

Supporting IP Services with CrossPATH*

Application Note **Overview**

With the evolution of IP networks further and further into traditional Time-Division Multiplexing (TDM) networks and the enhanced management features of today's cell-based network elements being used by wireless service providers, many IP-based services that have been available to the average business user are now available to remote cell sites.

These new services can include voice and video surveillance over IP, local access to the carrier's intranet, allowing maintenance technicians to download documentation instead of carrying the physical books, and the ability to upgrade operating software on the various network elements without the need to dispatch a technician.

This application note describes some IP services available to carriers and how using the CrossPATH is beneficial for these services. The note discusses:

- IP services examples (Voice over IP, video over IP, and management services)
- IP routing
- IP switching
- Quality of Service (QoS) protection

Using CrossPATH for Voice over IP

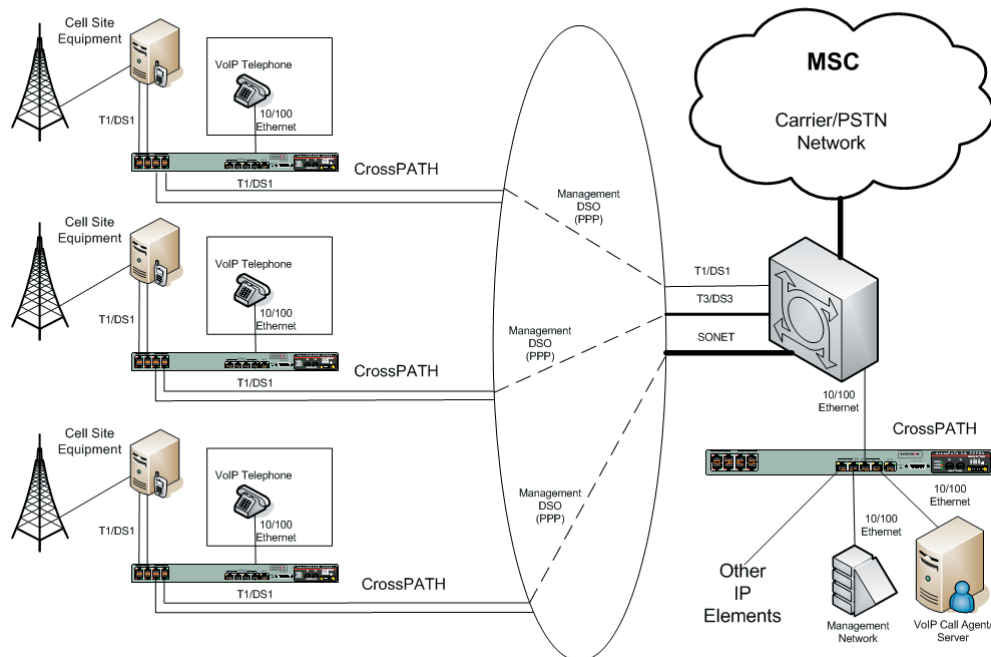


Figure 1: CrossPATH ensures VoIP quality for remote cell sites.

* CrossPATH refers to the CrossPATH 3G and CrossPATH 4.

IP service examples

Voice over IP

Many wireless service providers are looking for a more economical solution to provide voice services to remote cell sites for use by their technicians. Currently, this is usually accomplished by having a land line telephone installed by the local phone company that incurs a monthly cost. However, by using a Voice over IP (VoIP) telephone at the remote site, this ongoing charge can be eliminated.

With the integrated routing and QoS capabilities of the CrossPATH, a VoIP telephone can be supported while protecting the call quality for the remote cell site (see Figure 1).

Video over IP

Security at remote cell sites is an increasing concern for wireless service providers. Whether located in urban areas where vandalism and theft are becoming more of an issue or at remote locations that are difficult to visit during certain times of the year, many wireless providers are looking for an economical solution for viewing real-time conditions at the site.

