



CR4110

4000 Series Router

Wireless (CDMA) EV-DO 450 Rev.A

Installation Guide

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Safety Notices






- 1) Please read all instructions before installing and powering the unit. You should keep these instructions in a safe place for future reference.
- 2) The CR4110 uses a 12V DC/1.5A power supply (mains adapter). If the mains adapter shows signs of damage or malfunction, you should stop using it immediately, turn off the power at the mains and disconnect it from the mains supply before contacting your supplier for a repair or replacement.
- 3) Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. Use only the accessories, attachments, and power supplies provided by the manufacturer – connecting non-approved antennas or power supplies may damage the unit, cause interference or create an electric shock hazard, and will void your warranty.
- 4) Do not attempt to repair the product. The unit contains no electronic components that can be serviced or replaced by the user. Any attempt to service or repair the unit by the user will void the product warranty.
- 5) The CR4110 is designed for indoor use only and should be used in an environment that is suitable for computers and other electronic equipment.
- 6) Ports that are capable of connecting to other apparatus are defined as SELV ports. To ensure conformity with IEC60950 ensure that these ports are only connected to ports of the same type on other apparatus.

Note on Wireless Networks

The CR4110 is designed to operate on CDMA EV-DO 450 Rev. A (Block A) networks. Throughout this guide these networks will be referred to simply as 'wireless' networks.

Special Notes on CDMA/EV-DO Wireless Safety

Sarian Systems products are designed to the highest standards of safety and international standards compliance for the markets in which they are sold. However, wireless products contain radio devices which require specific consideration. Please take the time to read and understand the following guidance. Sarian Systems assumes no liability for an end user's failure to comply with these precautions.

	<p>Wireless routers incorporate a wireless radio module. Users should ensure that the aerial is positioned at least 1 metre away from themselves and other persons in normal operation.</p> <p>When in a hospital or other health care facility, observe the restrictions on the use of mobile phones. Do not use the router in areas where guidelines posted in sensitive areas instruct users to switch off mobile phones. Medical equipment may be sensitive to RF energy.</p> <p>The operation of cardiac pacemakers, other implanted medical equipment and hearing aids can be affected by interference from cellular terminals such as the wireless routers when placed close to the device. If in doubt about potential danger, contact the physician or the manufacturer of the device to verify that the equipment is properly shielded. Pacemaker patients are advised to keep the wireless router away from the pacemaker while it is on.</p>
	<p>Wireless routers must NOT be operated on aircraft. The operation of wireless appliances in an aircraft is forbidden to prevent interference with communications systems. Failure to observe these instructions may lead to the suspension or denial of cellular services to the offender, legal action, or both.</p>
	<p>As with any electrical equipment, you should not operate your wireless router in the presence of flammable gases, fumes or potentially explosive atmospheres. Radio devices should not be used anywhere that blasting operations are taking place.</p>
	<p>Wireless routers receive and transmit radio frequency energy while switched on. Remember that interference can occur if it is used close to TV sets, radios, computers or inadequately shielded equipment. Follow any special regulations and always switch off your wireless router wherever forbidden or when you suspect that it may cause interference or danger.</p>
	<p>SOS IMPORTANT! – Wireless routers operate using radio signals and cellular networks cannot be guaranteed to connect in all possible conditions. Therefore, you should never rely solely upon any wireless device for life critical communications.</p>

Preface

This guide describes the installation procedure for the CR4110. It is intended to provide sufficient information for you to be able to connect the unit to your terminal equipment and power supply. A complete reference guide to the software features that are available on the product is available separately in PDF format which can be downloaded from the Sarian Systems website (www.sarian.co.uk).

All models feature:

- ◆ 1 x 10/100Base-T Ethernet port
- ◆ 1 x RS232 sync/async serial port (25-way D)
- ◆ 2 x USB 2.0 host ports
- ◆ 2 x R-UIM card sockets
- ◆ 1 x proprietary expansion port (RJ11)
- ◆ CDMA 1xEV-DO 450 Release A wireless capability

The CR4110 may be purchased with an optional GPS (Global Positioning System) module.

Note: You will not be able to use the router for remote communication until you have subscribed to a suitable wireless network service.

Package Contents

When you receive the router carefully unpack it and check the contents. These should include:

- ◆ CR4110 router system unit (81-CR4110-SSEU-00)
- ◆ 100V-230VAC, 50 - 60/13A – 12V DC 1.5A mains adapter
- ◆ this Installation Guide
- ◆ 2M CAT5 STP (shielded twisted pair) LAN cable
- ◆ 2 x wireless stub antennas

If any item is missing or damaged, please contact your supplier. You should also make a record of any damage that may have occurred during shipping and report it to the carrier.

Antennas for use with the GPS option may be purchased separately.

1 Introduction

The CR4110 is a compact IP router that facilitates the transmission of data over 3G wireless CDMA EV-DO 450 networks at downlink speeds of up to 3.1Mbps and up-link speeds of up to 1.8Mbps depending on network conditions.

