

Adding Simple Network Management Protocol (SNMP) Capability to the CXR Larus 5702/5703 RouteSwitch Products

Mike Ritz, Director of Product Marketing, CXR Larus Corporation

The CXR Larus models 5702 and 5703 RouteSwitch T1 and E1 Automatic Protection Switch (APS) products have been field proven and are ultra reliable products, providing protection for many, many thousands of critical traffic bearing T1 and E1 circuits throughout the world. However, as networks become more sophisticated and network offices become increasingly remote and entirely unmanned the need for a more sophisticated remote monitoring and alarm reporting structure utilizing existing ethernet IP networks becomes important. This is increasingly becoming a mandatory network requirement, and while the existing 5702/5703 legacy E2A alarm structure certainly has enough depth in what is being reported, customers often find it difficult to interface the product's alarms with the rest of their network elements and remotely manage them via their networks. Some customers are even spending expensive engineering resources to design and implement their own alarm interfaces to extract the data from the RouteSwitch shelves.

The solution to this problem is to update the 5702/5703 product line with the addition of a new ethernet Local Area Network (LAN) based and open architecture Simple Network Management Protocol (SNMP) monitoring and reporting system, designated the CXR Larus Model 5700. This product will allow the integration of 5702/5703 systems, including those already deployed and in service, with modern ethernet IP based SNMP capability, thereby greatly reducing overall system maintenance costs. Since the Model 5700 is a standalone SNMP alarm integration system interfacing seamlessly, network alarm management engineering costs during the design and deployment phases can be greatly reduced as the requirement for custom designed alarm interface equipment is eliminated.

Why SNMP?

SNMP, since its creation in 1988, has achieved widespread acceptance and is the defacto standard for most modern network management systems. The simplicity of the system has lead to its widespread use within the entire telecommunications industry.

SNMP is based on the manager/agent model consisting of a manager, an agent, managed objects, a database containing the management information, and of course the protocol that makes it all happen. The manager provides the interface between the human network manager and the network management system. The agent provides the interface between the manager and the physical device (the 5702 in this case) being managed.

The manager and agent use a Management Information Base (MIB) and a small set of commands to exchange information.

Some of the major advantages of SNMP are:

- * It is LAN based, so it eliminates the requirement for a separate alarm network, thereby reducing overall costs.
- * It provides a common management platform for many different devices. Because of the MIB structure the SNMP manager can correctly interpret alarm data from any device that supports SNMP.
- * It is an open, non proprietary standard, and is supported by multiple vendors.

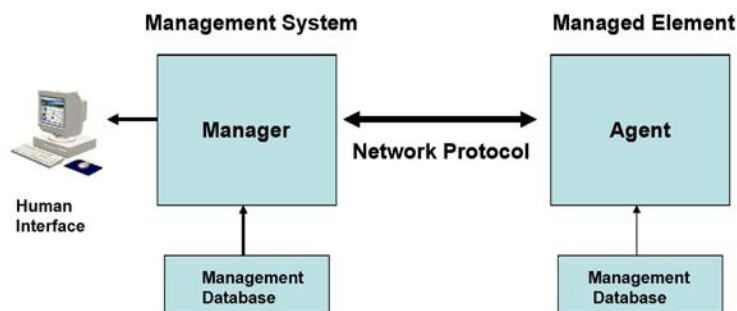


Figure 1. Typical SNMP agent/manager architecture

The History of the CXR Larus RouteSwitch

The CXR Larus Model 5702 Automatic Protection Switch (APS) family was originally designed by Larus Corporation in the early 1990s timeframe pursuant to AT&T Design Specification KS23779 for exclusive use within the AT&T network. This controlled KS document outlined all of the mechanical and operational specifications for the product family, which consisted of a 1 + 1 DS1 protection circuit pack module (the KS23779 List 1), a 19 inch mounting 12 slot office shelf (the KS23779 List 3), a 23 inch 14 slot office shelf, (the KS23779 List 4), and a 19/23 inch two slot remote shelf (the KS23779 List 2) The products were marketed and sold to AT&T under the “DDM-Ring” nomenclature, and many thousands were ultimately sold and deployed within the AT&T network. Part of the business arrangement with AT&T was that Larus could also sell the product under its own label, and the Model 5702 RouteSwitch family of products was born shortly thereafter.

Around the year 2002 timeframe a need emerged for an E1 version of the RouteSwitch to satisfy the requirements of international customers. The result of this was the introduction in 2003 of the Model 5703 E1 RouteSwitch. The 5703 is essentially the same product as

the T1 5702 version with all the same features and functions, other than framing formats and other specifications specific to the E1 network architecture.

