)	Slot 11	MSPAN ID 1	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3 <input type="checkbox"/> SFP
	Slot 12	MSPAN ID 1	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3 <input type="checkbox"/> SFP
	Slot 13	XSPAN ID 1	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> SFP
	Slot 13	XSPAN ID 2	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> SFP
	Slot 13	XSPAN ID 3	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> SFP
	Slot 13	XSPAN ID 4	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> SFP
	Slot 15	MSPAN ID 1	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3 <input type="checkbox"/> SFP
	Slot 16	MSPAN ID 1	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3 <input checked="" type="checkbox"/> SFP



See the following table for the VLAN Administration Parameters and Values:

VLAN Administration Parameters	Values
VLAN ID	Enter a VLAN ID from 1 to 4092, a value of 0 disables the Management VLAN
IP Address	The IP Address for the Management VLAN
Subnet Mask	The Subnet Mask for the Management VLAN
Default Gateway	The Default Gateway for the Management VLAN
Uplink Port	Specify the Uplink Port on the Common Control Card this VLAN ID is assigned to
RT Ports	Specify the CRU Port(s) this VLAN ID is assigned to

2.3.5.6.6 Rate Limiter

Selecting the Rate Limiter tab allows you to provision Ethernet Rate Limiters for the selected Ethernet Port.

Name	Type	Slot	Unit	XSPAN ID	Port	VLAN ID	COS	CIR (Mbps)	CBS (Bytes)	PIR (Mbps)	PBS (Bytes)
Downstream VLAN2	Port VLAN	1	CO		ICC	2		1	22222	1	22222
Downstream VLAN3	Port VLAN	3	CO		ICC	3		2	22222	2	22222
Downstream VLAN4	Port VLAN	5	CO		ICC	4		3	22222	3	22222
Downstream VLAN5	Port VLAN	12	CO		ICC	5		4	22222		
Downstream VLAN6	Port VLAN	13	CO		ICC	6		5	22222	5	22222
Upstream Port 12.1...	Port	12	RT		1			10	22222		
Upstream Port 5.3...	Port	5	RT	3	SFP			25	22222	25	22222
Upstream VLAN2 ...	Port VLAN	1	RT	1	2	2		10	22222	10	22222
Upstream VLAN3 C...	Port VLAN CoS	3	RT	1	2	3	3	10	22222	10	22222
Upstream VLAN6 ...	Port VLAN	13	RT	4	1	6		5	22222	5	22222

Critical: 0    Major: 0    Minor: 0

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

System refresh completed

Click the **Create Rate Limiter** button to display the following dialog box:



The image shows a dialog box titled "Rate Limiter" with the Aktino logo in the top right corner. The dialog contains several input fields and dropdown menus for configuring a rate limiter. The fields are: Name (text input), Slot (dropdown menu with value 1), Unit (dropdown menu with value RT), XSPAN ID (dropdown menu with value 1), Port (dropdown menu with value 1), Type (dropdown menu with value Port), VLAN ID (text input), COS (dropdown menu with value 0), CIR (Mbps) (text input), CBS (Bytes) (text input), PIR (Mbps) (text input), and PBS (Bytes) (text input). At the bottom, there are three buttons: OK, Apply, and Cancel.

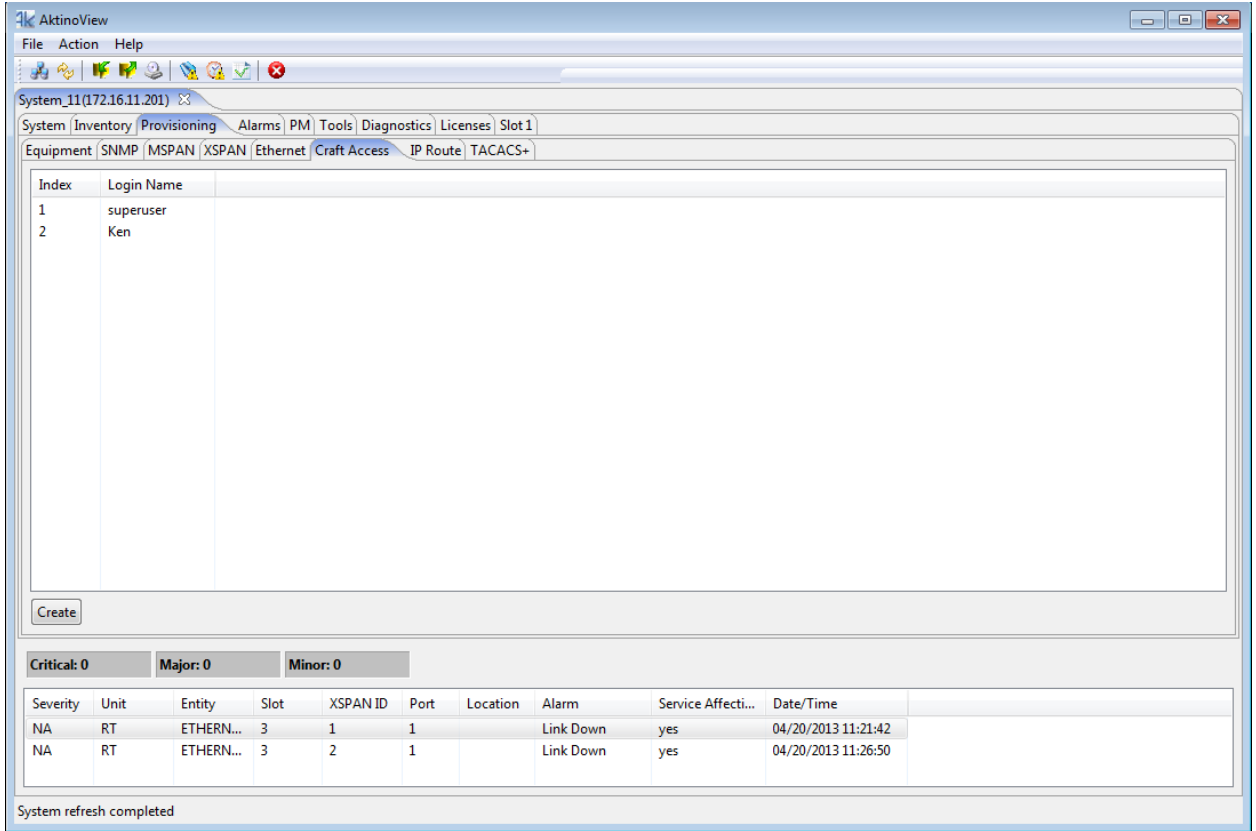
Field	Value
Name	
Slot	1
Unit	RT
XSPAN ID	1
Port	1
Type	Port
VLAN ID	
COS	0
CIR (Mbps)	
CBS (Bytes)	
PIR (Mbps)	
PBS (Bytes)	

See the following table for the Rate Limiter Parameters and Values:

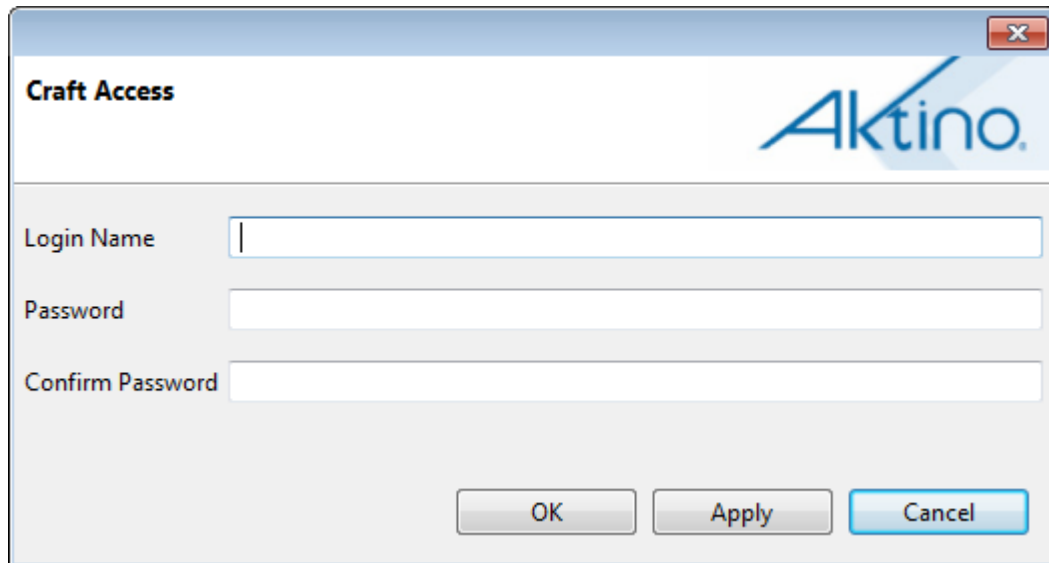
Rate Limiter Parameters	Values
Name	The Name for the Rate Limiter
Slot	Select the Slot
Unit	Select CO or RT
XSPAN ID	For FlexStream 200 and FlexStream 800 products only: Used in conjunction with the Slot entry to select the desired CRU (1 to 4)
Port	Select the Port
Type	Port - The Rate Limiter is for the selected Ethernet Port Port VLAN - The Rate Limiter is for the selected VLAN Port VLAN CoS - The Rate Limiter is for the selected Class of Service on the selected VLAN ID on the selected Port
VLAN ID	Specifies the VLAN ID and Port for the Rate Limiter (for Port VLAN and Port VLAN CoS modes only)
CoS	Select the Class of Service (for Port VLAN CoS mode only)
CiR (Mbps)	Committed Information Rate in Mbps (1 to 1024)
CBS (Bytes)	Committed Burst Size in bytes (16384 to 1048576)
PIR (Mbps)	For FlexStream 200 and FlexStream 800 products only: Peak Information Rate in Mbps (1 to 1024)
PBS (Bytes)	For FlexStream 200 and FlexStream 800 products only: Peak Burst Size in bytes (16384 to 1048576)

### 2.3.5.7 Craft Access

Selecting the Craft Access tab under Provisioning allows management administration.



Click the **Create** button to bring up the following Craft Access dialog box:



The screenshot shows a standard Windows-style dialog box titled "Craft Access" with the Aktino logo in the top right corner. The dialog contains three text input fields stacked vertically, labeled "Login Name", "Password", and "Confirm Password". At the bottom of the dialog, there are three buttons: "OK", "Apply", and "Cancel". The "Cancel" button is highlighted with a blue border.

The Craft Access dialog box provides fields where the Login Name and Password is created for the new Craft Access user

### 2.3.5.8 IP Route

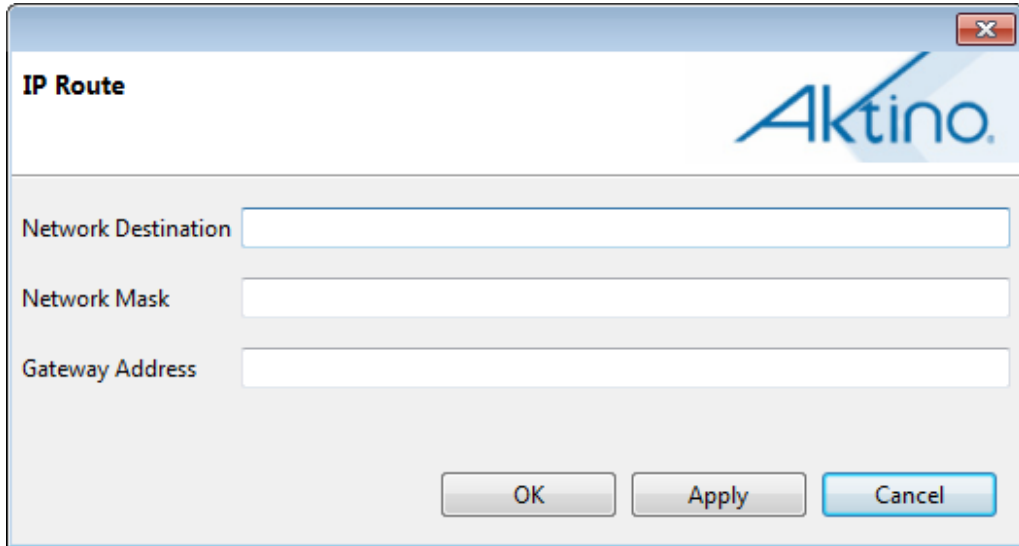
The IP Route tab allows you to provision static routes for the AK590CC Common Control card.

The screenshot shows the AktinoView application window. The main content area is titled 'System\_11(172.16.11.201)' and has several tabs: System, Inventory, Provisioning, Alarms, PM, Tools, Diagnostics, Licenses, Slot 1, Equipment, SNMP, MSPAN, XSPAN, Ethernet, Craft Access, IP Route, and TACACS+. The 'IP Route' tab is active, displaying a table with the following columns: Index, Network Destination, Network Mask, and Gateway Address. Below the table is a 'Create' button. At the bottom of the window, there is a summary section showing 'Critical: 0', 'Major: 0', and 'Minor: 0'. Below this is an alarm log table with the following data:

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

System refresh completed

Click the **Create** button to display the following dialog box:



The screenshot shows a dialog box titled "IP Route" with the Aktino logo in the top right corner. The dialog contains three text input fields: "Network Destination", "Network Mask", and "Gateway Address". At the bottom of the dialog are three buttons: "OK", "Apply", and "Cancel".

See the following table for the IP Route Parameters and Values:

IP Route Parameters	Values
Network Destination	Destination Network Address
Network Mask	Network Mask
Gateway Address	Gateway Address