Much like VoIP, the CrossPATH's integrated router with QoS has the ability to provide not only the IP connectivity necessary to support video surveillance to these remote sites but also provides the appropriate QoS mechanisms necessary to support this capability. The QoS mechanisms include Differentiated Services (DiffServ), low latency, weighted fair queuing, and traffic policing and shaping.

Video over IP access to cell site

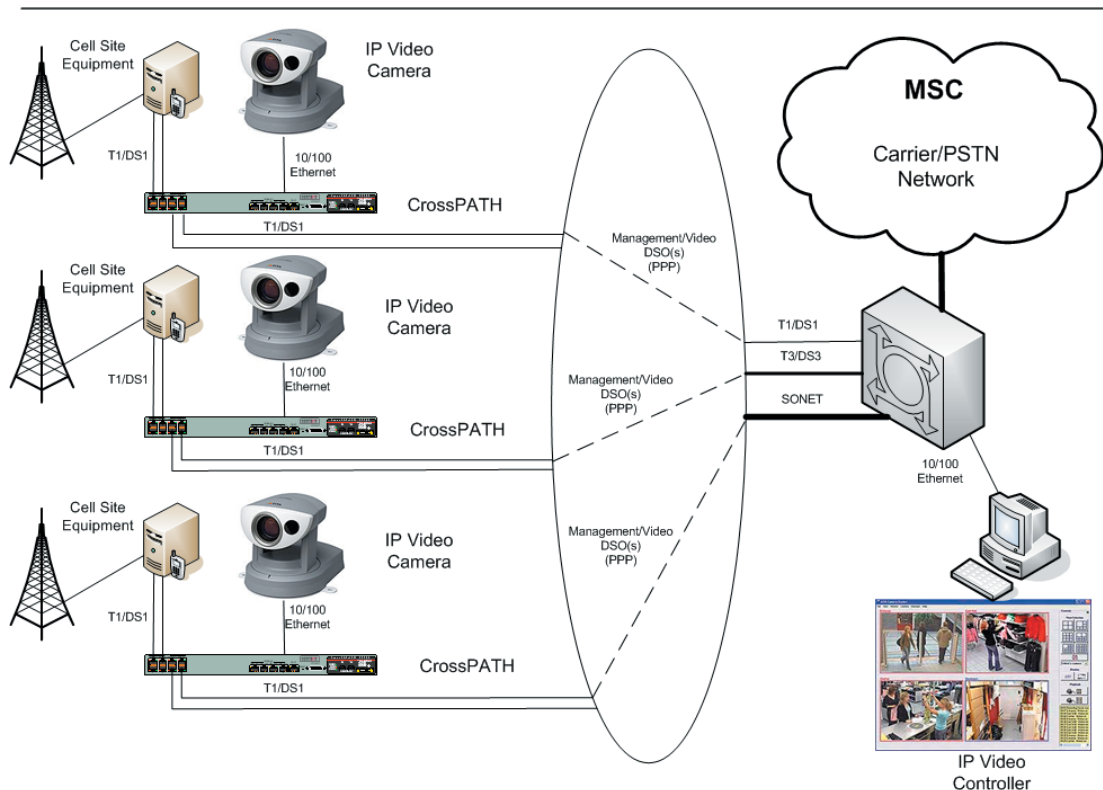


Figure 2: CrossPATH provides IP connectivity and QoS mechanisms to support video surveillance.

Management services

There is an increasing number of network elements located at cell sites that support Ethernet/IP for management purposes creating the need to provide connectivity options necessary to support them. The CrossPATH, with its integrated router and 4 port Ethernet switching, allows these network elements to share the same management link (see Figure 3).

For more details on this capability, see the Kentrox application note on [Using the CrossPATH for Network Management](#).

