

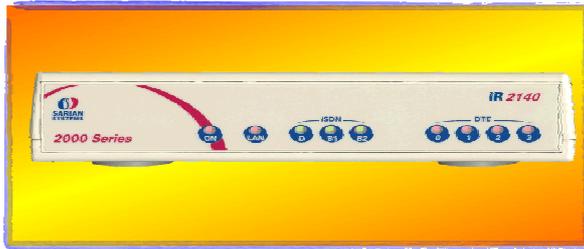


# Sarian 2000 Series Concepts

*An Introduction to the Sarian Software Architecture*

## 1. Introduction

The Sarian 2000 series of ISDN and GPRS devices are advanced products which go way beyond the capabilities of a normal ISDN Terminal Adaptor (TA) or GPRS “module”. This guide is intended to explain the basic architecture of the series and will help in your understanding of how to configure the unit for different applications.



Series 2000 is built on a highly modular principle which allows it to be used in a variety of diverse applications ranging from industrial telemetry gathering to on-line credit card authorisation.

Most “off the shelf” communications products have rigid interfaces to local devices which in turn means that the application must bend to fit the communications device (a common example is the use of so called “AT” commands which often have quite different meanings on different devices). This means that in many cases is difficult or even impossible to adapt an often undocumented legacy application to work with a new communications device.

Sarian devices are different in that they offer the system designer maximum flexibility in interfacing to local devices and can even be programmed to work with specific proprietary protocols.

Many of the 2000 Series devices support multiple serial ports and some support Ethernet connections as well, for example, the IR2140 “Routerplexer” has four serial ports and an Ethernet port. This allows a single communications device to be used to attach multiple remote devices saving on line costs as well as equipment and management costs.

In addition, Sarian products include sophisticated line and protocol monitoring functions. These are invaluable in diagnosing faults at remote sites without having to physically be there which can be expensive and time-consuming.

Our **REMOTEMANAGER™** system allows large numbers of deployed Sarian units to be managed from a single Personal Computer.

## 2. Software Architecture

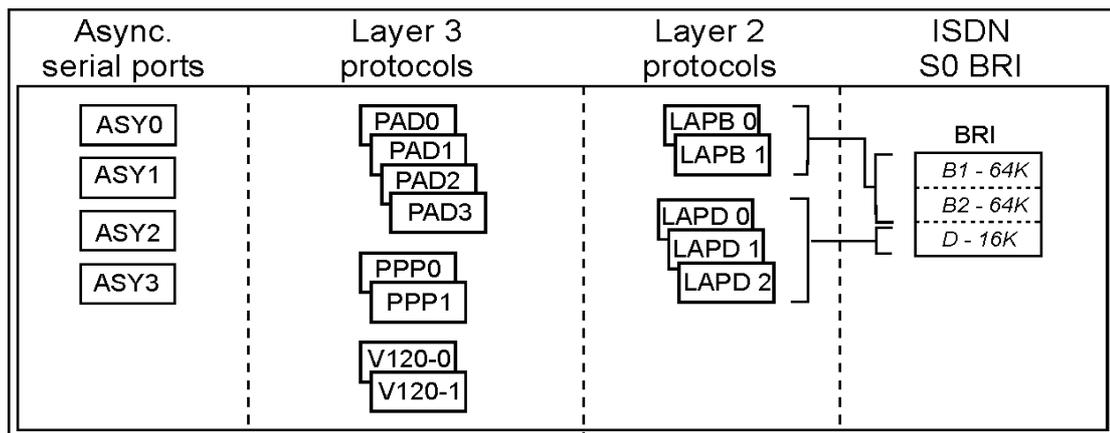
The 2000 SERIES uses a Proprietary Real-time Operating System (RTOS) designed specifically for communications processing along with a series of discrete modules that support specific functions such as the ISDN Physical interface, X.25 PAD, TCP/IP etc. This modular construction provides a high degree of flexibility and allows the dynamic 'binding' of different communications protocols to separate physical ports.