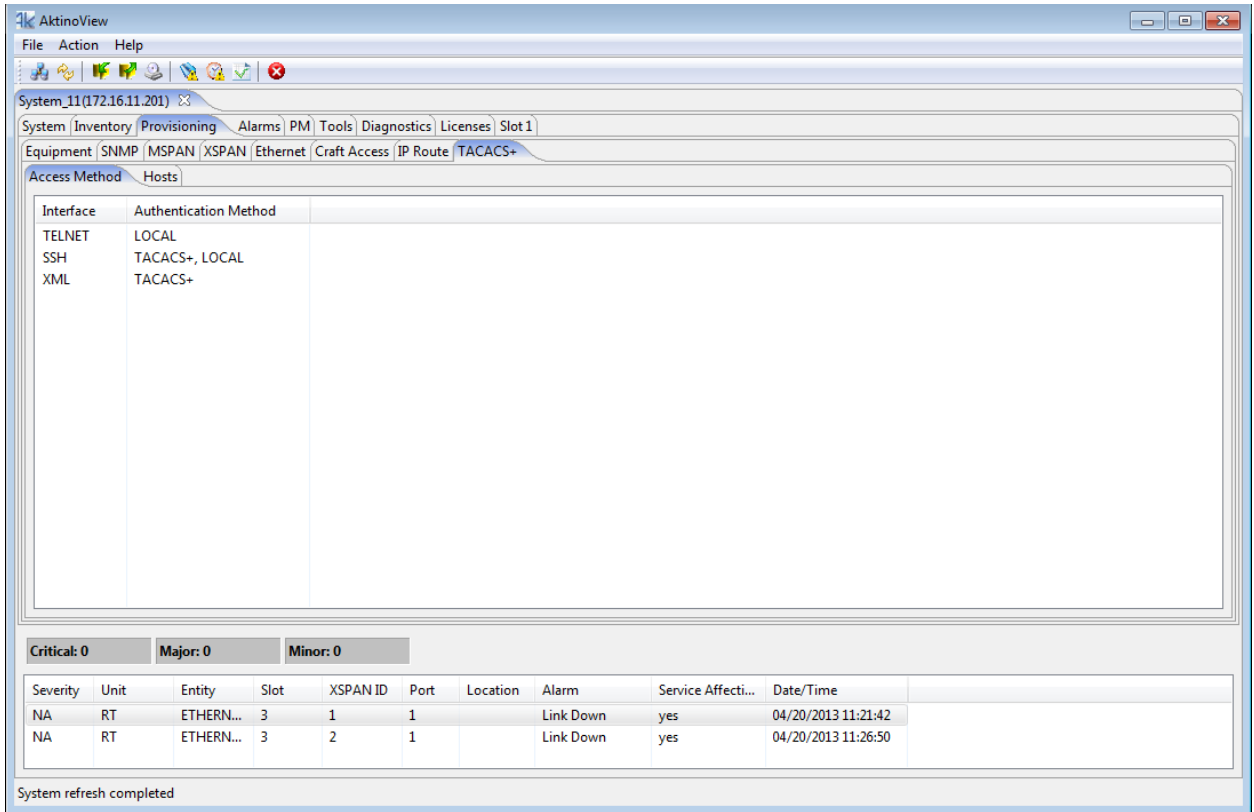


### 2.3.5.9 TACACS+

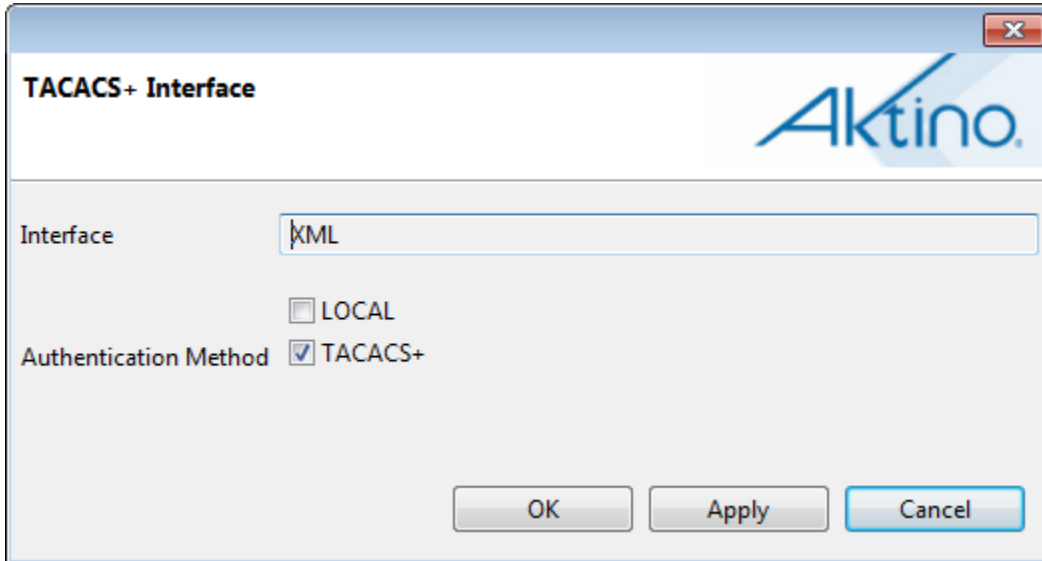
Clicking the TACACS+ tab displays all the TACACS+ configuration sub-sections supported by the AK5000 System.

#### 2.3.5.9.1 TACACS+ > Access Method

Selecting the Access Method tab allows you to provision which Authentication Method is selected for the various Access Methods.



Double click on the desired Interface to display its configuration options



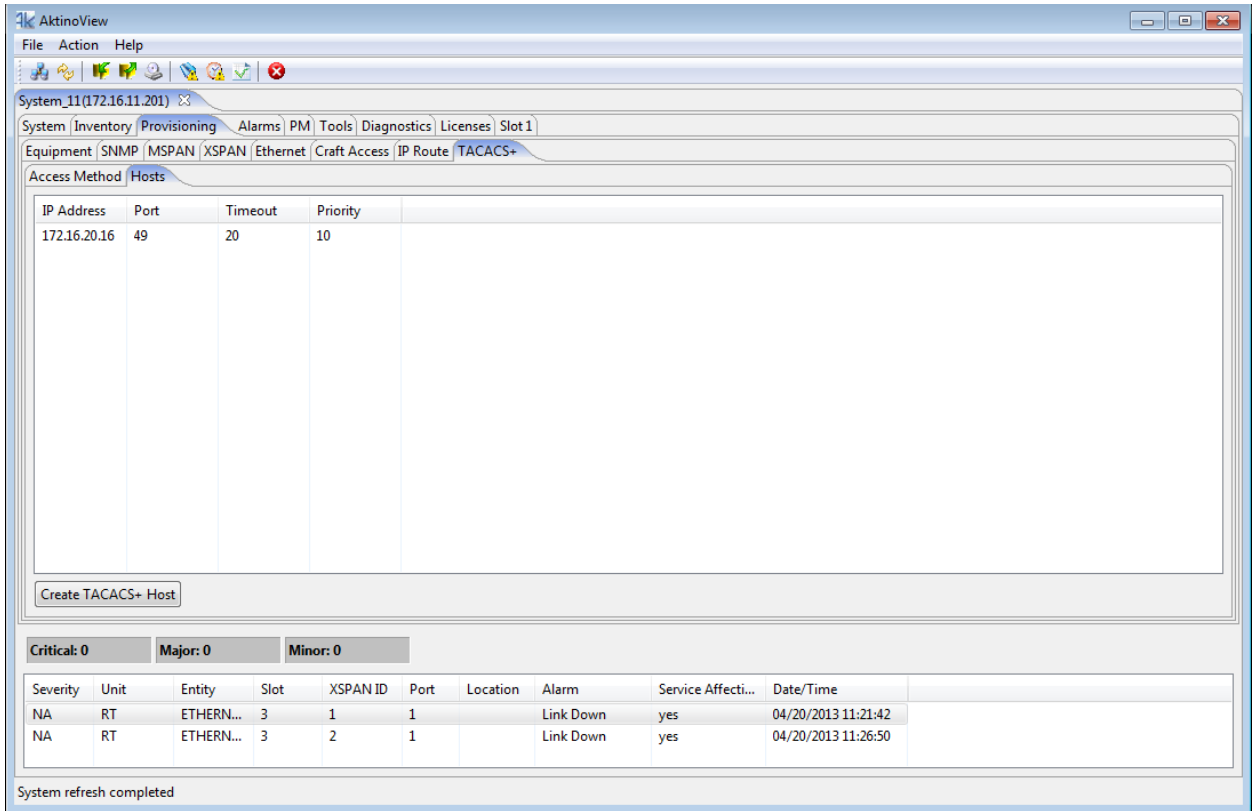
See the following table for the Interface and Authentication Parameters and Values:

Access Method	Values
Interface	<p>TELNET: For Telnet connections to the system</p> <p>SSH: For SSH connections to the system.</p> <p>XML: For AktinoView or Aktino EMS connections to the system</p>
Authentication Method	<p>Local: Use the system's locally stored user database for user authentication</p> <p>TACACS+: Use a TACACS+ Server for user authentication</p>

**Note:** In order to enable SSH connections, the SSH Server host keys need to be generated via the CLI.

2.3.5.9.2 TACACS+ > Hosts

Selecting the Hosts tab allows you to provision the settings for the TACACS+ Host Servers on the network.



Double click on the desired Interface to display its configuration options or click the Create TACACS+ Host button to add a TACACS+ Host Server

The screenshot shows a configuration window titled "TACACS+ Host" with the Aktino logo. The fields are as follows:

- IP Address: 172.16.20.16
- Port: 49
- Key: [Masked with 10 dots]
- Timeout: 20
- Priority: 10

Buttons: OK, Cancel

See the following table for the TACACS+ Host Configuration and Values:

Host Options	Values
IP Address	The IP Address of the TACACS+ Server
Port	The TCP Port number to use when communicating with the TACACS+ Server
Key	The TACACS+ Server Host Key string
Timeout	The timeout to wait for a response from the TACACS+ Server before querying the next TACACS+ Server in the network
Priority	For applications requiring multiple TACSACS+ Servers, an integer value giving the selected TACACS+ Server a priority, where the system queries the TACACS+ Servers starting with the lowest Priority value configured amongst the TACACS+ Servers

## 2.3.6 Alarms

### 2.3.6.1 Alarm Log > CO

The Alarm Log CO tab displays a list of all the alarms observed on the CO side of the system including time-stamp information as to when the alarm was triggered or cleared.

**Note:** See Appendix B for more Alarm details.

System refresh completed

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Active	Date
CR	CO	XSPAN	3	2			Loss of Signal	yes	-	04/2
MN	CO	PAIR	1		12		Loss of Signal	-	-	04/2
MN	CO	PAIR	1		10		Loss of Signal	-	-	04/2
MN	CO	PAIR	1		9		Loss of Signal	-	-	04/2
CR	CO	XSPAN	3	2			Loss of Signal	yes	yes	04/2
CR	CO	XSPAN	1	1			Loss of Signal	yes	-	04/2
CR	CO	XSPAN	1	2			Loss of Signal	yes	-	04/2
NA	CO	EQPT	CC B				Clock Change	-	yes	04/2
MN	CO	PAIR	1		10		Loss of Signal	-	yes	04/2
MN	CO	PAIR	1		12		Loss of Signal	-	yes	04/2
MN	CO	PAIR	1		9		Loss of Signal	-	yes	04/2
CR	CO	XSPAN	3	1			Loss of Signal	yes	-	04/2
CR	CO	MSPAN	16				Loss of Frame	yes	-	04/2
CR	CO	MSPAN	15				Loss of Frame	yes	-	04/2

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

2.3.6.2 Alarm Log > RT

The Alarm Log RT tab displays a list of all the alarms observed on the RT side of the system including time-stamp information as to when the alarm was triggered or cleared.

**Note:** See Appendix B for more Alarm details.

System refresh completed

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Active	Date
CR	RT	XSPAN...	3	1			Loss of Signal	yes	-	12/0
NA	RT	ETHERN...	3	1	1		Link Down	yes	yes	12/0
CR	RT	XSPAN...	3	1			Loss of Signal	yes	yes	12/0
NA	RT	ETHERN...	3	2	1		Link Down	yes	yes	04/2
CR	RT	XSPAN...	1	2		RT2	Loss of Signal	yes	-	04/2
CR	RT	XSPAN...	1	1			Loss of Signal	yes	-	04/2
NA	RT	ETHERN...	15		1		Link Down	yes	-	04/2
NA	RT	ETHERN...	15		2		Link Down	yes	-	04/2
NA	RT	ETHERN...	15		3		Link Down	yes	-	04/2
NA	RT	ETHERN...	15		SFP		Link Down	yes	-	04/2
NA	RT	ETHERN...	12		2		Link Down	yes	-	04/2
NA	RT	ETHERN...	12		3		Link Down	yes	-	04/2
NA	RT	ETHERN...	12		SFP		Link Down	yes	-	04/2
NA	RT	ETHERN...	11		1		Link Down	yes	-	04/2

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

### 2.3.6.3 Alarm History > CO

The Alarm History CO tab displays the alarms that have been observed by the CO side of the system, and how many times each of the alarms has been observed, as well as the first and last times the alarm has been observed.

**Note:** See Appendix B for more Alarm details.

System refresh completed

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	First Time	Last
CR	CO	XSPAN	3	2			Loss of Signal	yes	04/18/2013 09:53:44	04/2
NA	CO	EQPT	CC B				Clock Change	-	04/20/2013 11:25:28	04/2
MN	CO	PAIR	1		10		Loss of Signal	-	04/20/2013 11:25:26	04/2
MN	CO	PAIR	1		12		Loss of Signal	-	04/20/2013 11:25:26	04/2
MN	CO	PAIR	1		9		Loss of Signal	-	04/20/2013 11:25:26	04/2
CR	CO	MSPAN	16				Loss of Frame	yes	04/18/2013 09:54:56	04/2
CR	CO	XSPAN	1	2			Loss of Signal	yes	04/18/2013 09:53:50	04/2
CR	CO	MSPAN	15				Loss of Frame	yes	04/18/2013 09:54:36	04/2
CR	CO	EQPT	CC A				Improper Removal	yes	04/19/2013 17:03:43	04/2
CR	CO	XSPAN	1	1			Loss of Signal	yes	04/18/2013 09:53:50	04/2
MN	CO	PAIR	16		1		Loss of Signal	-	04/20/2013 11:23:28	04/2
MN	CO	PAIR	16		2		Loss of Signal	-	04/20/2013 11:23:28	04/2
MN	CO	PAIR	16		3		Loss of Signal	-	04/20/2013 11:23:28	04/2
MN	CO	PAIR	16		4		Loss of Signal	-	04/20/2013 11:23:28	04/2

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

**2.3.6.4 Alarm History > RT**

The Alarm History RT tab displays the alarms that have been observed by the RT side of the system, and how many times each of the alarms has been observed, as well as the first and last times the alarm has been observed.

**Note:** See Appendix B for more Alarm details.

The screenshot shows the AktinoView application window. The main area displays the 'Alarm History' tab for 'RT'. The table below shows a list of alarms with columns for Severity, Unit, Entity, Slot, XSPAN ID, Port, Location, Alarm, Service Affecti..., First Time, and Last. A 'Refresh' button is located below the table. At the bottom, a summary bar indicates 'Critical: 0', 'Major: 0', and 'Minor: 0'. Below this, a detailed view of the last alarm is shown.

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	First Time	Last
CR	RT	XSPAN	3	1			Loss of Signal	yes	12/03/2036 17:26:59	12/0
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/18/2013 09:53:31	04/2
CR	RT	XSPAN	1	2		RT2	Loss of Signal	yes	04/19/2013 17:06:19	04/2
CR	RT	XSPAN	1	1			Loss of Signal	yes	04/19/2013 09:56:53	04/2
NA	RT	ETHERN...	3	1	1		Link Down	yes	12/03/2036 17:27:00	04/2
CR	RT	EQPT	3	2			Mismatched Equipment	yes	04/20/2013 11:20:30	04/2
NA	RT	ETHERN...	15	1	1		Link Down	yes	04/18/2013 09:54:05	04/2
NA	RT	ETHERN...	15	1	2		Link Down	yes	04/18/2013 09:54:05	04/2
NA	RT	ETHERN...	15	1	3		Link Down	yes	04/18/2013 09:54:05	04/2
NA	RT	ETHERN...	15	1	SFP		Link Down	yes	04/18/2013 09:54:05	04/2
NA	RT	ETHERN...	12	1	2		Link Down	yes	04/18/2013 09:54:07	04/2
NA	RT	ETHERN...	12	1	3		Link Down	yes	04/18/2013 09:54:07	04/2
NA	RT	ETHERN...	12	1	SFP		Link Down	yes	04/18/2013 09:54:07	04/2
NA	RT	ETHERN...	11	1	1		Link Down	yes	04/18/2013 09:54:09	04/2

Summary: Critical: 0 Major: 0 Minor: 0

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

System refresh completed



### 2.3.7 Performance Monitoring (PM)

The PM tab allows you to display detailed Performance related information for the AK5000 System's Ethernet Ports, MSPAN, and XSPAN interfaces, and individual MSPAN and XSPAN Pairs. This PM data is provided for both the CO and RT sides of the system

**Note:** See Appendix C for more details.

#### 2.3.7.1 Ethernet > CO > Summary

The Ethernet CO Summary tab displays Ethernet Link information and counters for the selected Ethernet Slot. The page can be provisioned to refresh automatically, select the desired slot, and time-stamp information is displayed for each of the entries.

System refresh completed

2.3.7.2 Ethernet > CO > Detail

The Ethernet CO Detail tab displays detailed Ethernet counters for the selected Ethernet Slot. The page can be provisioned to refresh automatically, and time-stamp information is displayed for each of the entries.

The screenshot shows the AktinoView interface for system 11 (172.16.11.201). The navigation path is Ethernet > MSPAN > XSPAN > CO > RT > Detail. The 'Detail' sub-tab is active, showing Ethernet counters for Slot 11. The 'In Parameters' and 'Out Parameters' tables both show zero activity for all metrics across three ports (1, 2, and 3) on three consecutive timestamps (04/21/2013 16:43:55, 16:43:56, and 16:43:56). Below the tables, there is a 'Refresh' button and a 'Slot' dropdown menu set to '11'. At the bottom, the alarm status is shown as Critical: 0, Major: 0, and Minor: 0. An active alarm table is also visible, listing two 'Link Down' alarms on Ethernet ports 1 and 2 of Slot 3.

