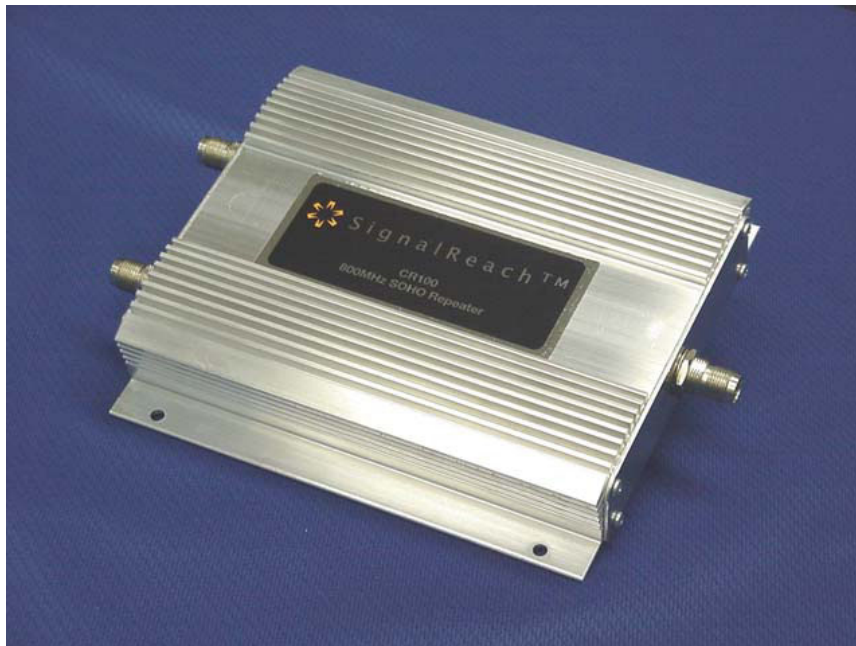


Installation & User Manual



CR100 Bi-Directional Repeater

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Introduction

In-building repeaters provide enhanced coverage of cellular telephone signals for areas that are confined or enclosed such as tunnels, underground parking garages, and within buildings. Many buildings are constructed of materials like metal, brick and concrete that attenuate cellular telephone signals. Symptoms such as dropped calls, broken audio and static indicate the need for an in-building repeater.

The SignalReach™ CR100 Small Office Home Office (SOHO) Cellular Repeater extends cellular services into buildings, parking garages, tunnels and other poor coverage areas. The CR100 is designed for use with 800MHz cellular telephones and offers a cost-effective solution for small business and residential applications. The repeater is useful in areas where cellular service is available outside of the building but marginal indoors.

The SignalReach™ CR100 is a stationary device that automatically reradiates signals from cellular base stations without channel translation, for the purpose of improving coverage of existing service by increasing the signal strength in dead spots. The repeater is a network-compatible device that amplifies cellular signals in both the uplink and downlink directions. The repeater is simple to install, and contains circuitry to ensure proper operating power levels, and as well, includes an automatic feedback and detection circuitry that detects poor isolation between the subscriber and donor antennae. In this condition the repeater will adjust it's gain to compensate for the abnormality, and warn the user through a visual indicator LED. The CR100 will enhance the cellular telephone user's experience while complying with cellular network specifications. Linear operation is guaranteed under all conditions.

The CR100 allows up to two indoor antennas to be used without the need of

external components. Its auxiliary indoor antenna port allows a second indoor zone to be easily connected. The repeater can be powered by its AC adapter or through the in-building primary subscriber antenna port using an optional power inserter.

This product is designed for installations where cellular coverage is available outside the building, and indoor coverage is inadequate.

CR100 Features:

- Easy Installation – No calibration required
- Automatic feedback detection and warning circuitry
- Auxiliary in-building antenna port provides enhanced coverage
- Up to 20000 ft² of free space coverage with only one interior antenna
- Network-compatible operation
- Auto levelling circuitry ensures linear operation
- FCC approved
- Optional power inserter available
- External fault output signal

Functional Description & Operation

The repeater works on the principle of receiving the handset signal through a subscriber (indoor) antenna, amplifying or 'boosting' its signal level, and then passing it on to the donor antenna located outside the building. Signals from the cellular tower (downlink) are also amplified and passed to the subscriber antenna.

The SignalReach™ CR-100 in-building repeater is a Class B Broadband

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device, and processes the entire cellular 800MHz spectrum. Input and output duplexers and band pass filters in the downlink and uplink path provide the repeater's filtering and isolation. The maximum gain in each of the downlink and uplink path is 60dB. Both the downlink and uplink paths incorporate automatic gain control, to ensure that downlink and uplink power amplifiers are not overdriven and operate free of distortion. The CR100 has primary and secondary subscriber ports, allowing the repeater to double the in-building coverage area.