The 5702/5703 Alarm Structure

The alarm structure of the card module and shelf was designed around the original AT&T KS specification, and encompassed industry standard Minor and Major alarms, with corresponding visual and audible dry contact closures available for customer use. These alarms are carried through as Summary Alarms, meaning that any card module which goes into an alarm state triggers a shelf major or minor alarm. The shelf is wired in such a way that as long as only one card in a protected pair is in alarm a Minor alarm is generated. These alarms are in parallel across the shelf and are diode OR'd together. A Major alarm is generated if both cards in a protection pair go into alarm due to the series alarm wiring strategy employed within the shelf. Also mandated within the confines of the KS specification were a series of E2A protocol status and control leads, originating from each circuit pack module, and terminated on user interface connectors on the shelves. When E2A was deployed in AT&T the equipment E2A lines were sensed and encoded, and the resultant data was sent through their management network to the Network Operations Center (NOC). The data was then decoded and displayed at the NOC as a series of alphanumeric characters which were interpreted as specific alarm events.

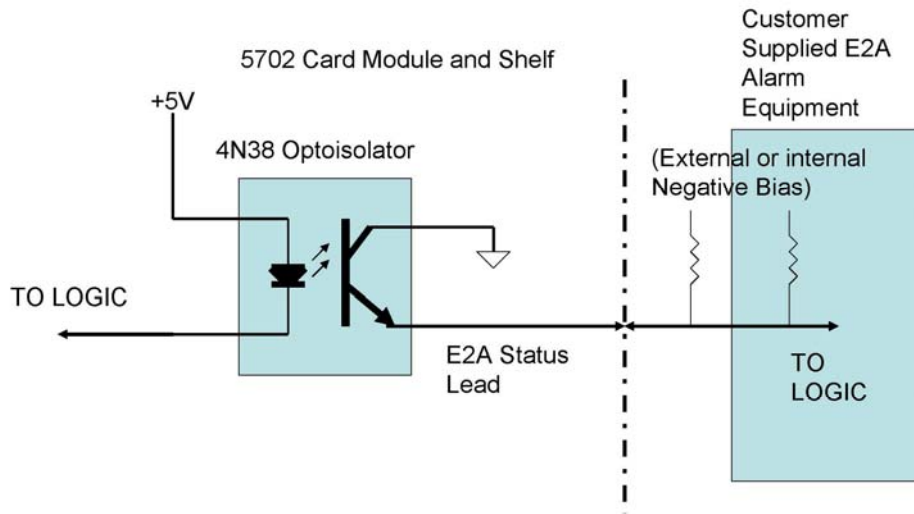
E-telemetry systems were developed by the AT&T organization in the 1960s as a method to monitor and control diverse network elements from a remote, centralized location. Status and command remote (SAC) units were employed in the central office to convert discrete (contact closure) alarms from monitored equipment into E-telemetry for efficient transfer of data to and from the operations center.

E2A was the most advanced version of the original E1 protocol and refers to simple alarm telemetry system consisting of a set of sensors at a remote position and a corresponding set of relay contact closures at a local position. The sensor data at a remote terminal is converted to a message on a data link and carried to a central office terminal where it activates appropriate alarm relays. The E2A alarm and control system is still widely deployed today, primarily within RBOC central offices, and is considered a legacy technology by today's standards. The E2A technology is utilized very little outside of the RBOC world.

The modern deployment of the 5702/5703 is primarily within the governmental/enterprise network world, where the E2A technology is not the universal alarm and control standard as it was at AT&T, the major RBOC pre-divestiture. This has historically not been a major concern for the majority of customers in the past, as the vast majority of customers have been satisfied with the availability of the contact closures provided by the Major and Minor Alarms. With the recent advent, acceptance and wide deployment of modern ethernet based alarm status and control, (usually provided by Simple Network Management Protocol (SNMP)), more and more of our customers have been asking for an updated alarm

and control methodology within the 5702/5703 product family to bring the product into the 21st century, and extend its useful life cycle. This is being driven by our customers and the increased usage of centralized IP based Network Operations Centers (NOC), where unmanned offices are monitored.

As a result of the legacy E2A alarm and control feature incorporated within the 5702/5703 product many customers have had immense problems trying to interface with the 5702/5703's alarm and control functions. The E2A alarms provided by the 5702/5703 card module, and outputted through the shelf connectors, utilize an optoisolator provide a grounding of a -48 VDC lead, which must be pulled to -48VDC with the use of an external resistor, usually located within the customer supplied equipment. Reference Figure 2, below:



Typical application of E2A Interface

The resistor value is typically in the order of 10K-47K ohms, just enough to source several milliamps through the 5702/5703's optoisolator. If the customer supplied equipment does not have the internal negative bias resistor an external resistor must be used.