Time	Slot	Unit	Port	Unicast Pkts	Broadcasts	Multicasts	Pause	Octets	64 Octets	127 Octets	255 Octets	511 Octets	102
04/21/2013 16:43:55	11	CO	1	0	0	0	0	0	0	0	0	0	0
04/21/2013 16:43:56	11	CO	2	0	0	0	0	0	0	0	0	0	0
04/21/2013 16:43:56	11	CO	3	0	0	0	0	0	0	0	0	0	0

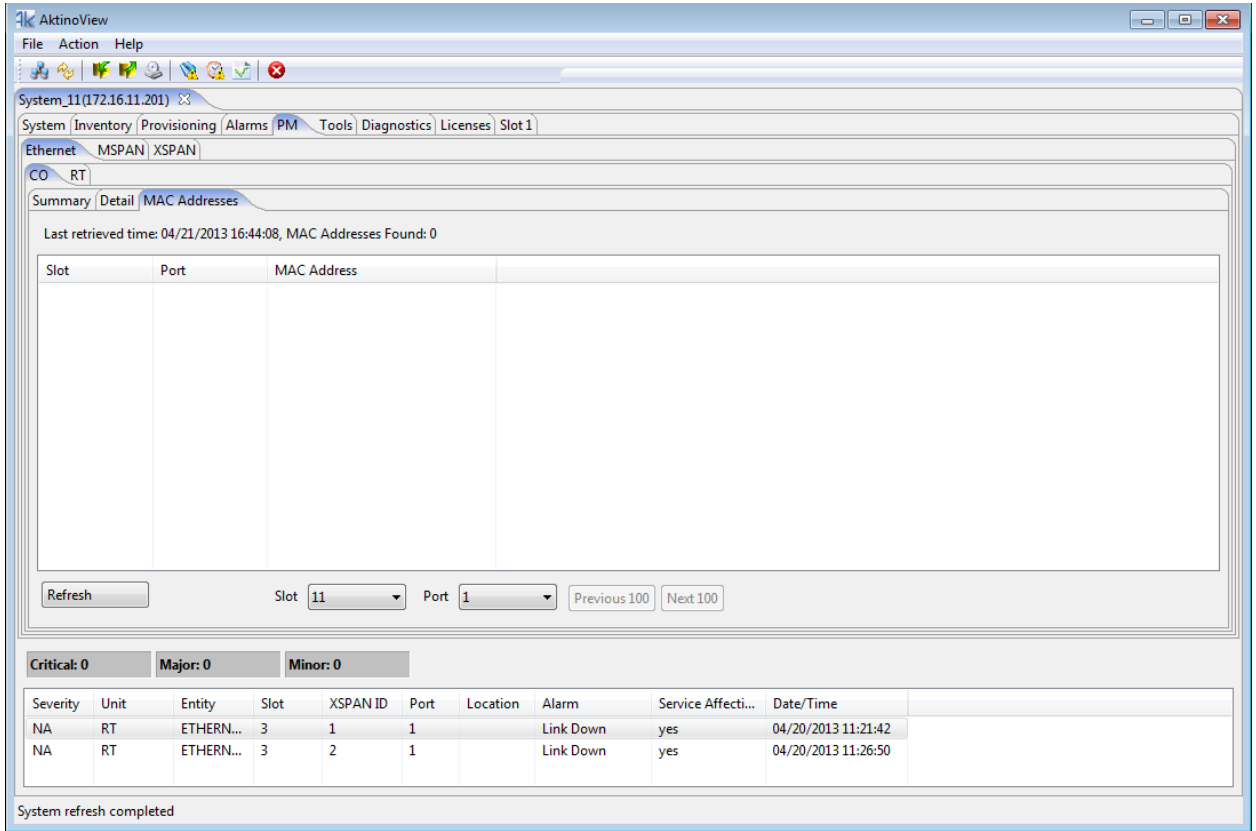
Time	Slot	Unit	Port	Unicast Pkts	Broadcasts	Multicasts	Pause	Octets	64 Octets	127 Octets	255 Octets	511 Octets	102
04/21/2013 16:43:55	11	CO	1	0	0	0	0	0	0	0	0	0	0
04/21/2013 16:43:56	11	CO	2	0	0	0	0	0	0	0	0	0	0
04/21/2013 16:43:56	11	CO	3	0	0	0	0	0	0	0	0	0	0

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

**2.3.7.3 Ethernet > CO > MAC Addresses**

The Ethernet CO MAC Addresses tab displays the Ethernet MAC Addresses learned by the selected slot.



The page can be provisioned to refresh automatically, select the Slot and Port, and scroll between the discovered MAC Addresses.



2.3.7.4 Ethernet > RT > Summary

The Ethernet RT Summary tab displays Ethernet Link information and counters for the selected CRU.

The screenshot shows the AktinoView interface with the Ethernet RT Summary tab selected. It contains two data tables and control elements.

Time	Slot	Unit	XSPAN ID	Port	State	Resolved	Speed	Duplex	In Frames	Out Frames	In Errors	Discarded Pkts
04/21/2013 16:44:23	1	RT	1	1	DO...	NO	1000	FULL	0	0	0	0
04/21/2013 16:44:23	1	RT	1	2	UP	YES	1000	FULL	2582806945	13194593	2	0
04/21/2013 16:44:24	1	RT	1	SFP	DO...	NO	1000	FULL	0	0	0	0

Time	Slot	Unit	XSPAN ID	Port	In Octets	Bad Octets	Undersize	Oversize	Fragments	Align Errors	Jabber	Collision
04/21/2013 16:44:23	1	RT	1	1	0	0	0	0	0	0	0	0
04/21/2013 16:44:23	1	RT	1	2	3389314048	972	0	0	0	0	0	0
04/21/2013 16:44:24	1	RT	1	SFP	0	0	0	0	0	0	0	0

Refresh    now    Slot 1    XSPAN ID 1

Critical: 0    Major: 0    Minor: 0

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

System refresh completed

The page can be provisioned to refresh automatically, select the desired Slot and XSPAN ID, and time-stamp information is displayed for each of the entries.

Refresh    now    Slot 1    XSPAN ID 1

2.3.7.5 Ethernet > RT > Detail

The Ethernet RT Detail tab displays detailed Ethernet counters for the selected CRU. The page can be provisioned to refresh automatically, and time-stamp information is displayed for each of the entries.

The screenshot shows the AktinoView application window. The main content area displays Ethernet RT Detail statistics for Slot 1, XSPAN ID 1. It is divided into 'In Parameters' and 'Out Parameters' sections, each with a table of traffic statistics. Below these tables are controls for refreshing the data and selecting filters. At the bottom, there is a summary of alarm counts (Critical: 0, Major: 0, Minor: 0) and a table of active alarms.

**In Parameters**

Time	Slot	Unit	XSPAN ID	Port	Unicast Pkts	Broadcasts	Multicasts	Pause	Octets	64 Octets	127 Octets	255 Octets	511
04/21/2013 16:44:35	1	RT	1	1	0	0	0	0	0	0	0	0	0
04/21/2013 16:44:35	1	RT	1	2	2583096087	0	0	0	3685056512	0	0	1	0
04/21/2013 16:44:36	1	RT	1	SFP	0	0	0	0	0	0	0	0	0

**Out Parameters**

Time	Slot	Unit	XSPAN ID	Port	Unicast Pkts	Broadcasts	Multicasts	Pause	Octets	64 Octets	127 Octets	255 Octets	511
04/21/2013 16:44:35	1	RT	1	1	0	0	0	0	0	0	0	0	0
04/21/2013 16:44:35	1	RT	1	2	13196073	0	0	0	258406056	0	0	0	0
04/21/2013 16:44:36	1	RT	1	SFP	0	0	0	0	0	0	0	0	0

Refresh:  now

Slot:  XSPAN ID:

**Alarm Summary:** Critical: 0, Major: 0, Minor: 0

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

System refresh completed

2.3.7.6 Ethernet > RT > Circuit

The Ethernet RT Circuit tab shows performance monitoring traffic from the RT port to the Common Control Card.

The screenshot shows the AktinoView interface. The main window displays the 'Ethernet > RT > Circuit' tab. Below the navigation tabs, there is a table with the following data:

Time	Slot	Entity	XSPAN ID	Port	In Frames	Out Frames	Discarded Pkts	Filtered Pkts	Paused	Tail Drop Fram...
04/27/2013 10:53:08	12	RT		1	775791118	491942802	0	0	0	
04/27/2013 10:53:09	12	CO		ICCA	1248404382	3076060694	0	0	0	
04/27/2013 10:53:09	12	CO		IMS1	3170040322	491957611	0	0	0	0
04/27/2013 10:53:09	CC A	CC A		ISL12	3076050614	1248161646	0	0	0	
04/27/2013 10:53:09	CC A	CC A		2	2155075019	793073582	0	0	0	

Below the table, there are controls for 'Refresh', a frequency dropdown set to 'now', and dropdowns for 'Slot' (12) and 'Port' (1). At the bottom, there are status indicators for 'Critical: 0', 'Major: 0', and 'Minor: 0', followed by an alarm log table:

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/24/2013 14:44:10
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/24/2013 13:33:18

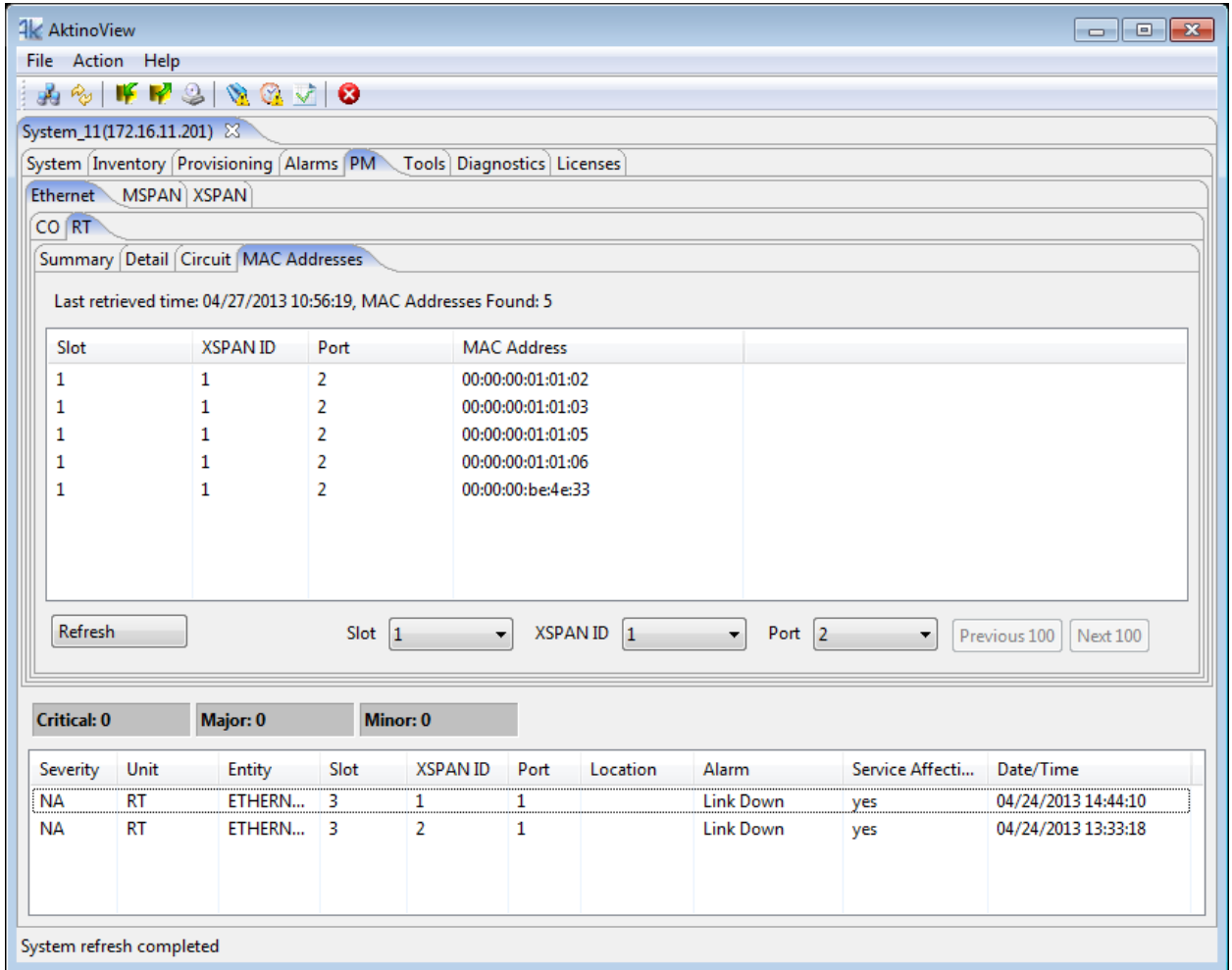
The status bar at the bottom indicates 'System refresh completed'.

The page can be provisioned to refresh automatically, select the CRU Port to monitor, and time-stamp information is displayed for each of the entries.

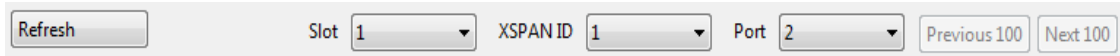
This image shows a close-up of the refresh controls. It includes a 'Refresh' button, a frequency dropdown menu currently set to 'now', and two dropdown menus for 'Slot' (set to 1) and 'Port' (set to 1).

**2.3.7.7 Ethernet > RT > MAC Addresses**

The Ethernet RT MAC Addresses tab displays the Ethernet MAC Addresses learned by the selected CRU port.



The page can be provisioned to refresh automatically, select the desired Slot, XSPAN ID, CRU Port, and scroll between the discovered MAC Addresses.



**2.3.7.8 MSPAN > CO > MSPAN**

The MSPAN CO MSPAN tab displays the upstream PM information for the selected MSPAN. This PM data is separated into three sections:

- 1 The heading section provides summary information for the MSPAN including upstream MSPAN Capacity, Rate, and SNR Margin values.
- 2 The 15-Minutes section provides PM data for 15-Minute intervals for the last 24-hours.
- 3 The 24-Hours section provides PM data for the previous 7 days.

The screenshot shows the AktinoView interface for System\_11 (172.16.11.201). The 'PM' tab is active, showing the 'MSPAN' configuration for 'Pair'. Summary metrics are displayed as follows:

Capacity (Kbps):	40432	Rate (Kbps):	25024	Margin (dB):	18.94	State:	DATA
PSD Mask:	M1	TX Utilization (%):	16.28	RX Utilization (%):	42.47	2.2 MHz:	NO

Below the summary, there are two data tables:

**15 Minutes**

Ending Time Period	CRC	ES	SES	UAS	Min Capacity (Kbps)	Max Capacit...	Min Rate (Kbps)	Max Rate (Kbps)	Min Mar...	Max Mar...	TX Util (%)	RX Util (%)
04/27/2013 10:59	0	0	0	0	40408	40476	25024	25024	18.92	18.97	16.28	42.3
04/27/2013 10:45	0	0	0	0	40400	40468	25024	25024	18.92	18.97	16.28	42.3
04/27/2013 10:30	0	0	0	0	40396	40464	25024	25024	18.92	18.97	16.28	42.3

**24 Hours**

Ending Time Period	CRC	ES	SES	UAS	Min Capacity (K...	Max Capacity (Kbps)	Min Rate (Kbps)	Max Rate (Kbps)	Min Mar...	Max Mar...	TX Util (%)	RX Ut
04/27/2013	0	0	0	0	40392	40484	25024	25024	18.92	18.98	16.28	42.3
04/26/2013	0	0	0	0	40388	40480	25024	25024	18.91	18.98	16.28	42.3
04/25/2013	0	0	0	0	40392	40492	25024	25024	18.91	18.98	16.28	42.3

At the bottom of the interface, there are controls for 'Refresh', a time selection dropdown (set to 'now'), and a 'Slot' dropdown (set to '12'). Below these are status indicators for 'Critical: 0', 'Major: 0', and 'Minor: 0'. A table at the bottom shows alarm details:

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/24/2013 14:44:10
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/24/2013 13:33:18

A status message at the bottom left reads 'System refresh completed'.