The software can be visualised in four main layers. These are ;

- The physical interface drivers connecting the local devices which can be via Synchronous / Asynchronous ports or Ethernet LAN connections
- The session layer protocols (e.g. X.25 PAD, TPAD)
- The link layer protocols (e.g. LAPB, LAPD, TCP/IP)
- The WAN physical interface drivers (e.g. ISDN BRI, GPRS, PSTN)

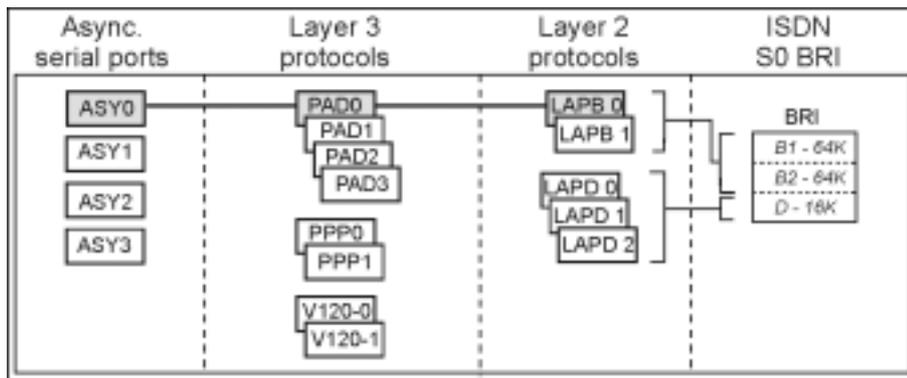
In the specific case of the GR2140, for example, there is only one physical WAN interface; the ISDN BRI.

In the illustration below, the ISDN physical interface driver is permanently bound to the protocol link layers (LABP for the B-channels and LAPD for the D-channel). However, the associations between the asynchronous port drivers and the session/link layer protocols can be defined as required to suit specific applications.



Additionally, the 2000 SERIES is capable of supporting multiple 'instances' of the session and link layer protocols. For example the GR2130 has both GPRS and ISDN WAN interfaces. Each physical port or each instance of a protocol session is referred to as an 'entity'.

The following diagram illustrates some of the entities that are available in the Sarian 2000 SERIES.



To illustrate, at layer 3 an X.25 PAD is an entity and the device supports up to four instances of the X.25 PAD entity.

To configure the multiplexer to access remote services over the ISDN network you must first establish bindings between the various entities that will be used. For example, to configure a terminal connected to ASY 0 to communicate with a remote X.25 service over a B-channel, ASY 0 must first be bound to an X.25 PAD, say PAD 0. To complete the link, it is also necessary to configure the PAD for B-channel operation by binding it to a LAPB entity (as opposed to LAPD which would be required for D channel operation).

Once these links have been established the terminal connected to ASY 0 can establish an X.25 session by making an ISDN call (using the **ATD** command common to modems and other ISDN terminal adapters), and then issuing an X.25 CALL.

Similarly, a second application running on a terminal connected to ASY 1, could simultaneously access D-channel X.25 service. In this case, ASY 1 would be bound to PAD 1 and PAD 1 would be bound to LAPD 0.

In each case, the multiplexer must be configured so that the appropriate entities are bound and other operational parameters are set correctly before an application is used.

This configuration process is generally quite simple and can be carried out via the built-in web interface using a standard Web browser such as Microsoft Internet Explorer™ or Netscape Navigator™. Alternatively you may use a series of text-based commands entered via one of the serial ports.

Once configured, the settings can be saved in non-volatile memory so they are not lost when the power is removed.

## 3. 2000 SERIES Command Interfaces

There are two principal methods of configuring the 2000 SERIES:

- By using the Web-based (HTML) configuration pages
- By entering text commands

Both methods may be used from a locally attached terminal or remotely over the ISDN network.

In each case, remote access is username and password protected to prevent unauthorised use.

The Web interface is the simplest and quickest option but requires that you have access to a Web browser. The command line interface not as intuitive but requires only a basic ASCII terminal.

## 3. Principal Features

In addition to basic communications protocols such as V.120 / V.110, X.75, PPP and X.25, the 2000 SERIES incorporates a number of other important features.

### 3.1 Web server.

The built-in Web server provides access to a series of Web pages that allow you to configure the multiplexer for different applications or to view operational status or statistics information.

For configuration purposes, separate pages are provided for each instance of the various protocols. Each page lists all of the parameters related to that particular type of entity and allows you to set each parameter to the required value.

The 2000 SERIES also maintains important statistics about different entities such as X.25 PADs, PPP instances etc. These statistics can be viewed through dynamic Web pages that are updated each time you load them. For example, the statistics page related to the X.25 PAD instances provides information about the number of X.25 CALLs made and received, the number RESTART packets transmitted and received etc.