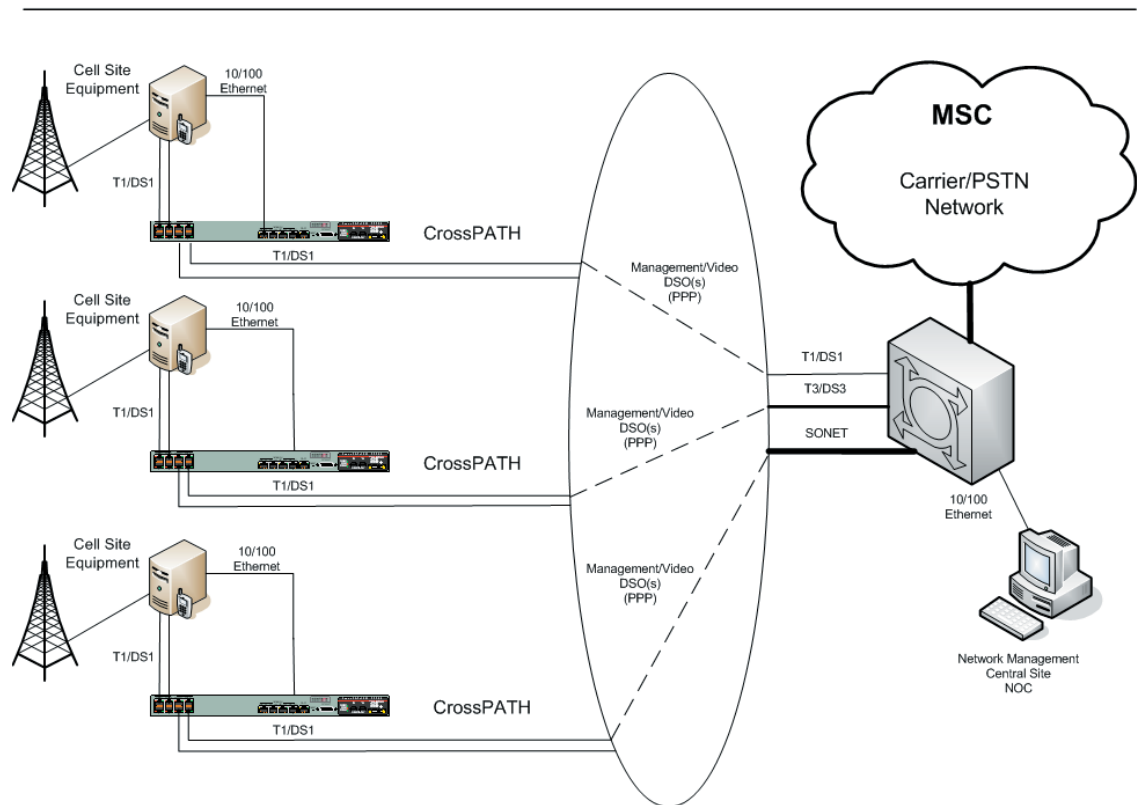


Figure 3: Network management and IP access to cell sites using the CrossPATH

IP routing overview

IP services to cell sites would not be possible without IP routing. IP routing at the cell site provides the ability to integrate into a company's intranet or the Internet. The CrossPATH integrates state of the art routing capabilities that allow wireless carriers to support current and future services that use IP as their underlying technology.

The CrossPATH supports a dual-router interface, each supporting from 64 kbps up to full T1 speeds of 1.536 Mbps. These interfaces support the following:

- Static, RIP v1/v2, and OSPF
- PPP and Frame Relay
- DHCP server, relay
- DHCP client, relay
- DNS client, relay

Routing capabilities are essential to support IP services being offered by carriers. However, technicians don't want to spend time learning how to configure a router. The CrossPATH's built-in router is easy to configure (see Figure 4) with a point-and-click GUI.

The screenshot displays the KENTROX CrossPATH web interface for configuring routers. The main content area is titled "Router Interface Configuration" and shows two routers: Router-1 and Router-2.