The page can be provisioned to refresh automatically, select the desired Slot, and time-stamp information is displayed for each of the entries.

This block shows a close-up of the controls mentioned in the text: a 'Refresh' button, a dropdown menu currently set to 'now', and a 'Slot' dropdown menu currently set to '12'.



**2.3.7.9 MSPAN > CO > Pair > Summary**

The MSPAN CO Pair Summary tab displays the upstream Pair Summary information for all the Pairs supported by the selected MSPAN. The page can be provisioned to refresh automatically, and time-stamp information is displayed for each of the entries.

The screenshot shows the AktinoView application window. The breadcrumb path is System\_11(172.16.11.201) > System > Inventory > Provisioning > Alarms > PM > Tools > Diagnostics > Licenses > Ethernet > MSPAN > XSPAN > CO > RT > MSPAN > Pair > Summary. The main data table is as follows:

Time Period	Slot	Unit	Pair	Remote Pair	Capacity (Kb...)	Rate (Kb...)	Margin (...)	Voltage (v)	Line Current (mA)	Ground Current (...)
04/27/2013 10:59:50	12	CO	1	1	5812	3820	18.97	50.59	7.00	0.00
04/27/2013 10:59:50	12	CO	2	NONE	0	0	0.00	0.00	2.00	0.00
04/27/2013 10:59:50	12	CO	3	3	5760	3780	18.89	50.59	7.40	0.00
04/27/2013 10:59:51	12	CO	4	4	5712	3724	18.92	50.59	7.40	0.00
04/27/2013 10:59:51	12	CO	5	5	5696	3704	18.94	50.59	7.40	0.00
04/27/2013 10:59:51	12	CO	6	6	5784	3800	18.92	50.59	7.20	0.00
04/27/2013 10:59:51	12	CO	7	7	5856	3868	18.98	50.59	7.40	0.00
04/27/2013 10:59:53	12	CO	8	8	5824	3832	18.94	50.59	7.20	0.00

Below the table, there are controls: a Refresh button, a dropdown menu set to 'now', and a Slot dropdown menu set to '12'. At the bottom of the window, there are status indicators: Critical: 0, Major: 0, Minor: 0. Below these are two rows of alarm data:

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/24/2013 14:44:10
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/24/2013 13:33:18

At the very bottom, it says "System refresh completed".

**2.3.7.10 MSPAN > CO > Pair > Current 15 Minutes**

The MSPAN CO Pair Current 15 Minutes tab displays the upstream Pair PM information for all the Pairs supported by the selected MSPAN for the last 15-minute interval. The page can be provisioned to refresh automatically, and time-stamp is displayed for each of the entries.

Summary | **Current 15 Minutes** | Current 24 Hours | History

Time Period	Slot	Unit	Pair	CS	ES	SES	UAS	Min Capacit...	Max Capacity (K...	Min Rate (Kb...	Max Rate (Kb...	Min Margin (...	Max Margin (...	EFS (%)
04/27/2013 11:00:20	12	CO	1	0	0	0	0	5804	5816	3820	3820	18.92	19.00	100.00
04/27/2013 11:00:20	12	CO	2	0	0	0	0	0	0	0	0	0.00	0.00	100.00
04/27/2013 11:00:21	12	CO	3	0	0	0	0	5752	5764	3776	3780	18.88	18.94	100.00
04/27/2013 11:00:22	12	CO	4	0	0	0	0	5704	5716	3724	3724	18.92	18.98	100.00
04/27/2013 11:00:22	12	CO	5	0	0	0	0	5688	5704	3704	3708	18.88	18.92	100.00
04/27/2013 11:00:22	12	CO	6	0	0	0	0	5776	5788	3800	3800	18.92	18.95	100.00
04/27/2013 11:00:23	12	CO	7	0	0	0	0	5848	5864	3868	3868	18.95	19.00	100.00
04/27/2013 11:00:24	12	CO	8	0	0	0	0	5808	5824	3832	3832	18.91	18.95	100.00

Refresh | now | Slot 12

Critical: 0 | Major: 0 | Minor: 0

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affect...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/24/2013 14:44:10
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/24/2013 13:33:18

System refresh completed

**2.3.7.11 MSPAN > CO > Pair > Current 24 Hours**

The MSPAN CO Pair Current 24 Hours tab displays the upstream Pair PM information for all the Pairs supported by the selected MSPAN for the last 24 hours. The page can be provisioned to refresh automatically, and time-stamp information is displayed for each of the entries.

System refresh completed

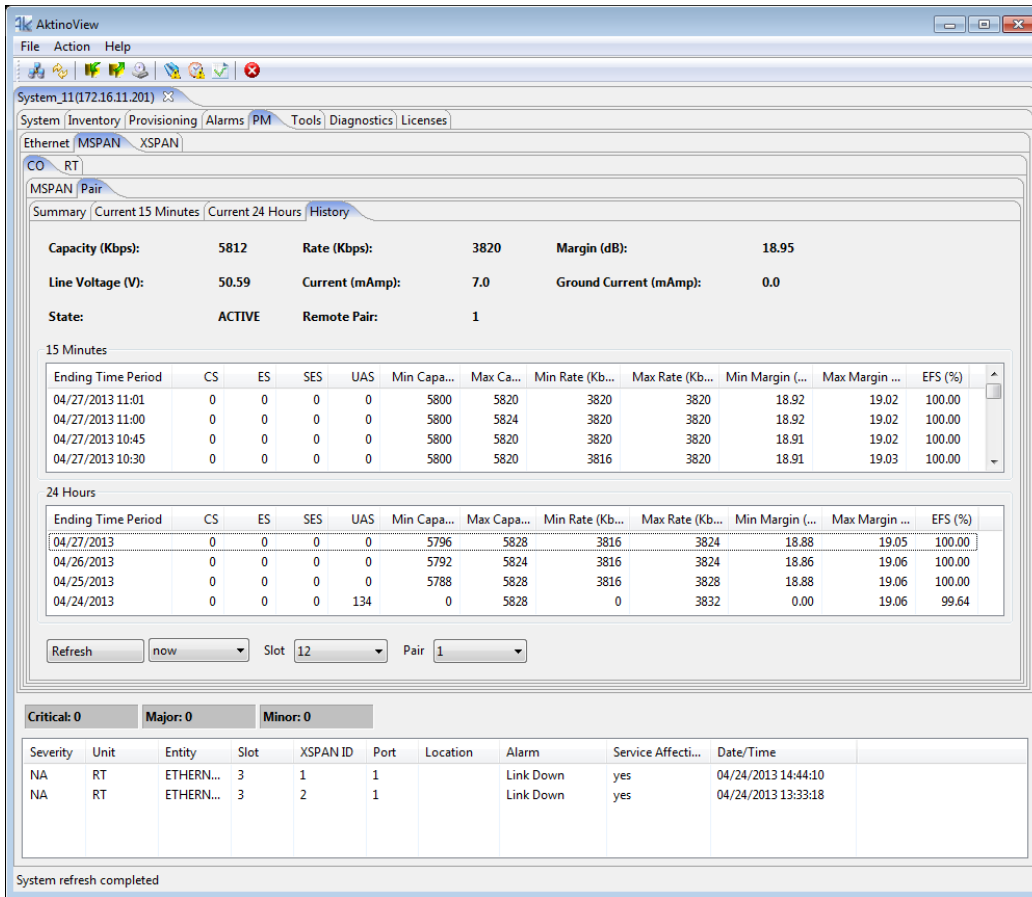
Time Period	Slot	Unit	Pair	CS	ES	SES	UAS	Min C...	Max Capaci...	Min Rate (K...	Max Rate (Kbps)	Min Margin (...)	Max Margin (...)	EFS (%)
04/27/2013 11:00:50	12	CO	1	0	0	0	0	5796	5828	3816	3824	18.88	19.05	100.00
04/27/2013 11:00:51	12	CO	2	0	0	0	0	0	0	0	0	0.00	0.00	100.00
04/27/2013 11:00:51	12	CO	3	0	0	0	0	5744	5776	3772	3784	18.83	19.00	100.00
04/27/2013 11:00:53	12	CO	4	0	0	0	0	5696	5728	3720	3732	18.84	19.03	100.00
04/27/2013 11:00:53	12	CO	5	0	0	0	0	5680	5712	3696	3708	18.84	19.02	100.00
04/27/2013 11:00:53	12	CO	6	0	0	0	0	5764	5800	3796	3804	18.83	19.03	100.00
04/27/2013 11:00:54	12	CO	7	0	0	0	0	5840	5876	3864	3868	18.89	19.06	100.00
04/27/2013 11:00:54	12	CO	8	0	0	0	0	5800	5836	3828	3836	18.84	19.03	100.00

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/24/2013 14:44:10
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/24/2013 13:33:18

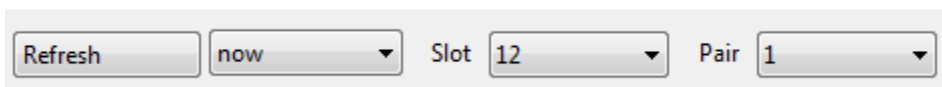
2.3.7.12 MSPAN > CO > Pair > History

The MSPAN CO Pair History tab displays the upstream PM information for the Pairs supported by the selected MSPAN. This PM data is separated into three sections and the PM can be displayed for each of the Pairs of the MSPAN.

- 1 The heading section provides summary information for the MSPAN including upstream Pair Capacity, Rate, and SNR Margin values.
- 2 The 15-Minutes section provides PM data for 15-Minute intervals for the last 24-hours.
- 3 The 24-Hours section provides PM data for the previous 7 days.



The page can be provisioned to refresh automatically, select the Slot and Pair, and time-stamp information is displayed for each of the entries.



**2.3.7.13 MSPAN > RT > MSPAN**

The MSPAN RT MSPAN tab displays the downstream PM information for the selected MSPAN. This PM data is separated into three sections:

- 1 The heading section provides summary information for the MSPAN including upstream MSPAN Capacity, Rate, and SNR Margin values.
- 2 The 15-Minutes section provides PM data for 15-Minute intervals for the last 24-hours.
- 3 The 24-Hours section provides PM data for the previous 7 days.

The screenshot shows the AktinoView application window. The main content area displays the MSPAN RT MSPAN configuration and performance data. The configuration section includes:

- Capacity (Kbps): 53184
- Rate (Kbps): 25024
- Margin (dB): 27.62
- State: DATA
- PSD Mask: M1
- TX Utilization (%): 42.17
- RX Utilization (%): 16.27
- 2.2 MHz: NO

Below the configuration are two data tables:

**15 Minutes**

Ending Time Period	CRC	ES	SES	UAS	Min Capacity (K...	Max Capacit...	Min Rate (Kbps)	Max Rate (Kbps)	Min Mar...	Max Mar...	TX Util (%)	RX Util (%)	EFS (%)
04/27/2013 11:02	0	0	0	0	53128	53200	25024	25024	27.55	27.66	42.35	16.29	100.00
04/27/2013 11:00	0	0	0	0	53124	53208	25024	25024	27.52	27.67	42.32	16.28	100.00
04/27/2013 10:45	0	0	0	0	53120	53208	25024	25024	27.50	27.66	42.32	16.28	100.00

**24 Hours**

Ending Time Period	CRC	ES	SES	UAS	Min Capacity (K...	Max Capacit...	Min Rate (Kbps)	Max Rate (Kbps)	Min Mar...	Max Mar...	TX Util (%)	RX Util (%)	EFS (%)
04/27/2013	0	0	0	0	53104	53228	25024	25024	27.50	27.70	42.32	16.28	100.00
04/26/2013	0	0	0	0	53072	53228	25024	25024	27.47	27.72	42.32	16.28	100.00
04/25/2013	0	0	0	0	53080	53220	25024	25024	27.53	27.77	42.32	16.28	100.00
04/24/2013	6	1	0	162	0	53300	0	25024	0.00	27.84	46.96	14.75	99.57

At the bottom of the data sections, there is a 'Refresh' button, a dropdown menu set to 'now', and a 'Slot' dropdown menu set to '12'. Below these are status indicators for Critical (0), Major (0), and Minor (0) alarms. An alarm table is also visible:

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/24/2013 14:44:10
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/24/2013 13:33:18

A status message at the bottom left reads 'System refresh completed'.

The page can be provisioned to refresh automatically, select the desired Slot, and time-stamp information is displayed for each of the entries.

This block shows a close-up of the controls from the screenshot. It includes a 'Refresh' button, a dropdown menu currently set to 'now', and a 'Slot' dropdown menu currently set to '12'.

**2.3.7.14 MSPAN > RT > Pair > Summary**

The MSPAN RT Pair Summary tab displays the downstream Pair Summary information for all the Pairs supported by the selected MSPAN. The page can be provisioned to refresh automatically, and time-stamp information is displayed for each of the entries.

The screenshot shows the AktinoView interface for System\_11(172.16.11.201). The navigation path is Ethernet > MSPAN > XSPAN > CO > RT > MSPAN > Pair > Summary. The main table displays the following data:

Time Period	Slot	Unit	Pair	Remote Pair	Capacity (Kb...)	Rate (Kb...)	Margin (...)	Voltage (v)	Line Current (mA)	Ground Current (...)
04/27/2013 11:03:41	12	RT	1	1	7508	3644	27.63			
04/27/2013 11:03:41	12	RT	2	NONE	0	0	0.00			
04/27/2013 11:03:42	12	RT	3	3	7596	3912	27.61			
04/27/2013 11:03:42	12	RT	4	4	7580	3852	27.66			
04/27/2013 11:03:43	12	RT	5	5	7652	3772	27.63			
04/27/2013 11:03:43	12	RT	6	6	7656	3952	27.63			
04/27/2013 11:03:44	12	RT	7	7	7600	3808	27.59			
04/27/2013 11:03:44	12	RT	8	8	7588	3592	27.59			

Below the table, there is a 'Refresh' button, a dropdown menu set to 'now', and a 'Slot' dropdown menu set to '12'. At the bottom of the window, there are status indicators for Critical: 0, Major: 0, and Minor: 0. Below these are two tables of active alarms:

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/24/2013 14:44:10
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/24/2013 13:33:18

At the very bottom, a status bar indicates 'System refresh completed'.

**2.3.7.15 MSPAN > RT > Pair > Current 15 Minutes**

The MSPAN RT Pair Current 15 Minutes tab displays the downstream Pair PM information for all the Pairs supported by the selected MSPAN for the last 15-minute interval. The page can be provisioned to refresh automatically, and time-stamp is displayed for each of the entries.