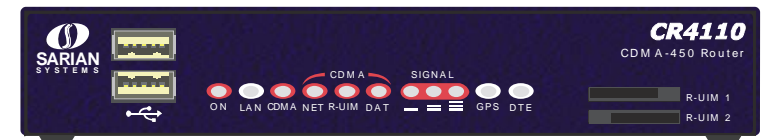
EV-DO 450 networks provide a wireless, IP-based data transmission service using an “always-on” protocol which means that once the router has “attached” to the network, data can be transmitted and received on demand, i.e. it is not necessary to make a call first. Data transmission rates on Rev A networks may be up to 3.1Mbps in the receive direction and 1.8Mbps for sending which makes them suitable for a wide variety of applications.

The routers can be configured either by using commands entered at the serial port (much like a modem), or via the built-in Web interface. We recommend that you use the Web interface whenever possible.

In addition to many standard LAN and Internet protocols such as PPP, the CR4110 provides a combination of powerful but easy to use configuration, management and diagnostic tools. This makes it a simple and cost-effective solution for migrating existing terminal or telemetry equipment, which use wired networks (PSTN, ISDN, etc.), to wireless operation.

1.1 Front Panel Features

The front panel of the unit incorporates the USB host connectors, eleven LED indicators and the two R-UIM card-holders as shown in the following illustration:



USB Host Connectors

The USB host connectors may be used to connect compatible USB 2.0 client devices such as memory sticks, serial adapters, etc. Note that the total current available to power USB devices is collectively 0.5A (i.e. for both ports).

Status Indicators

The status indicators operate as follows:

ON	Illuminates steady red when power is applied.
LAN	Illuminates steady when there is a network connection to the LAN port and flashes when data is transmitted or received.

CDMA	Off when the unit cannot detect a CDMA EV-DO 450 network, flashes when trying to detect a network and illuminates steady when a connection has been established.
NET	Illuminates steady when a wireless network has been detected.
R-UIM	Illuminates steady when a valid Removable User Identity Module (R-UIM card) is installed in the unit. Depending on which network you subscribe to, an R-UIM may or may not be required. If you are unsure, contact your network service provider.
DAT	Flashes to indicate that data is being transferred over the wireless network.
SIGNAL	The three indicators labelled SIGNAL illuminate to indicate the GSM signal strength as follows: None illuminated < -116 dBm (effectively no signal) 1 LED illuminated >= -115 dBm and <= -104 dBm (weak) 2 LED's illuminated >= -103 dBm and <= -94 dBm (medium) 3 LED's illuminated >= -93 dBm and <= -83 dBm (strong)
GPS	Illuminates when the GPS option is fitted and has been successfully configured by the unit. It will then flash when the GPS module is receiving positioning information from one or more satellites.
DTE	Illuminates steady if a terminal is connected to the serial port and the DTR signal is on. Flashes when data is transmitted or received.

R-UIM sockets

The two sockets at the right side of the front panel are for use with Removable User Identity Modules (R-UIM's) in cases where these are supported by the wireless network to which you subscribe.

Rear Panel Features

The functions of these connectors are described in the following table:

12V DC	This jack socket is used to connect the unit to the power supply using 12V DC mains adapter.
GPS	If the GPS option is not fitted, this connector will be replaced with a "GPS OPTION NOT FITTED" label. If you have purchased the GPS option the unit will be fitted with an SMA antenna connector.
SERIAL 0	This 25-way D socket provides an asynchronous RS2322 serial port which may be used to connect the router to a compatible serial device. The unit is supplied with a suitable 2 metre serial cable. To comply with EMC requirements it should not be used with a longer cable.
GSM / 3G ANT (MAIN)	This SMA connector is used to fit the wireless antenna supplied with the unit. A range of alternative antennas are available for purchase separately.
GSM / 3G ANT (AUX.)	This SMA connector is used to fit the wireless antenna supplied with the unit. A range of alternative antennas are available for purchase separately.
LAN	The socket labelled LAN is used to connect the unit to a 10/100Base-T LAN using the 2-metre STP (Shielded Twisted Pair) cable supplied or a suitable alternative. This port is auto-sensing for speed and wiring (straight-through or cross-over). To comply with EMC requirements it should not be used with non-STP cable.
EXP.	The socket labelled EXP. may be used to connect various accessories supplied by Sarian Systems. For further information please contact your supplier.

Reset switch

This is located on the underside of the unit near the front. Pressing the switch gently with the tip of a pen or other suitable implement will generate a hardware reset.

2 Installation

The CR4110 is designed for indoor use (office or home). The router should be positioned on a smooth, level surface making sure that there is adequate ventilation. Do not expose the router to extremes of heat or cold, strong magnetic fields or liquids.

It is important to remember that these products are wireless devices just like a mobile phone, so they will only operate reliably over the CDMA network if there is a good signal. For many applications the stub aerial provided will be suitable but in some circumstances it may be necessary to use a window-mounted or magnetically mounted aerial with an extended cable to allow the aerial itself to be positioned to provide the best possible signal reception. Sarian Systems can supply a range of suitable aerials.