Router-1 Configuration:

Interface Name	Alias	DSO Speed	Link Speed	Controls			
Router-1	mdSO Router #1	64000	1536000	<<Make Selection>>			
PPP I/F Name	Status	LCP Echo Interval	LCP Max Conf	LCP Max Fail	LCP Max Term	Link Up/Down Trap	Controls
ppp-1	Network	5 seconds	10 requests	5 failures	2 requests	Disabled	<<Make Selection>>
ipwan-1 (Static)	Subnet Mask	IP MTU	MSS Clamp	Security Zone	Controls		
172.16.10.11	255.255.255.0	1500	Enabled	Untrusted	<<Make Selection>>		

Router-2 Configuration:

Interface Name	Alias	DSO Speed	Link Speed	Controls			
Router-2	mdSO Router #2	64000	64000	<<Make Selection>>			
Frame Relay I/F Name	Status	LMI Type	LMI Status	Link Up/Down Trap	Frame Relay Trap State	Frame Relay Trap Rate	Controls
Fr-2	LinkUp	None	---	Disabled	Disabled	0 msec	<<Make Selection>>
DLCI I/F Name	Status	DLEI	Encapsulation	CCR [kbps]	Inverse ARP	Far-end IP Addresses	Controls
dci1001	Active	1001	RFC-1490	0	Enabled	25.10.10.10 (Static) 25.10.10.11 (Discovered)	<<Make Selection>>
Fr-2 (Static)	Subnet Mask	IP MTU	MSS Clamp	Security Zone	Controls		
25.10.10.11	255.255.255.0	1500	Enabled	Untrusted	<<Make Selection>>		

A "Refresh" button is located at the bottom of the configuration area.

Figure 4: CrossPATH's easy to configure GUI for routing capabilities.

When deploying IP services, it is beneficial to know the performance of these services. The router helps you easily see how everything is working. If there is a problem, the CrossPATH's easy-to-understand GUI aids in troubleshooting and debug (see Figure 5).

IP switching

Wireless service providers may want to segment their voice and data traffic into separate Virtual Local Area Networks (VLANs). The CrossPATH includes a fully integrated four-port 10/100Base-TX switch with the following features:

- RJ-45 interface(s)
- Auto-sensing speed detection
- Auto-sensing polarity detection
- VLAN support for 8 LAN subnets using 802.1Q tags
- DNS client, relay

The CrossPATH enables the carrier to easily connect various networks elements together on the layer 3 Ethernet (see Figure 6). With the fully integrated switch, the carrier has less equipment to install and manage.