The screenshot shows the AktinoView interface for System\_11 (172.16.11.201). The navigation path is Ethernet > MSPAN > XSPAN > CO > RT > MSPAN > Pair > Current 15 Minutes. The main data table is as follows:

Time Period	Slot	Unit	Pair	CS	ES	SES	UAS	Min Cap...	Max Cap...	Min Rate (Kb...	Max Rate (Kb...	Min Margin (...	Max Margin (...	EFS (%)
04/27/2013 11:04:06	12	RT	1	0	0	0	0	7496	7516	3640	3652	27.50	27.67	100.00
04/27/2013 11:04:07	12	RT	2	0	0	0	247	0	0	0	0	0.00	0.00	0.00
04/27/2013 11:04:07	12	RT	3	0	0	0	0	7576	7604	3892	3916	27.48	27.78	100.00
04/27/2013 11:04:08	12	RT	4	0	0	0	0	7560	7580	3844	3856	27.53	27.78	100.00
04/27/2013 11:04:08	12	RT	5	0	0	0	0	7632	7660	3768	3788	27.50	27.70	100.00
04/27/2013 11:04:08	12	RT	6	0	0	0	0	7644	7664	3952	3968	27.45	27.72	100.00
04/27/2013 11:04:08	12	RT	7	0	0	0	0	7592	7616	3792	3812	27.52	27.75	100.00
04/27/2013 11:04:08	12	RT	8	0	0	0	0	7564	7604	3576	3596	27.48	27.78	100.00

Below the table, there is a 'Refresh' button, a dropdown menu set to 'now', and a 'Slot' dropdown menu set to '12'. At the bottom, the alarm status is shown as Critical: 0, Major: 0, Minor: 0. An alarm table is also visible:

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/24/2013 14:44:10
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/24/2013 13:33:18

System refresh completed

**2.3.7.16 MSPAN > RT > Pair > Current 24 Hours**

The MSPAN RT Pair Current 24 Hours tab displays the downstream Pair PM information for all the Pairs supported by the selected MSPAN for the last 24 hours. The page can be provisioned to refresh automatically, and time-stamp information is displayed for each of the entries.

The screenshot shows the AktinoView application window. The navigation path is System\_11(172.16.11.201) > Ethernet > MSPAN > XSPAN > CO > RT > MSPAN > Pair > Current 24 Hours. The main data table is as follows:

Time Period	Slot	Unit	Pair	CS	ES	SES	UAS	Min Capa...	Max Capaci...	Min Rate (Kb...	Max Rate...	Min Margin (...	Max Margin (...	EFS (%)
04/27/2013 11:04:33	12	RT	1	0	0	0	0	7476	7524	3620	3656	27.41	27.83	100.00
04/27/2013 11:04:33	12	RT	2	0	0	0	39872	0	0	0	0	0.00	0.00	0.00
04/27/2013 11:04:34	12	RT	3	0	0	0	0	7568	7612	3892	3928	27.36	27.88	100.00
04/27/2013 11:04:34	12	RT	4	0	0	0	0	7544	7588	3828	3876	27.34	27.84	100.00
04/27/2013 11:04:35	12	RT	5	0	0	0	0	7628	7664	3740	3788	27.36	27.81	100.00
04/27/2013 11:04:35	12	RT	6	0	0	0	0	7632	7668	3936	3980	27.31	27.86	100.00
04/27/2013 11:04:36	12	RT	7	0	0	0	0	7576	7620	3788	3836	27.27	27.86	100.00
04/27/2013 11:04:36	12	RT	8	0	0	0	0	7552	7608	3576	3608	27.42	27.81	100.00

Below the table, there is a 'Refresh' button, a dropdown menu set to 'now', and a 'Slot' dropdown menu set to '12'. At the bottom, there are status indicators: Critical: 0, Major: 0, Minor: 0. An alarm table is also visible:

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/24/2013 14:44:10
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/24/2013 13:33:18

System refresh completed



**2.3.7.17 MSPAN > RT > Pair > History**

The MSPAN RT Pair History tab displays the downstream PM information for the Pairs supported by the selected MSPAN. This PM data is separated into three sections and the PM can be displayed for each of the Pairs of the MSPAN.

- 1 The heading section provides summary information for the MSPAN including upstream Pair Capacity, Rate, and SNR Margin values.
- 2 The 15-Minutes section provides PM data for 15-Minute intervals for the last 24-hours.
- 3 The 24-Hours section provides PM data for the previous 7 days.

Summary

Capacity (Kbps): 7504      Rate (Kbps): 3644      Margin (dB): 27.63

State: ACTIVE      Remote Pair: 1

15 Minutes

Ending Time Period	CS	ES	SES	UAS	Min Capacity (K...	Max Capacity (K...	Min Rate (Kb...	Max Rate (Kb...	Min Margin (...	Max Margin ...	EFS (%)
04/27/2013 11:04	0	0	0	0	7496	7516	3640	3652	27.50	27.67	100.00
04/27/2013 11:00	0	0	0	0	7492	7516	3636	3652	27.50	27.67	100.00
04/27/2013 10:45	0	0	0	0	7492	7520	3640	3656	27.41	27.67	100.00

24 Hours

Ending Time Period	CS	ES	SES	UAS	Min Capacity (K...	Max Capacity (K...	Min Rate (Kb...	Max Rate (Kb...	Min Margin (...	Max Margin ...	EFS (%)
04/27/2013	0	0	0	0	7476	7524	3620	3656	27.41	27.83	100.00
04/26/2013	0	0	0	0	7480	7524	3616	3652	27.42	27.83	100.00
04/25/2013	0	0	0	0	7472	7524	3616	3656	27.41	27.94	100.00

Refresh    now    Slot 12    Pair 1

Critical: 0    Major: 0    Minor: 0

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/24/2013 14:44:10
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/24/2013 13:33:18

System refresh completed

The page can be provisioned to refresh automatically, select the Slot and Pair, and time-stamp information is displayed for each of the entries.

Refresh    now    Slot 12    Pair 1

2.3.7.18 XSPAN > Summary

The XSPAN Summary tab displays XSPAN and Pair status information for the selected XSPAN ID.

The screenshot shows the AktinoView interface with the XSPAN Summary tab selected. It displays two summary tables: XSPAN Summary - CO and RT, and Pair Summary - CO and RT. Below the tables are controls for Refresh, Slot, and XSPAN ID, and an alarm status section.

**XSPAN Summary - CO and RT**

Time Period	Unit	State	Capacity (Kbps)	Rate (Kbps)	Standard	USO Mask	Bandplan	VDSL2 Limit Mask
04/21/2013 16:48:30	CO	DATA	491139	400000	VDSL2	EU_32	Annex_A	Not_Applicable

**Pair Summary - CO**

Time Period	Pair	Remote Pair	State	Capacity (Kb...)	Rate (Kbps)	Margin (...)	Transmit Power (d...)	Delay (ms)	INP (*250 μs)	G.INP State	INP REIN (*2
04/21/2013 16:48:30	1	5	ACTIVE	61769	50000	10.30	11.30	3	1.00	INACTIVE	
04/21/2013 16:48:30	2	6	ACTIVE	62560	50000	10.60	11.30	3	1.00	INACTIVE	
04/21/2013 16:48:30	3	7	ACTIVE	62911	50000	10.90	11.30	3	1.00	INACTIVE	
04/21/2013 16:48:30	4	8	ACTIVE	59151	50000	10.80	11.20	3	1.00	INACTIVE	
04/21/2013 16:48:32	5	1	ACTIVE	62079	50000	10.20	11.40	3	1.00	INACTIVE	
04/21/2013 16:48:32	6	2	ACTIVE	61629	50000	10.20	11.30	3	1.00	INACTIVE	

**Pair Summary - RT**

Time Period	Pair	Remote Pair	State	Capacity (Kb...)	Rate (Kbps)	Margin (...)	Transmit Power (d...)	Delay (ms)	INP (*250 μs)	G.INP State	INP REIN (*2
04/21/2013 16:48:30	1	5	ACTIVE	149446	99998	17.80	6.10	4	1.00	INACTIVE	
04/21/2013 16:48:30	2	6	ACTIVE	148627	99998	17.60	5.80	4	1.00	INACTIVE	
04/21/2013 16:48:31	3	7	ACTIVE	148547	99998	17.60	5.80	4	1.00	INACTIVE	
04/21/2013 16:48:31	4	8	ACTIVE	148985	99998	17.70	6.00	4	1.00	INACTIVE	
04/21/2013 16:48:31	5	1	ACTIVE	145392	99998	16.80	5.90	4	1.00	INACTIVE	
04/21/2013 16:48:32	6	2	ACTIVE	144194	99998	15.40	5.90	4	1.00	INACTIVE	

Refresh [now] Slot [1] XSPAN ID [1]

**Critical: 0 Major: 0 Minor: 0**

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

System refresh completed

The page can be provisioned to refresh automatically, select the Slot and XSPAN ID, and time-stamp information is displayed for each of the entries.

Refresh [now] Slot [1] XSPAN ID [1]

2.3.7.19 XSPAN > Current 15 Minutes

The XSPAN Current 15 Minutes tab displays the current 15 minute XSPAN and Pair performance monitoring information for the selected XSPAN ID. The page can be provisioned to refresh automatically, and time-stamp is displayed for each of the entries.

The screenshot shows the AktinoView interface with the XSPAN Current 15 Minutes tab selected. It displays performance data for CO and RT units, including metrics like Capacity, Rate, and Margin. Below the data tables, there are controls for refreshing the data and selecting the XSPAN ID. At the bottom, there is a summary of alarm counts and a table of active alarms.

**XSPAN Current 15 Minutes - CO and RT**

Ending Time Period	Unit	ES	SES	UAS	Min Capacity (Kbps)	Max Capacity (Kbps)	Min Rate (Kbps)	Max Rate (Kbps)	EFS (%)	Tx Rate (Kbps)	Rx Rate (Kbps)
04/21/2013 16:49:01	CO	0	0	0	490085	493077	400000	400000	100.0	1010.53	10509.41
04/21/2013 16:49:02	RT	0	0	0	1172264	1185148	799984	799984	100.0	10112.98	1010.08

**Pair Current 15 Minutes - CO**

Time Period	Pair	CS	ES	SES	UAS	LEFTRS	Min Capacity (Kbps)	Max Capacity (Kbps)	Min Rate (Kb...	Max Rate (Kb...	Min Margin (...	Max Margin (...
04/21/2013 16:49:02	1	0	0	0	0	0	61566	61769	50000	50000	9.80	10.30
04/21/2013 16:49:02	2	0	0	0	0	0	62377	62608	50000	50000	10.20	10.80
04/21/2013 16:49:02	3	0	0	0	0	0	62795	62919	50000	50000	10.50	11.00
04/21/2013 16:49:03	4	0	0	0	0	0	59103	59179	50000	50000	10.50	10.90
04/21/2013 16:49:04	5	0	0	0	0	0	61968	64291	50000	50000	10.00	10.50
04/21/2013 16:49:04	6	0	0	0	0	0	61160	61633	50000	50000	9.50	10.20

**Pair Current 15 Minutes - RT**

Time Period	Pair	CS	ES	SES	UAS	LEFTRS	Min Capacity (Kbps)	Max Capacity (Kbps)	Min Rate (Kb...	Max Rate (Kb...	Min Margin (...	Max Margin (...
04/21/2013 16:49:02	1	0	0	0	0	0	148484	157030	99998	99998	17.40	17.90
04/21/2013 16:49:02	2	0	0	0	0	0	147453	148850	99998	99998	17.20	17.70
04/21/2013 16:49:02	3	0	0	0	0	0	147700	148885	99998	99998	17.30	17.80
04/21/2013 16:49:02	4	0	0	0	0	0	147923	149112	99998	99998	16.90	17.80
04/21/2013 16:49:03	5	0	0	0	0	0	144939	145619	99998	99998	16.50	16.80
04/21/2013 16:49:04	6	0	0	0	0	0	143501	147907	99998	99998	15.10	15.50

Refresh:  Interval:  Slot:  XSPAN ID:

**Critical: 0 Major: 0 Minor: 0**

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

System refresh completed

2.3.7.20 XSPAN > Current 24 Hours

The XSPAN Current 24 Hours tab displays the current 24 hours XSPAN and pair performance monitoring information for the selected XSPAN ID. The page can be provisioned to refresh automatically, and time-stamp information is displayed for each of the entries.

The screenshot shows the AktinoView interface with the following sections:

- System Information:** System\_11 (172.16.11.201)
- Navigation:** Ethernet | MSPAN | XSPAN
- Summary:** Current 15 Minutes | **Current 24 Hours** | History 15 Minutes | History 24 Hours
- XSPAN Current 24 Hours - CO and RT:**

Ending Time Period	Unit	ES	SES	UAS	Min Capacity (Kbps)	Max Capacity (Kbps)	Min Rate (Kbps)	Max Rate (Kbps)	EFS (%)	Tx Rate (Kbps)	Rx Rate (Kbps)
04/21/2013 16:49:18	CO	0	0	0	489345	495409	400000	400000	100.0	1010.21	10508.13
04/21/2013 16:49:19	RT	0	0	0	1169180	1192984	799984	799984	100.0	10118.92	1010.55
- Pair Current 24 Hours - CO:**

Time Period	Pair	CS	ES	SES	UAS	LEFTRS	Min Capacity (Kbps)	Max Capacity (Kbps)	Min Rate (Kb...	Max Rate (Kb...	Min Margin (...	Max Margin (...
04/21/2013 16:49:19	1	2	0	0	0	0	60885	63670	50000	50000	9.30	10.40
04/21/2013 16:49:20	2	0	0	0	0	0	62003	65047	50000	50000	9.80	10.90
04/21/2013 16:49:20	3	0	0	0	0	0	62529	65536	50000	50000	10.00	11.10
04/21/2013 16:49:21	4	0	0	0	0	0	58781	61987	50000	50000	10.00	11.00
04/21/2013 16:49:22	5	1	0	0	0	0	61602	64494	50000	50000	9.60	10.60
04/21/2013 16:49:22	6	1	0	0	0	0	60913	63444	50000	50000	9.40	10.30
- Pair Current 24 Hours - RT:**

Time Period	Pair	CS	ES	SES	UAS	LEFTRS	Min Capacity (Kbps)	Max Capacity (Kbps)	Min Rate (Kb...	Max Rate (Kb...	Min Margin (...	Max Margin (...
04/21/2013 16:49:19	1	0	0	0	0	0	147919	157300	99998	99998	17.10	17.90
04/21/2013 16:49:19	2	0	0	0	0	0	147087	156377	99998	99998	17.00	17.80
04/21/2013 16:49:20	3	0	0	0	0	0	147346	156075	99998	99998	17.00	17.90
04/21/2013 16:49:20	4	0	0	0	0	0	146964	156751	99998	99998	16.90	17.80
04/21/2013 16:49:20	5	0	0	0	0	0	144151	153174	99998	99998	16.20	16.90
04/21/2013 16:49:21	6	0	0	0	0	0	142875	148130	99998	99998	14.90	15.50
- Refresh:** Refresh button, dropdown set to 'now', Slot 1, XSPAN ID 1.
- Alerts:** Critical: 0, Major: 0, Minor: 0.
- Alert Log:**

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50
- Status:** System refresh completed

2.3.7.21 XSPAN > History 15 Minutes > XSPAN

The XSPAN 15 Minutes History tab displays the XSPAN PM history for the last 24 hours in 15 minute intervals for the selected XSPAN ID. The page can be provisioned to refresh automatically, and time-stamp information is displayed for each of the entries.