Finally, the Status pages allow you to view information such as the protocol analyser trace, the event log, a listing of the file directory, ISDN BRI status etc.

### 3.2 Event Log.

The Event Log is an extremely useful feature for managing the 2000 SERIES once it has been installed. The Event Log maintains a real-time record of certain events that

may occur while the unit is in use. The log is generated automatically and is stored in non-volatile memory in a pseudo-file called **eventlog.txt**. The types of event that are logged include Power Up, Reboot, Call failure, Login attempts etc.

Each type of event can be allocated a priority code and based on this code the unit can be configured to automatically generate and send an email message to a pre-defined address to alert a Network manager or operator that a significant or critical event has occurred. If necessary, analyser logs or other information can be sent with the email as an attachment.

### **3.3 Protocol Analyser.**

The Protocol Analyser can be used to generate a trace of activity at the ISDN interface, the serial ports, the Ethernet interface, the X.25 link layer (LAPB/LAPD) and the X.25 network layer.

In the case of Ethernet traffic, a full TCP/IP protocol decode is provided allowing easy debugging of LAN traffic.

Any or all communication layers may be included in the trace that is stored in a pseudo-file in the multiplexer's memory called **ana.txt**. The contents of the file can be viewed either via the **Status->Analyser** web page or by using the **type** command from the command line to list the **ana.txt** pseudo file.

### **3.4 FTP Server**

Files can be transferred to and from the multiplexer using the File Transfer Protocol (FTP). Using FTP client software such as Cute FTP or WS\_FTP, files stored in the multiplexer can be retrieved or replaced by new versions. This can be carried out over the ISDN network or via a local serial port connection and is useful for upgrading configuration files or firmware. Some FTP clients will also allow you to view text files such as the analyser trace or event log.

### **3.5 Telnet Server**

The 2000 SERIES incorporates a Telnet server. This allows remote access to the text command interface over the ISDN network. By establishing a Telnet session into the unit you can take full control over it for the purposes of configuration or upgrade.

### **3.6 SMTP (Email) Client**

The Simple Mail Transport Protocol (SMTP) client is provided to support automatic email generation as part of the Event Log and alert facility.

## **4. Security**

An important feature new to the Sarian 2000 range is the addition of IPSec compliant VPN tunnelling. This allows network designers to consider using the Internet for serious business applications without the worry of eavesdropping due to 3DES and AES encryption techniques.

Many organisations are now finding VPN's more and more important in their network infrastructure, however, as the complexity increases it is often very difficult indeed to locate connection problems as the very security involved often blocks access to normal debugging tools. Sarian's in-built IKE (Internet Key Exchange) analyser gives access to important low level protocol information allowing key management issues to be resolved without compromising security.

## 5. Benefits

As can be seen from the above, the Sarian 2000 series has a highly modular software structure. This means that not only can the device be easily adapted to existing applications, but as new protocols become available they can be simply downloaded into the unit via a simple FTP call. This can be done whilst the unit is on-line requiring only a reboot during twilight hours for the new software to become effective.

The basic hardware architecture of the Sarian 2000 is also very flexible allowing the possibility of many different physical variants whilst keeping the same management interface, thus reducing retraining costs for installation and network management personnel.

Another cost saving feature is the built in protocol analyser. Depending on the variant purchased, the unit in the field can contain the same ability to trace and trap problems as was previously only possible by having a person on site with an expensive dedicated analyser. This means fewer site visits and higher Quality of Service.

Finally, the in-built web server removes the need for specialised vendor specific software to access the unit. Any authorised technician can configure, monitor and control the unit from anywhere in the world he can get access to a standard web browser. Of course, for those more used to a text based interface, telnet remains available for simple on-line configuration changes.

## 6. General Specifications

### Local Protocols

IEEE 802.3 Ethernet 10 /100 Mb/s (10BaseT / 100BaseT)

V.35

V.24 75 – 256Kb/s

V.21 Synchronous up to 1.0Mb/s

AT Command set, TPAD, X.28 PAD

### Communications Protocols

V110 / V120 Rate Adaption

X75 / X.75NL

PPP / MLPPP

BACP (Bandwidth Allocation Control Protocol)

AO/DI

X.25

### **Security**

PAP / CHAP login

MD5 password encryption

IPSec compliant VPN

DES / 3DES / AES data encryption

### **Built-In Management**

SNMP 1.0

SMTP

FTP