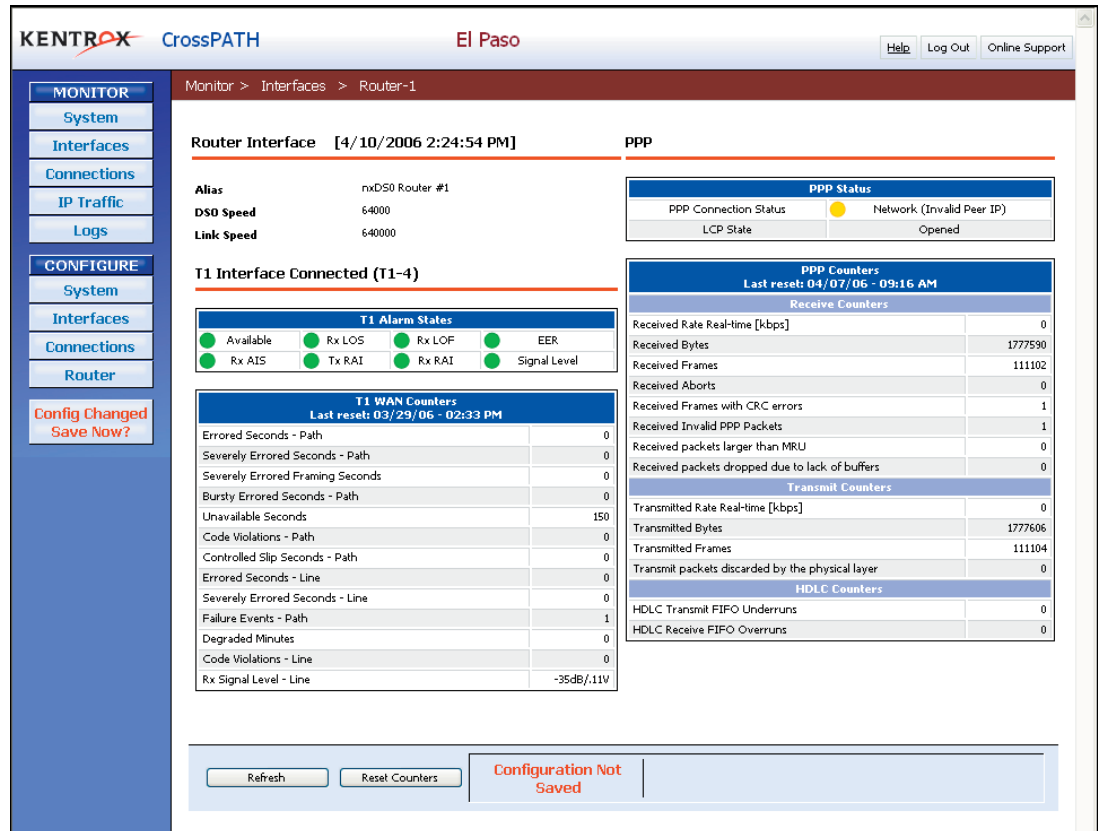


Figure 5: Monitor and diagnose common problems using statistics from the CrossPATH's reporting.

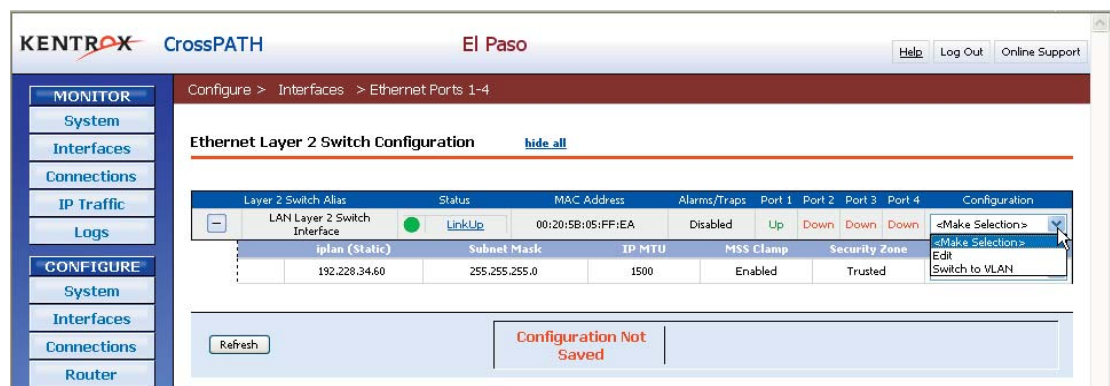


Figure 6: Easily change layer 2 Ethernet ports to support VLAN 802.1q tagging with CrossPATH.

Quality of Service (QoS) protection

For wireless providers to support the IP services being offered such as VoIP, video, and management, it is important for the network to guarantee different levels of service for various traffic types (voice, data, etc.). The goal of QoS is to provide priority to certain traffic flows without making other flows fail - ensuring consistent, guaranteed performance.

The CrossPATH includes easy-to-configure (see Figure 7) QoS support with the following capabilities:

- Class-based Weighted Fair Queuing
- Auto DiffServ/TOS-based priority queuing
- VoIP and video prioritization
- All DiffServ classes supported
- Configurable QoS marking and re-marking
- 32 user-configurable QoS policies for prioritization by source/destination addresses, port, protocol, and DiffServ Code Point (DSCP)
- QoS traffic reports and graphs
- Configurable WAN latency reports

KENTROX CrossPATH El Paso Help Log Out Online Support

Configure > Router > IP QoS > QoS Config Summary

QoS Config Summary

Interface	QoS IFTType	Attached to Layer-2	Bandwidth [kbps]	Bandwidth Auto-Configured	Policies Configured	QoS Enabled	Controls
iplan [192.228.34.60]	Lan	Yes	100000	Yes	1	Yes	Interface DscpMap Policies
ipwan-1 [125.250.50.1]	Wan	Yes	640	Yes	1	Yes	Interface DscpMap Policies

Configuration Not Saved

Figure 7: The QoS configuration summary displays all interfaces that have QoS policies configured and if they have been enabled.