The screenshot shows the AktinoView interface with the following components:

- Navigation:** System\_11 (172.16.11.201) > Ethernet > MSPAN > XSPAN > History 15 Minutes.
- Summary:** XSPAN Pair
- XSPAN History 15 Minutes - CO:**

Ending Time Period	ES	SES	UAS	Min Capacity (Kbps)	Max Capacity (Kbps)	Min Rate (Kbps)	Max Rate (Kbps)	EFS (%)	Tx Rate (Kbps)	Rx Rate (Kbps)
04/21/2013 16:49	0	0	0	490085	494064	400000	400000	100.0	1010.4	10492.06
04/21/2013 16:45	0	0	0	489698	493361	400000	400000	100.0	1010.32	10506.87
04/21/2013 16:30	0	0	0	490004	493060	400000	400000	100.0	1010.58	10509.33
04/21/2013 16:15	0	0	0	490197	493709	400000	400000	100.0	1010.41	10482.73
04/21/2013 16:00	0	0	0	489958	493561	400000	400000	100.0	1010.7	10520.64
04/21/2013 15:45	0	0	0	489522	493241	400000	400000	100.0	1009.91	10512.93
04/21/2013 15:30	0	0	0	489708	493322	400000	400000	100.0	1009.99	10515.57
04/21/2013 15:15	0	0	0	489644	493777	400000	400000	100.0	1010.69	10504.32
- XSPAN History 15 Minutes - RT:**

Ending Time Period	ES	SES	UAS	Min Capacity (Kbps)	Max Capacity (Kbps)	Min Rate (Kbps)	Max Rate (Kbps)	EFS (%)	Tx Rate (Kbps)	Rx Rate (Kbps)
04/21/2013 16:49	0	0	0	1172264	1185148	799984	799984	100.0	10109.84	1009.98
04/21/2013 16:45	0	0	0	1171248	1185286	799984	799984	100.0	10117.84	1010.37
04/21/2013 16:30	0	0	0	1172008	1185692	799984	799984	100.0	10117.0	1010.43
04/21/2013 16:15	0	0	0	1170633	1184740	799984	799984	100.0	10119.82	1010.72
04/21/2013 16:00	0	0	0	1171612	1185741	799984	799984	100.0	10114.27	1009.96
04/21/2013 15:45	0	0	0	1172672	1192984	799984	799984	100.0	10122.17	1010.83
04/21/2013 15:30	0	0	0	1172403	1185305	799984	799984	100.0	10113.76	1010.09
04/21/2013 15:15	0	0	0	1172929	1185983	799984	799984	100.0	10116.24	1010.38
- Summary:** Critical: 0, Major: 0, Minor: 0
- Alarms Table:**

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50
- Status:** System refresh completed

2.3.7.22 XSPAN > History 15 Minutes > Pair

The XSPAN History 15 Minutes Pair tab displays the Pair PM history for the selected Pair for the last 24 hours in 15 minute intervals for the selected XSPAN ID.

The page can be provisioned to refresh automatically, select the Slot, XSPAN ID, Pair, and time-stamp information is displayed for each of the entries.

The screenshot shows the AktinoView interface with the following components:

- Navigation:** System\_11 (172.16.11.201) > Ethernet > MSPAN > XSPAN > Summary > Current 15 Minutes > Current 24 Hours > History 15 Minutes > History 24 Hours > XSPAN > Pair.
- Pair History 15 Minutes - CO Table:**

Ending Time Period	CS	ES	SES	UAS	LEFTRS	Min Capacity (K...	Max Capacity (Kbps)	Min Rate (Kb...	Max Rate (Kb...	Min Margin (...)	Max Margin (dB)
04/21/2013 16:53	0	0	0	0	0	61566	61801	50000	50000	9.60	10.30
04/21/2013 16:45	0	0	0	0	0	61502	61816	50000	50000	9.50	10.40
04/21/2013 16:30	0	0	0	0	0	61454	61801	50000	50000	9.80	10.40
04/21/2013 16:15	0	0	0	0	0	61402	61812	50000	50000	9.80	10.30
04/21/2013 16:00	0	0	0	0	0	61434	61792	50000	50000	9.80	10.30
04/21/2013 15:45	0	0	0	0	0	61482	61804	50000	50000	9.60	10.30
04/21/2013 15:30	0	0	0	0	0	61303	61836	50000	50000	9.60	10.40
- Pair History 15 Minutes - RT Table:**

Ending Time Period	CS	ES	SES	UAS	LEFTRS	Min Capacity (K...	Max Capacity (Kbps)	Min Rate (Kb...	Max Rate (Kb...	Min Margin (...)	Max Margin (dB)
04/21/2013 16:53	0	0	0	0	0	148484	157030	99998	99998	17.40	17.90
04/21/2013 16:45	0	0	0	0	0	148145	156819	99998	99998	17.20	17.90
04/21/2013 16:30	0	0	0	0	0	148599	156266	99998	99998	17.30	17.90
04/21/2013 16:15	0	0	0	0	0	148416	149701	99998	99998	17.30	17.90
04/21/2013 16:00	0	0	0	0	0	148456	157086	99998	99998	17.40	17.90
04/21/2013 15:45	0	0	0	0	0	148500	156875	99998	99998	17.40	17.90
04/21/2013 15:30	0	0	0	0	0	148316	156875	99998	99998	17.30	17.90
- Alerts Summary:** Critical: 0, Major: 0, Minor: 0.
- Alerts Table:**

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50
- System Status:** System refresh completed.
- Controls:** Refresh button, dropdown for 'now', Slot 1, XSPAN ID 1, Pair 1.

**2.3.7.23 XSPAN > History 24 Hours > XSPAN**

The XSPAN 24 Hours History XSPAN tab displays the XSPAN PM history for the last 7 days in 1 day intervals for the selected XSPAN ID. The page can be provisioned to refresh automatically, and time-stamp information is displayed for each of the entries.

The screenshot shows the AktinoView interface with the following sections:

**XSPAN History 24 Hours - CO**

Ending Time Period	ES	SES	UAS	Min Capacity (Kbps)	Max Capacity (Kbps)	Min Rate (Kbps)	Max Rate (Kbps)	EFS (%)	Tx Rate (Kbps)	Rx Rate (Kbps)
04/21/2013	0	0	0	489345	495409	400000	400000	100.0	1010.21	10507.96
04/20/2013	0	0	545	0	498884	0	400000	98.82	998.17	10369.82

Refresh:  now Slot:  XSPAN ID:

**XSPAN History 24 Hours - RT**

Ending Time Period	ES	SES	UAS	Min Capacity (Kbps)	Max Capacity (Kbps)	Min Rate (Kbps)	Max Rate (Kbps)	EFS (%)	Tx Rate (Kbps)	Rx Rate (Kbps)
04/21/2013	0	0	0	1169180	1192984	799984	799984	100.0	10118.96	1010.56
04/20/2013	0	0	212	0	1198331	0	799984	99.53	10058.95	1005.24

Refresh:  now Slot:  XSPAN ID:

**Alerts Summary:** Critical: 0 Major: 0 Minor: 0

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

System refresh completed

**2.3.7.24 XSPAN > History 24 Hours > Pair**

The XSPAN History 24 Hours Pair tab displays the Pair PM history for the last 7 days in 1 day intervals for the selected XSPAN ID and Pair. The page can be provisioned to refresh automatically, and time-stamp information is displayed for each of the entries.

The screenshot shows the AktinoView interface for XSPAN history. It features a navigation menu with tabs for System, Inventory, Provisioning, Alarms, PM, Tools, Diagnostics, Licenses, and Slot 1. The main content area is divided into two sections: 'Pair History 24 Hours - CO' and 'Pair History 24 Hours - RT'. Each section contains a table with the following columns: Ending Time Period, CS, ES, SES, UAS, LEFTRS, Min Capacity (Kbps), Max Capacity (Kbps), Min Rate (Kbps), Max Rate (Kbps), Min Margin (dB), and Max Margin (dB). Below each table are controls for Refresh, a dropdown for 'now', and dropdowns for Slot, XSPAN ID, and Pair.

Ending Time Period	CS	ES	SES	UAS	LEFTRS	Min Capacity (Kbps)	Max Capacity (Kbps)	Min Rate (Kbps)	Max Rate (Kbps)	Min Margin (dB)	Max Margin (dB)
04/21/2013	2	0	0	0	0	60885	63670	50000	50000	9.30	10.40
04/20/2013	1	0	0	516	0	0	63694	0	50000	0.00	10.70

Ending Time Period	CS	ES	SES	UAS	LEFTRS	Min Capacity (Kbps)	Max Capacity (Kbps)	Min Rate (Kbps)	Max Rate (Kbps)	Min Margin (dB)	Max Margin (dB)
04/21/2013	0	0	0	0	0	147919	157300	99998	99998	17.10	17.90
04/20/2013	0	0	0	202	0	0	157300	0	99998	0.00	18.20

At the bottom of the interface, there is a status bar showing 'Critical: 0', 'Major: 0', and 'Minor: 0'. Below this is a table of active alarms:

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

System refresh completed



### 2.3.8 Tools

The Tools tab displays the Active and Standby Firmware versions for each components of the AK5000 system. The Active partition contains the firmware version currently running. The Standby partition is used for firmware upgrades and provides a means of having a backup firmware version on the system.

The screenshot shows the AktinoView application window with the 'Tools' tab selected. The main area contains a table with the following data:

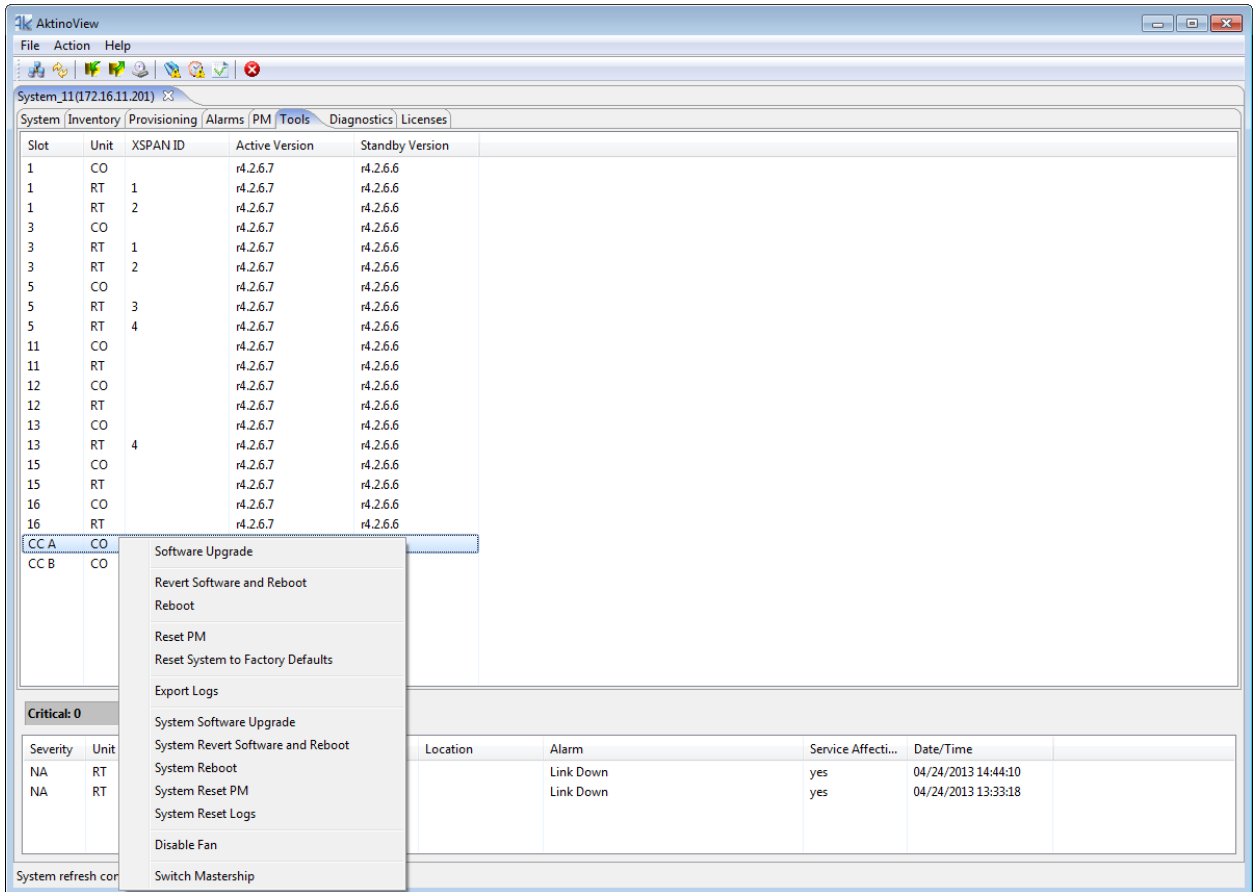
Slot	Unit	XSPAN ID	Active Version	Standby Version
11	CO		r4.2.6.6	r4.2.6.5
12	CO		r4.2.6.6	r4.2.6.5
13	CO		r4.2.6.6	r4.2.6.5
15	CO		r4.2.6.6	r4.2.6.5
16	CO		r4.2.6.6	r4.2.6.5
CC A	CO		r4.2.6.6	r4.2.6.5
CC B	CO		r4.2.6.6	r4.2.6.5
1	CO		r4.2.6.6	r4.2.6.5
3	CO		r4.2.6.6	r4.2.6.4
5	CO		r4.2.6.6	r4.2.6.5
11	RT		r4.2.6.6	r4.2.6.5
12	RT		r4.2.6.6	r4.2.6.5
13	RT	4	r4.2.6.6	r4.2.6.5
15	RT		r4.2.6.6	r4.2.6.5
16	RT		r4.2.6.6	r4.2.6.5
1	RT	1	r4.2.6.6	r4.2.6.5
1	RT	2	r4.2.6.6	r4.2.6.5
3	RT	1	r4.2.6.6	r4.2.6.4
3	RT	2	r4.2.6.6	r4.2.6.4
5	RT	3	r4.2.6.6	r4.2.6.5
5	RT	4	r4.2.6.6	r4.2.6.5

Below the table, there are status indicators: Critical: 0, Major: 0, Minor: 0. An Alarms table is also visible:

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/20/2013 11:21:42
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/20/2013 11:26:50

System refresh completed

Right-Clicking on a slot displays additional menu options for the slot.



Right-Clicking on the Master Common Control Card allows you to select the following options:

Option	Description
Software Upgrade	Upgrades the software on the AK5000 Common Control Card
Revert Software and Reboot	Reboots the AK5000 Common Control Card, and when the unit reboots, the unit selects the firmware version in the Standby partition.
Reboot	Reboots the AK5000 Common Control Card, and when the unit reboots, the unit selects the firmware version in the Active partition.
Reset PM	Resets only the Performance Monitoring data in the AK5000 Common Control Card.
Reset System to Factory Defaults	Resets all the cards in the system to Factory Defaults
Export Logs	Opens a dialog box enabling you to export important system information for analysis by Positron Technical Support.
System Software Upgrade	Opens a dialog box enabling you to upgrade the Aktino System software. (See Appendix A for System Software Upgrade procedures).
System Revert Software and Reboot	Reboots all the cards in the AK5000 system, and when the cards reboot, they select the firmware version in their Standby partitions.
System Reboot	Reboots all the cards in the system.
System Reset PM	Resets the PM for the entire system.
System Reset Logs	Resets all the logs in the system.
Disable Fan	Disables the system fans so they can be safely replaced.
Switch Mastership	For systems with Redundant Common Control Cards the Mastership will switch to the other Common Control Card.

Right-Clicking on the Standby Common Control Card allows you to select the following options:

Option	Description
Software Upgrade	Upgrades the software on the AK5000 Common Control Card
Revert Software and Reboot	Reboots the AK5000 Common Control Card, and when the unit reboots, the unit selects the firmware version in the Standby partition.
Reboot	Reboots the AK5000 Common Control Card, and when the unit reboots, the unit selects the firmware version in the Active partition.
Reset PM	Resets only the Performance Monitoring data in the AK5000 Common Control Card.
Export Logs	Opens a dialog box enabling you to export important system information for analysis by Positron Technical Support.

Right-Clicking on a CO unit allows you to select the following options:

Option	Description
Software Upgrade - Circuit	Upgrades the software for the CO Unit and its RT.
Software Upgrade - CO Only	Upgrades the firmware in the AK5000 CO Unit only.
Revert Software and Reboot	Reboots the CO unit, and when the unit reboots, the unit selects the firmware version in the Standby partition
Reboot	Reboots the CO unit
Reset PM	Resets only the Performance Monitoring data in the CO unit.
Export PM	Exports the MSPAN/XSPAN and Pair PM for the given slot for both the CO and RT.
Export Logs	Opens a dialog box enabling you to export important system information for analysis by Positron Technical Support.

Right-Clicking on a RT unit allows you to select the following options:

Option	Description
Revert Software and Reboot	Reboots the RT unit, and when the unit reboots, the unit selects the firmware version in the Standby partition
Reboot	Reboots the RT unit
Reset PM	Resets only the Performance Monitoring data in the RT unit.
Reset System to Factory Defaults	Resets the RT unit to Factory Defaults

### 2.3.9 Diagnostics

Diagnostics can be run on the AK5000 system. There are two types of tests: Single Ended Loop Test (SELT) and Dual Ended Loop Test (DELT).