Step 1 - Installing the R-UIM(s)

Note:

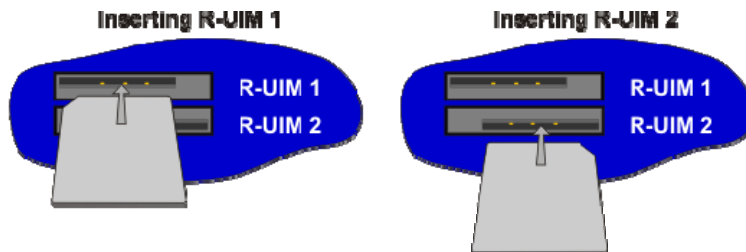
Some CDMA-450 networks do not require or support the use of Removable User Identity Modules (R-UIM's), commonly referred to as SIMs on GSM networks. If your service provider does not support R-UIMS, your router will be "provisioned" for use on your chosen network when you receive it and this stage of the installation procedure will not be required. If your router has not been provisioned, you will need to contact your service provider to obtain an IMSI and NAI in order to provision the unit manually. See the configuration section for more details.

The router incorporates two separate cardholders for R-UIM's (SIMs) so that if your service provider and application demand it, you may install R-UIM's for two different networks. This means that one wireless service may be used as a back-up service in the event that the primary service fails in some way. By default, R-UIM 1 is the default R-UIM that is used for access to the primary network and R-UIM 2 is used for the back-up network.

Note:

R-UIM1 and R-UIM 2 cannot be used to access two networks simultaneously.

The R-UIM card(s) should be inserted into the cardholders on the right of the front panel as illustrated below.



In both cases, the end of the R-UIM card with the chamfered corner should be inserted first. For R-UIM 1 the contacts should be face down. For R-UIM 2 the contacts should be face up.

Step 2 – Fitting the CDMA antennas

The router is supplied with two "stub" antennas. Alternatively you may have ordered a different type of antenna separately. In either case these must be screwed onto the SMA aerial connectors on the rear of the unit.

When both of these are fitted the operation over the wireless network may be improved, especially in areas of low signal strength. This is called "diversity" mode. *Note that if you use antennas other than the stub antennas supplied as standard (e.g. two wall-mount antennas), the separation between the two should be no less than the separation between the two associated connectors on the rear panel of the unit.*

Step 3 – Connecting the LAN cable

Plug one end of one of the supplied 2 metre CAT5 STP cable into the RJ45 socket labelled LAN 0. Plug the other end into the LAN socket on your PC or notebook.

Step 4 – Connecting the serial cable

For connection to a serial terminal device, connect the 25-way D plug on the serial cable provided to the SERIAL connector on the rear of the unit. Connect the other end of the cable (9-way D socket) to the terminal. If the serial connector on the terminal is not a 9-way D plug, you will need a suitable adapter.

Step 5 – Connecting the GPS antenna (if applicable)

If you have purchased the router with the GPS option fitted, this connector is used to connect the GPS antenna. A range of suitable antennas are available for purchase separately. To connect the antenna, screw the SMA termination firmly onto the rear panel connector.

Step 6 – Connecting the power supply

Plug the jack plug on the mains adapter into the socket labelled 12V DC. When power is first applied, the ON indicator will illuminate and the unit will initiate a series of diagnostic self-tests. During this process one or more of the other indicators, will flash to show that the unit is busy. When the flashing stops, the unit is ready to use.

The unit is now ready to be configured.

3 Configuration

Once the router has been installed and powered up, you must now configure it to communicate with your network and the Internet.

Note: The default IP address for the LAN 0 port is 192.168.0.99, with a Class C subnet (255.255.255.0). Setting your PC's IP address to one on the same subnet (192.168.0.*) will enable you to connect to the unit's Web interface.

You will then be able to browse to the unit and configure it using your web browser. Typically, you would configure the unit's Ethernet port and DHCP server in order to set up the unit for Internet access. See the Sar/OS Reference Guide for full details.

Manual Provisioning

If your router was not supplied pre-provisioned, then you will need to obtain the following details from your Service Provider:

- a 15 digit IMSI (International Mobile Subscriber Identity)
- an NAI (Network Access Identifier)
- an NAI password

When you have these details you can then manually provision the unit by issuing the following command at the command-line interface (either over a telnet connection or a direct serial connection):

```
bas provision.sb <IMSI> <NAI> <NAI Password>
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Note that there may be a delay after provisioning before network access is possible.

4 General Specifications

Model numbers	81-CR4110-SSEU-01
Power supply	12V DC / 1.5A
Dimensions	W160 x D120 x H32 mm
Weight	0.53Kg
Operating temp. range	-20 to +50 degree Celsius
Wireless Interface	CDMA 1xEV-DOA (IS-856-A) (A Block)
USB ports	Two USB 2.0 Full-speed Host (OHCI) (12 Mbits per second maximum throughput)
Ethernet interface	10/100Base-T auto-sensing, auto-MDI/MDX (RJ45)
Serial interface	Sync/Async RS232 compatible via 25-way D socket
GPS (optional)	Fastrax iTrax03-02: 12-channel, -153 dBm tracking sensitivity