Many customers have had major problems trying to interface non-E2A alarm monitoring equipment with the 5702/5703, and at least one customer has gone as far as hiring an outside consultant firm to design an interface for them. Many non-RBOC customers are not familiar with negative bias voltages ie: -48 VDC, or are attempting to use alarm sensors that operate off a positive bias such as TTL, which is more of a modern industry standard today. Other customers are attempting to employ external relays schemes to get around the biasing problems.

In order to ensure that the 5702/5703 remain as viable products, and to ensure their continued use with our major customers, an interface device has been designed that will make it easy for our customers to interface with the alarm status

and control operations, and incorporate the IP based SNMP system. Along with SNMP operation, a set of standard TTL logic level input and output control and status leads and dry contact closures (selectable) will be provided on a set of connectors.

It is important to note that the only shelves that will be supported by this 5700 SNMP interface adapter are the 5702-3A and the 5702-11. The 23 inch version of the shelf, the 5702-4 will not be supported due to the fact that it is no longer a supported product by CXR Larus, and the vast majority of shelves sold over the years into non AT&T applications have been the -3A and the -11 shelves.

Product Features

Below are the key features of the CXR Larus 5700 SMNP Monitoring System:

- Provides E2A alarm conversion to IP based graphical SNMP interpretation of all alarm states
- Operates with MIB II table, per SNMP V2c and V3 (software selectable). Supports GET, SET, and TRAP and commands. The SET command can be used to force a transfer on a particular protection module set.
- Supports full SNMP Discovery mode
- Provides TTL logic level driver outputs with software logic control for all E2A alarm outputs, and TTL logic level driver inputs for TRANSFER function
- Provides for automatic sensing of 10 or 100 Base-T ethernet connection, and status LEDs
- RS-232 Craft interface for local control and alarm status, DCE configuration
- All inputs and outputs are electrically isolated, and ESD and surge protected
- Occupies only 1.5 RU of additional rack space, and operates off nominal -48VDC office power
- Interface cable available to work with the 5702-11 Remote Shelf
- Supports DHCP and Static IP addressing.
- Provides TELNET and TFTP (FTP)

- Full security control with multiple users and user selectable passwords
- Full FTP support for remote software upgrades
- Internal Real Time Clock (RTC) for time stamping of alarm events. Up to two weeks of alarm events (up to 2,000 events) can be saved and recorded in internal non volatile memory. Data can be accessed through the Craft Port.
- Customer Path and Location names can be written into the software through the Craft Port and can be tied to a particular APS card set, ie: **PAIR 1- FLOWER MOUND TO RATTLESNAKE GULCH**
- Compatible with both 5702-1, -1A, -1B (DS1) and 5703-0 (E1) APS versions.
- Because the 5700 is truly “plug and play” it can be seamlessly installed into existing installations, providing an upgrade path for those customers that are moving to SNMP management.
- Reduces CapEx and future OpEx expenditures for both the system integrator and the end customer.

Summary

CXR Larus is completely committed to providing extremely stable and reliable products built with top tier quality for our customers, and the 5702/5703 APS is certainly no exception. With literally thousands and thousands of these products deployed in the field in all corners of the globe, this product has proven to be one of the best we have ever offered for sale. We also have a great history of listening and responding to what our customers are saying to us, and the introduction of the Model 5700 SMNP Monitor unit is the result.

Interfacing with the 5702/5703’s legacy E2A alarm structure has been a sore spot with many customers over the years. Bringing the existing 5702/5703 product line’s management system into the 21st century, while enabling existing customers to upgrade their systems to current SNMP technology without the need for a “forklift upgrade”, greatly enhances the product line and extends its useful life in the field for many years to come. No longer will new customers have to expend expensive resources to design or purchase a third party alarm interface system to extract alarm data from the APS, nor will existing customers have to replace their existing APS systems to gain ethernet based SNMP management. This will greatly lower capital expenditure costs for the customer, and greatly reduce operating maintenance expenses for them in the future.

The ability of the 5700 SNMP Monitor Unit to log and record up to 2,000 individual APS alarm events locally for troubleshooting will greatly aid the service technician with fault diagnosis, reducing the time it takes to isolate troubled spans, another cost saving.

Advanced orders for the 5700 SNMP Monitor Unit are being taken now, with delivery expected Q3, 2008. Contact CXR Larus at 408-573-2700, your local telecom distributor sales representative, or visit us at www.cxrlarus.com for more information.