**Note:** SELT and DELT are supported only on the FlexStream 100 cards.

#### 2.3.9.1 SELT

Single Ended Loop Test (SELT) provides diagnostics for each pair. Follow this procedure to run SELT:

- 1 SELT is service effecting. The remote unit must be disconnected to run the test.
- 2 The Pairs need to be calibrated. To get distance from the chassis, remove the MSPAN connector from the chassis. If removal of the MSPAN connector is not possible, calibration can be done at any point in the loop, including the MDF. This point will be the start of the Line Length test.
- 3 Click on the Calibrate button to start the calibration process. The Status of the calibration is indicated.
- 4 Connect the pairs back to the Outside Plant. Ensure that the remote unit is NOT connected.
- 5 Click on Start Testing button to run the SELT test. The Status of the SELT test is indicated.
- 6 The results can be exported to an Excel csv file by clicking on the Export Test Result button.

The results of the SELT test are indicated below:

Slot	Unit	Pair	Line Length (ft)	Tip To Ground Resistance (oh...)	Ring To Ground Resistance (o...)	Tip To Ring Resistance (ohms)
16	CO	1	4940	108888.0	Open	Open
16	CO	2	4994	108888.0	Open	Open
16	CO	3	4979	98000.0	Open	Open
16	CO	4	5036	98000.0	Open	Open
16	CO	5	5053	98000.0	980000.0	Open
16	CO	6	5061	98000.0	Open	Open
16	CO	7	4940	108888.0	Open	Open
16	CO	8	5001	108888.0	Open	Open

Calibrate    Export Test Result    Start Testing    Slot: 16    Status: Completed

Critical: 2    Major: 0    Minor: 8

Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecti...	Date/Time
CR	CO	MSPAN	15				Loss of Frame	yes	04/26/2013 09:31:33
CR	CO	MSPAN	16				Loss of Signal	yes	04/26/2013 09:30:53
MN	CO	PAIR	16		1		Open Circuit	-	04/26/2013 09:30:52
MN	CO	PAIR	16		2		Open Circuit	-	04/26/2013 09:30:52
MN	CO	PAIR	16		3		Open Circuit	-	04/26/2013 09:30:52
MN	CO	PAIR	16		4		Open Circuit	-	04/26/2013 09:30:52
MN	CO	PAIR	16		5		Open Circuit	-	04/26/2013 09:30:52
MN	CO	PAIR	16		6		Open Circuit	-	04/26/2013 09:30:52
MN	CO	PAIR	16		7		Open Circuit	-	04/26/2013 09:30:52
MN	CO	PAIR	16		8		Open Circuit	-	04/26/2013 09:30:52
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/24/2013 14:44:10
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/24/2013 13:33:18

System refresh completed

For each pair, the following test results are available:

- Line Length. This is the physical line length, it is AWG agnostic. If there are large differences in the line length of the pairs, it indicates possibly a short, open, ground fault, or bridge tap. If the pair is open in the middles of a loop, the length will indicate where it exists.
- Tip to Ground Resistance. Ring to Ground Resistance. Tip to Ring Resistance. The results should show "Open" for all pairs since the remote is not connected. IF there is resistance on any pair, this indicates that there may be a problem.

**2.3.9.2 DELT**

Dual Ended Loop Test (DELT) provides diagnostics for each pair. Follow this procedure to run DELT:

- 1 DELT is service effecting. The remote unit must be connected to run the test.
- 2 Click on Start Testing button to run the DELT test. The Status of the DELT test is indicated.
- 3 The results can be exported to an Excel csv file by clicking on the Export Test Result button.

The results of the DELT test are indicated below:

The screenshot shows the AktinoView software interface. The main window displays the 'DELT' test results for 'System\_11(172.16.11.201)'. The test results are presented in a table with columns for Unit, Pair, and various test parameters (T1 through T10). Below the table, there are control buttons: 'Export Test Result', 'Start Testing', a 'Slot' dropdown menu set to '16', and a 'Status' indicator showing 'Completed'. At the bottom of the window, there are summary boxes for 'Critical: 0', 'Major: 2', and 'Minor: 0', followed by a table of active alarms.

Unit	Pair	T1	R1	T2	R2	T3	R3	T4	R4	T5	R5	T6	R6	T7	R7	T8	R8	T9	R9	T10	R10	T
CO	1	23.0	26.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
CO	2	0.0	0.0	30.8	26.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
CO	3	0.0	0.0	0.0	0.0	24.0	26.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
CO	4	0.0	0.0	0.0	0.0	0.0	0.0	25.4	26.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
CO	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.6	26.2	0.0	0.0	0.0	0.0	0.0	0.0					
CO	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.0	26.0	0.0	0.0	0.0	0.0					
CO	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.2	26.2	0.0	0.0					
CO	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.4	26.2					

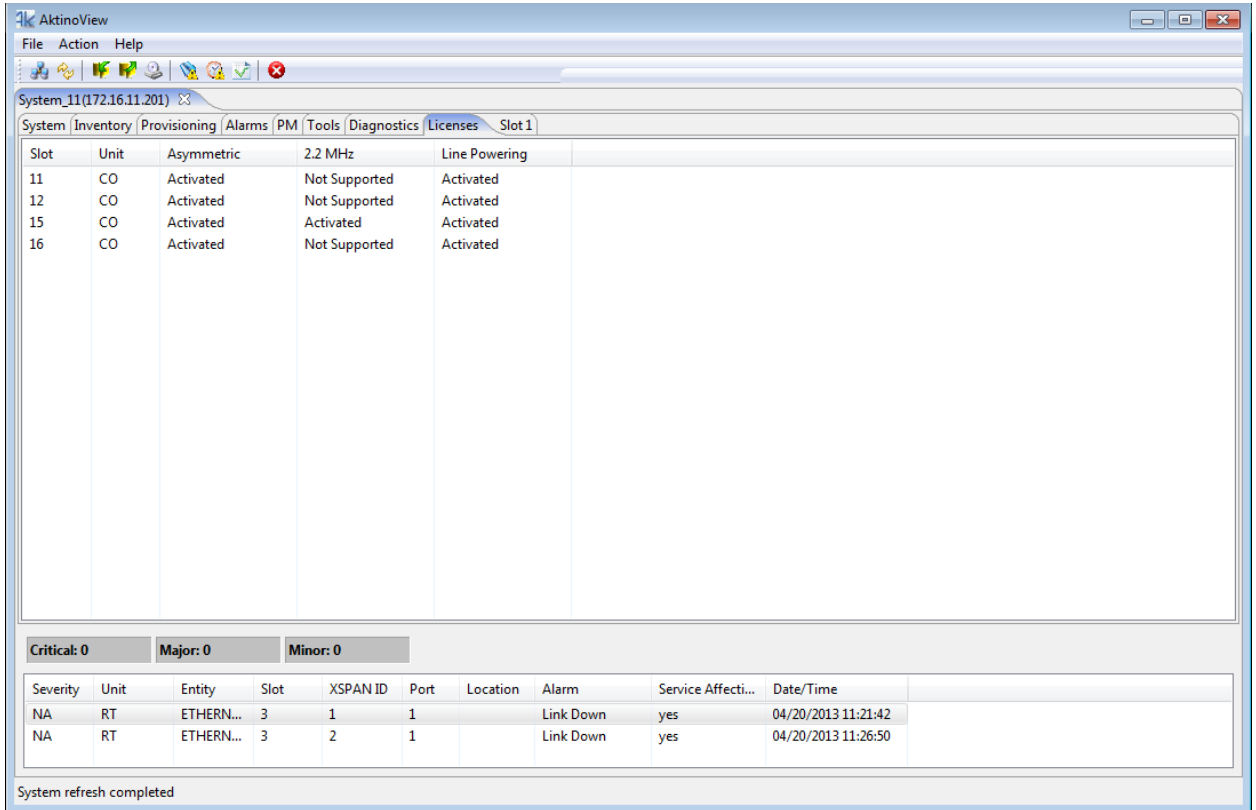
Severity	Unit	Entity	Slot	XSPAN ID	Port	Location	Alarm	Service Affecting	Date/Time
MJ	CO	MSPAN	15				Rate Below Configur...	yes	04/26/2013 09:32:35
MJ	RT	MSPAN	15				Rate Below Configur...	yes	04/26/2013 09:32:35
NA	RT	ETHERN...	3	1	1		Link Down	yes	04/24/2013 14:44:10
NA	RT	ETHERN...	3	2	1		Link Down	yes	04/24/2013 13:33:18



For each pair's tip and ring, the current in milliamps is indicated on itself and between that pair and every other pair being used in the system. The screen shot above shows a normal result. There should be current flowing between Pair1 and T1 and R1, between Pair 2 and T2 and R2. The current flow numbers should be close in value. Large differences in the current flow values indicate a problem with that pair. No current should be flowing between pairs. If there is current flowing between pairs, this indicates a problem with those pairs, possibly a short.

### 2.3.10 Licenses

The License tab displays the features that are activated for the various slots in the AK5000 System.



Click on a specific CO united to bring up its Software License dialog box. Contact customer service to find out more about how to obtain licenses.

**Software License**

Slot: 11

Unit: CO

Serial Number: 1012844

License Key:

Buttons: OK, Apply, Cancel

See the following table for the Features and Values:

Feature	Values
Asymmetric, 2.2 Mhz, Line Powering	Activated - This feature is activated on the selected slot Not Activated - This feature is not activated on the selected slot Not Supported - This features is not supported on the selected slot

# Chapter 3

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## Technical and Regulatory Specifications

## 3.1 AK5000 System Technical Specifications

### General Features

- Sixteen Line Card slots
- Two redundant management/uplink slots
- Three Gbps symmetric throughput per shelf
- Five nines availability

### Layer 2 Features

- Metro Ethernet Forum (MEF9/MEF14) Compliant
- VLAN Tagging: IEEE 802.1q support
- Stacked VLAN Tagging
- Priorities: IEEE 802.1p, Port, or DiffServ
- Dynamic Bridging: 8K MAC addresses

### Network Management

- CLI, SNMP
- AktinoView, Aktino EMS
- Inband VLAN Management

### Electrical Specifications

- Per AK500 Series Line Card
  - Power input: - 42 to - 56.7Vdc
  - Max heat dissipation: 40 watts
- Per AK600 Series Line Card
  - Power input: - 42 to - 56.7Vdc
  - Max heat dissipation: 50 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: 12.25" (311.15 mm) high (7RU) x 17.2" (436.88 mm) wide x 12.0" (304.8 mm) deep
- Weight: Approximately 20 lbs (9 kg).

**Alarm Contacts**

- Critical, Major, Minor, SysID
- Visual, Audio, Alarm-Cutoff Pushbutton

**AK590CC Uplink Interfaces**

- (2) 10/100/1000BaseT RJ45, (1) 1000BaseX SFP

**AK590CC Front Panel Indicators**

- Status, Fuse, BATA, BATB
- Master, SFP Status

## 3.2 AK500 Series CO Line Card Technical Specifications

- Bandwidth: 25Mbps Symmetric / 60Mbps Asymmetric at CSA with full disturbers on 24AWG
- System Latency: 3 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

#### Front Panel Indicators

- Status, Fuse
- MSPAN Outside Plant Pair Status (up to 8)

#### Outside Plant Pairs

- Technology: MIMO on DMT
- Number of pairs: 1 to 8
- Sealing current: Meets G991.2
- T1.417 (Spectral) Compliant

### 3.3 AK600 Series CO Line Card Technical Specifications

- Up to four bonding groups per Line Card
- One to eight pairs per bonding group
- Bandwidth:
  - Up to 800 Mbps Downstream
  - Up to 400 Mbps Symmetric
- Latency: 3 ms minimum
- Resiliency: Carrier grade automatic pair failure protection
- BER:  $10^{-12}$  at 6 dB SNR margin

#### Interfaces

##### Front Panel Indicators

- Status, Fuse
- Outside Plant Pair Status (12)

##### Outside Plant Pairs

- Technology: VDSL2 (g.993.2), ADSL2+ (g.992.5), and g.vector (g.993.5)
- Number of pairs: Up to 12
- Sealing current: Meets 50V/100mA per pair
- T1.417 (Spectral) Compliant



## 3.4 AK500 Series Compact Remote Unit Technical Specifications

### System

- Bandwidth: 25Mbps Symmetric / 60Mbps Asymmetric at CSA with full disturbers on 24AWG
- System Latency: 3 ms minimum
- Resiliency: Carrier grade automatic pair failure protections
- BER:  $10^{-12}$

### Interfaces

#### Ethernet

- Interface: Four 10/100BaseT, Auto Negotiating, Auto MDIX, One 100 Base-FX or 1000 Base-X SFP
- Connector: RJ45, SFP
- Compliance: IEEE 802.3

#### Outside Plant Pairs

- Technology: MIMO on DMT
- Number of pairs: 1 to 8
- Sealing current: Meets G991.2
- T1.417 (Spectral) Compliant

#### Management interface

- 10/100BaseT RJ45

### Layer 2 Features

- VLAN Tagging: IEEE 802.1q support
- Stacked VLAN Tagging
- Priorities: IEEE 802.1p, Port, or DiffServ
- Dynamic Bridging: 8K MAC addresses

### **Regulatory Approval**

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

### **Electrical**

- Line Powered by CCU Unit or
- Local Power Input: 120 Vac using AKRUPA Remote Unit Power Adapter
- Max Heat Dissipation: 40 Watts
- Provides 12 Vdc, 12 Watt output

### **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" (44.45 mm) high (1RU) x 8.5" (215.9 mm) wide x 11.2" (284.48 mm) deep
- Weight: Approximately 4 lbs. (1.80 kg)

### **Front Panel Indicators**

- Status, Local PWR, 1000B-X, 100B-FX
- MSPAN Outside Plant Pair Status (up to 8)

### **Network Management**

- AktinoView GUI

## 3.5 AK600 Series Compact Remote Unit Technical Specifications

### System

- Bandwidth:
  - Up to 800 Mbps Downstream
  - Up to 400 Mbps Symmetric
- Latency: 3 ms minimum
- Resiliency: Carrier grade automatic pair failure protection
- BER:  $10^{-12}$  at 6 dB SNR margin

### Interfaces

#### Ethernet

- Interface: Two 10/100/1000BaseT, Auto Negotiating, Auto MDIX, 1000BaseX SFP
- Connector: RJ45, SFP
- Compliance: IEEE802.3

#### Outside Plant Pairs

- Technology: VDSL2 (g.993.2), ADSL2+ (g.992.5), and g.vector (g.993.5)
- Number of pairs: Up to 8
- Sealing current: Meets 50V/100mA per pair
- T1.417 (Spectral) Compliant

#### Management interface

- 10/100/1000BaseT RJ45

### Layer 2 Features

- VLAN Tagging: IEEE 802.1q support
- Stacked VLAN Tagging
- Priorities: IEEE 802.1p, Port, or DiffServ
- Dynamic Bridging: 8K MAC addresses

### **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: 1.6" (40.64 mm) high (1RU) x 8.5" (215.9 mm) wide x 11.2" (284.49 mm) deep
- Weight: Approximately 4 lbs. (1.80 kg)

### **Front Panel Indicators**

- Status, Fuse, SFP
- MSPAN Outside Plant Pair Status (up to 8)
- XSPAN Outside Plant Pair Status (up to 12)