The QoS policies in CrossPATH use bandwidth rules that apply to the WAN for each type of traffic. This assures each traffic type has the right amount of bandwidth for the appropriate application. The default settings automatically prioritize VoIP traffic, but user-configurable policies can be created through the easy-to-use GUI (see Figure 8). This enables wireless service providers to prioritize traffic based on their needs.

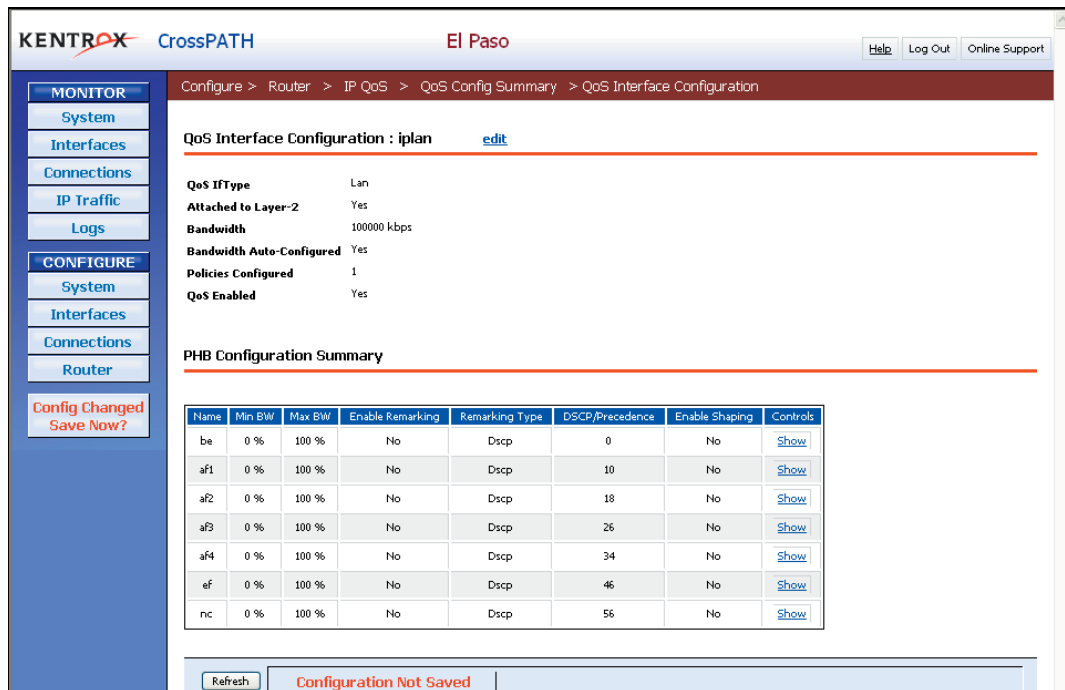


Figure 8: CrossPATH configuration summary quickly shows the status of each traffic class.

Summary

Kentrox is an industry leader in providing quality network access products. Kentrox is leading the charge in providing solutions that are easy to install, simple to manage, and meet the growing needs of both wireline and wireless access products.

Kentrox continues to meet the evolving IP services requirements of wireless service providers by providing innovative solutions at a very attractive price point. As the industry shifts to IP for more and more services, the CrossPATH can help save time and money. With integrated routing, switching, and QoS capabilities, the CrossPATH is ideal for allowing wireless service providers to not only support the new requirements of VoIP and video over IP, but to help reduce the costs associated with them.

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