### **Network Management**

- AktinoView GUI

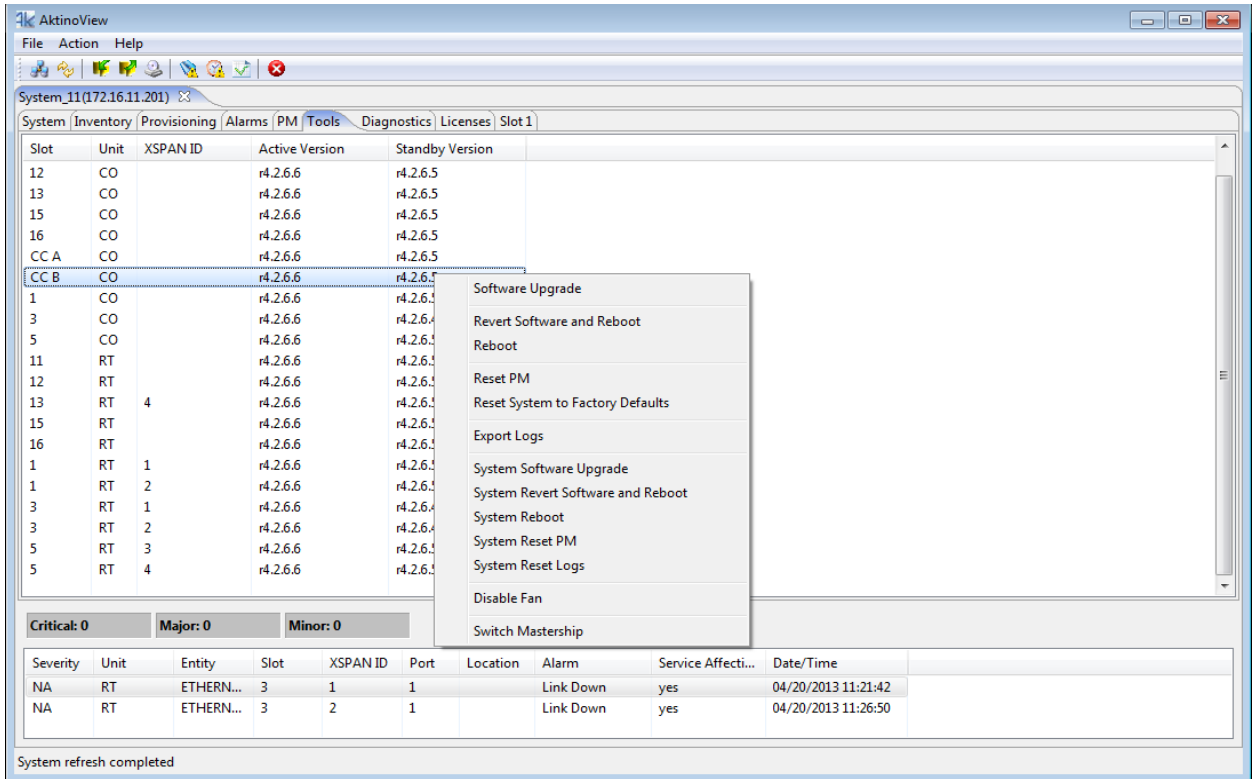
# Chapter 4

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## Maintenance

## 4.1 Fans

In order to remove Fans they MUST be disabled prior to removal. Select the Tools tab and right click on the Common Control Card. A dialog box with Disable Fans appears at the bottom.



## 4.2 Filters

Filters need to be replaced for both the AK500S and the CRU.

### 4.2.1 AK500S Chassis

The filter for the AK500S Chassis should be replaced every six months. Care should be taken when replacing filters to ensure collected dust on the filters does not enter into the equipment (see Figure 9). Ordering information can be found at the end of this document.

### 4.2.2 Compact Remote Unit

The fan filter for the CRUs should be replaced every six months. Care should be taken when replacing filters to ensure collected dust on the filters does not enter into the equipment. Ordering information can be found at the end of this document.

# Chapter 5

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## Safety and Warnings

## Safety and Warnings

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

A 40A (AK500S Shelf) UL listed use/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 wiring in order to provide a UL required disconnect point.

The Positron products (except AK5xx Compact Remote Units) accept 48Vdc for powering. The 48Vdc voltage range must be between -42.5Vdc to -56.5Vdc.

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 Positron 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 Positron 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 Positron for repair.

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

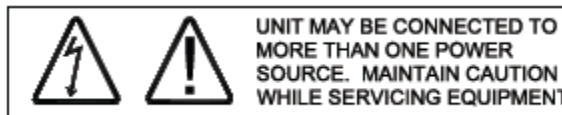
To prevent ESD events when handling the AK500S equipment, ESD shoes or wrist straps should be utilized by all personnel, or ESD flooring must be present. See Figure 11 for location of wrist strap grounding connection point for the AK500S.



Care should be taken when installing in a closed or multi-unit rack to ensure that the maximum operating ambient temperature of 65°C (149°F) is not exceeded.

Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

Connect the unit only to a properly rated supply circuit. Reliable earthing (grounding) of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).



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.

Mounting of equipment in a rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

The Positron Multi Pair span interface is designed to coordinate with a standard 350 Vdc (230 Vdc in Europe) gas discharge tube protector. Carbon block protectors shall not be used.

#### Line Powering

If line powering is enabled, voltage on the 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 46.2uF. The effective capacitance of the units between the connection point for one conductor of tip or ring and earth is 0.25uF.

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 Figure 2 of UL60950-21.

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 Positron unit's circuit voltage, together with superimposed transients.

At the time of installation it shall be checked that all multi-pair span circuits to be connected together are all RFT-V circuits. In practical terms as all equipment supplied by Positron only uses RFT-V circuits, then it should be checked that the multi-pair span of Positron equipment is not connected to any other vendor's equipment.

**WARNING:** The intra-building ports of the equipment are suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building ports of the equipment **MUST NOT** be metalically connected to interfaces which connect to the OSP or its wiring. These interfaces are designed for use as intra-building Interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 4) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metalically to OSP wiring.

AK500S IS SUITABLE FOR MOUNTING ON OR ABOVE CONCRETE OR OTHER NON-CONDUCTIVE SURFACE ONLY.

# Chapter 6

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## Warranty and Customer Service

Positron 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 Positron customer web portal:

<http://portal.positronaccess.com/login.asp>

**Positron Sales Pricing/Availability**

+1 (951) 272-9100

**Positron Technical Support**

Pre-Sales Applications/Post-Sales Technical Assistance:

+1 (951) 272-9100

7days/week, 24 hours/day

**Positron Repair**

Return for Repair/Upgrade:

+1 (951) 272-9100

<http://ticketmaster.positronaccess.com/>

**Repair and Return Address**

Contact Customer Service prior to returning equipment to Positron.

# Chapter 7

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## Positron Products

**Positron Products (AK5000)**

Equipment Name	Description
<b>AK500S Multi-Point Shelf Common Products</b>	
AK500S	AK500S Chassis
AK590CC	AK500S Common Control Card
AK500BAF	AK500S Air Intake Baffle
AK500FILT	AK500S Air Filter 2 Pack
AK500FILLERS	AK500S Blank Panels (Full Set)
AKFAN	AK500S Fan Assembly
AK500TR	AK500S Tracer Board
AK500TCS	AK500S Test Cable for attaching two AK500S Line Cards to two Compact Remote Units (4 feet long)
<b>AK500 Series Line Card Products</b>	
AK525LC P	AK500S CO Line Card 8-Pair with Line Power Option
AK525 LC A	AK500S CO Line Card 8-Pair with Asymmetric Option
AK525 LC PA	AK500S CO Line Card 8-Pair with Line Power and Asymmetric Option
AK525LC	AK500S CO Line Card 8-Pair, No Line Power
AK512LC P	AK500S CO Line Card 4-Pair with Line Power Option
AK512LC A	AK500S CO Line Card 4-Pair with Asymmetric Option
AK512LC PA	AK500S CO Line Card 4-Pair with Line Power and Asymmetric Option
AK512LC	AK500S CO Line Card 4-Pair, No Line Power
<b>AK600 Series Line Card Products</b>	
AK626LC	AK500S 12 Pair Ethernet Line Card, up to 800 Mbps max, Asymmetric, No Line Power

Equipment Name	Description
<b>AK500 Series Compact Remote Unit Products</b>	
AK525RU	Compact Remote Unit (CRU) 8-Pair
AK512RU	Compact Remote Unit (CRU) 4-Pair
AKCUFAN	Compact Remote Unit Fan Assembly
AK5NDC22	Compact Remote Unit Power Supply -48Vdc Input to 15Vdc Output
AKRUPA	Compact Remote Unit Power Supply 90 to 264 VAC Input to 15Vdc Output
AKCUF19	19" Mounting Flanges (One Compact Remote Unit per RU)
AKCUF23	23" Mounting Flanges (One Compact Remote Unit per RU)
AKCURB	Compact Unit Dual Bracket (Two Compact Remote Units per RU)
AKCUFILT	Compact Unit Air Filters (6 Pack)
AKCURCON	Compact Remote Unit Connector Kit
<b>AK600 Series Compact Remote Unit Products</b>	
AK624RU	Remote 8 Pair Ethernet Compact Unit, 800 Mbps max, Asymmetric
AKRTPS	Remote Unit -48Vdc Power Supply



# Appendices

# Appendix A:

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## System Software Upgrade

Proceed through the following steps to perform the System Software Upgrade:

**Note:** All MSPAN connections must be up. If not, set the Line Card(s) out of service before you proceed (see page 22- 23). If the Line Card(s) are not set out of service, the system software upgrade will fail.

- 1 Go to [www.positronaccess.com](http://www.positronaccess.com)
- 2 Select **Portal**
- 3 Select the **Login** option if you are already a registered user.

**Note:** If you are not a registered user, select the **Register** option and allow 24-48 hours for your account to be setup.

- 4 Select **AK Firmware**.
- 5 Select the appropriate software version.
- 6 Select the corresponding self-extracting .exe file and store the file in the place of your choice on your PC
- 7 Go to the tool bar and select Action Menu > System Software Upgrade... This will bring up the System Software Upgrade dialog box.
- 8 Select the system you want to upgrade and then click on the **Upgrade** button.
- 9 Locate the appropriate .exe file from your PC and click the **OK** button.
- 10 Select the **Upgrade** button on the System Software Upgrade.

**Note:** The system will ask if you want to switch and reboot after the upgrade. You can either choose this selection immediately, or perform the switch and reboot later.

- 11 Select **OK** to confirm the version number the system is being upgraded to.

The system will begin the process of upgrading the system. Note that this process will take a few minutes. The sequence of rebooting will be first, the RT's, then the Line Cards, ending with the Common Control Cards.

# Appendix B:

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## Alarm Information

Alarm	Entity	Severity	Alarm Description
Loss of Signal	PAIR	MN	Circuit Pair signal is lost.
Short Circuit	PAIR	MN	Circuit Pair is shorted.
Open Circuit	PAIR	MN	Circuit Pair has been disconnected.
Ground Fault	PAIR	MN	Circuit Pair has been shorted to ground.
Pair is Miswired	PAIR	MN	Circuit Pair of one XSPAN has been miswired to two or more XSPAN devices on the remote side.
Pair has bad Signal Quality	PAIR	MN	The Pair has been removed by the System's Bad Pair detection mechanism as a result of exceeding the Pair LOS Threshold.

Pair has high ES/SES	PAIR	MN	The Pair has been removed by the System's Bad Pair detection mechanism as a result of exceeding the Pair ES Threshold.
Loss of Signal	MSPAN	CR	Loss of signal (LOS) is a condition where the received signal drops below threshold due to an obstruction.
Loss of Signal	XSPAN	CR	Loss of signal (LOS) is a condition where the received signal drops below threshold due to an obstruction.
Loss of Frame	MSPAN	CR	LOF indicates that the CO Unit is attempting to sync up with the RT Unit.
Rate Below Configured Rate Threshold	MSPAN	MJ	Capacity below configured rate. Not enough cable pairs have been provisioned or the overall cable distance is too long for the desired data rate.
SNR Margin Below Margin Threshold	MSPAN	MN	The obtained SNR margin is below the configured SNR margin.
Line Powering Failure	MSPAN	CR	Not enough cable pairs have been provisioned for the MSPAN or the overall cable distance is too long for Line Power.
Equipment Failure	EQPT	CR	Generated when the system cannot communicate with line powering subsystem.
Improper Removal	EQPT	CR	Generated when In-Service Line Card is removed or fails to establish a link with Common Control Card.
Mismatched Equipment	EQPT	CR	Generated when software version on CO Unit is different than Software version on RT. The data path will be down in this condition.
Loss of Management	EQPT	CR	Generated when in-service Line Card fails to communicate with the Master CC Card.

Alarm	Entity	Severity	Alarm Description
Mismatched Hardware	EQPT	CR	Both AK590CC cards do not support Redundancy.
High Temperature	COM	MN	Triggered when the temperature is 85 degrees Celsius or above, once set the alarm is cleared after the temperature falls below 80 degrees Celsius.
Power A Failed	COM	MN	No power detected on power input A.
Power B Failed	COM	MN	No power detected on power input B.
Environmental Alarm 1	COM	MN	Alarm detected from Alarm Connections.
Environmental Alarm 2	COM	MN	Alarm detected from Alarm Connections.

Mastership Switch	COM	NA	Mastership switch has occurred from one CC card to the other.
Fan Failure	FAN	MN MJ	Minor Alarm if one fan fails, Major Alarm if more than one fan fails.
Improper Fan Removal	FAN	MJ	Fan Module cannot be detected.
Link Down	ETHERNET	NA CR	No Ethernet equipment detected. The Severity is Critical when the condition is detected on a CC Card Port that has VLANs assigned.
Clock Change	EQPT	NA	The system time has been changed.
System Reboot	COM	NA	The system has been rebooted.

# Appendix C:

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## System MSPAN/XSPAN Error Information

MSPAN Errors	Description
CRC Error	A CRC is a way of identifying if data was received error free. Transmitted data is divided into blocks that are appended with 1 or 2 CRC bytes that are derived from the original data. The receiver re-computes the CRC bytes from the received data and if there is a mismatch, it signifies that there was a mismatch between the transmitted and received data
MSPAN ES	An Errored Second is any second in which the MSPAN incurs a CRC error
MSPAN SES	A Severely Errored Second is any second in which the MSPAN exceeds 18 CRC errors or has suffered an LOF event
MSPAN UAS	An Unavailable second is any second in which the MSPAN is in LOS or LOF and has experienced 10 MSPAN SES's in a row (in which case 10 SES shall be subtracted from the UAS total)
Pair CS	Any second during which a correctable error occurred, i.e. an error occurred during transmission, but the Reed Solomon (RS) error protection mechanisms was able to detect and correct it
Pair ES	An Errored Second is any second that has at least one CRC error
Pair SES	A Severely Errored Second is any second that has more than 18 CRC errors
Pair UAS	An Unavailable Second is any second with an LOS (Loss of Signal), LOF (Loss of Frame), or 10 SES in a row (in which case 10 shall be subtracted from the SES total)



XSPAN Errors	Description
CRC Error	A CRC is a way of identifying if data was received error free. Transmitted data is divided into blocks that are appended with 1 or 2 CRC bytes that are derived from the original data. The receiver re-computes the CRC bytes from the received data and if there is a mismatch, it signifies that there was a mismatch between the transmitted and received data
XSPAN ES	An Errored Second is any second in which any pair in the XSPAN bonding group incurs a CRC error
XSPAN SES	A Severely Errored Second is any second in which the cumulative number of CRC errors of all the pairs in the XSPAN exceeds $18 \cdot N$ , where N is the number of pairs in the XSPAN that are in data mode
XSPAN UAS	An Unavailable Second is any second in which all the pairs in the XSPAN are in LOS or have experienced 10 XSPAN SES's in a row (in which case 10 SES shall be subtracted from the UAS total)
Pair CS	Any second during which a correctable error occurred, i.e. an error occurred during transmission, but the Reed Solomon (RS) error protection mechanisms was able to detect and correct it
Pair ES	An Errored Second is any second during which at least one CRC error
Pair SES	A Severely Errored Second is any second interval during which more than 18 CRC errors occurred
Pair UAS	An Unavailable Second is a second where the previous 10 or more consecutive seconds were SES, or if the Pair is not in data mode
Pair LEFTRS	Used only when G.INP is enabled. The number of seconds that experienced a Low Error Free Throughput Rate, i.e. seconds during which the Error Free Throughput dropped below the configured threshold