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Installation Procedure

Warning; Equipment Installation:

- ❖ Proper Grounding
 - Follow the local building codes for installation of antennae on buildings.
 - Ensure that the exterior mounted donor antenna is properly mounted and grounded for lightning protection.
- ❖ RF exposure Guidelines
 - During transmitter operation, in order to meet RF Maximum Permissible Exposure Safety Guidelines, a minimum distance of 50 cm (20 in.) shall be maintained between the outdoor (uplink) antenna and personnel.
 - During transmitter operation, in order to meet RF Maximum Permissible Exposure Safety Guidelines, a minimum distance of 20 cm shall be maintained between the indoor antenna and personnel.
 - The maximum cellular outdoor (uplink) antenna gain authorized shall be limited to 18 dBi or less in order to meet RF exposure (MPE) limit as per FCC guidelines.
 - The maximum cellular indoor (downlink) antenna gain authorized shall be limited to 9 dBi or less in order to meet RF exposure (MPE) limit as per FCC guidelines.
- ❖ When servicing or installing outdoor transmitting elements (i.e. antennae), all transmitting signal sources should be turned off in order to meet RF exposure (MPE) limit as per FCC guidelines.

The repeater unit should be installed in a sheltered area, it's operating temperature range is extensive, but is not sealed to prevent water (rain) ingress. The repeater unit should not be installed in an area where the ambient temperature is expected to exceed +60°C.

The SignalReach CR100 is not supplied with cabling or any antennae. The indoor and outdoor antenna types and locations must be chosen carefully to avoid re-generative feedback. Re-generative feedback occurs when the subscriber antenna picks up the donor antenna transmit signal. A general rule of thumb is to locate the antennae where the isolation is at least 10 dB greater than the operating repeater gain. The Arrista repeater has a maximum gain of 60dB in uplink path, as a result, the isolation required

between the subscriber and the donor antenna is in a range of 70dB. The line of sight separation between the subscriber and donor antenna represented by

a free space loss of 70dB within a building is 17 meters (55 feet). The separation distance can be reduced if the donor antenna is mounted on the building exterior (i.e. on a roof), or by using a directional donor antenna

Product Maintenance

The CR100 does not require maintenance, as long as it is properly installed following the guidelines stated in this manual. It is recommended that all RF connectors be periodically checked for corrosion, strain relief, and the integrity of power connections

Operation

The in-building repeater operates automatically and does not require user intervention. There are no user controls, except for a sliding switch to allow a user to connect additional subscriber antenna on the repeaters secondary port for increased coverage area.

The front panel has two system status LEDs. A green 'Power' lamp indicates that the repeater is operating. An 'Status' lamp indicates a fault.

Troubleshooting

The repeater unit contains no user serviceable parts and should not require maintenance. Two LEDs on the unit will indicate if it is functioning properly.

Symptom	Cause	Action
Power LED is off, status LED is off	The repeater does not have power applied to it	Check the power supply connection.
Power LED is on, status LED is off	The repeater is operating normally	None.
Power LED is on, status LED is green	The repeater is operating normally	None
Power LED is on, status LED is amber or flashing	The signal received at the outdoor antenna is too strong.	The installer should rotate the exterior antenna (directional antennas) or insert an attenuator at the exterior antenna port.
Power LED is on, status LED is green and flashing	The repeater has reduced its uplink gain to maintain network compatibility. This is usually caused by a handset being used too close to the interior antenna	None. The repeater will automatically return to full gain when conditions permit.
Power LED is off, status LED is red and flashing	The repeater is off-line due to a high temperature fault. The repeater will restart automatically when the unit cools down	Determine the cause of the overheating (hot environment, inadequate airflow?) Re-locate the amplifier to a cooler location.
Power LED is flashing, status LED is red	The repeater has detected an internal fault and is off-line.	Interrupt power to the unit and see if it returns to normal operation, otherwise service is required.

If the repeater is continuously has a flashing amber or flashing green status LED, it is possible that there is poor isolation between the subscriber and donor antennae; or between the two subscriber antennae.

Specifications

RF Specifications

	Uplink	Downlink
Frequency Range	824-849 MHz	869-894 MHz
Maximum Output Power ¹	+ 20dBm	+15dBm
Maximum Gain	60 dB	60 dB
Maximum Allowable Antenna Gain	18 dBi	9 dBi
Poor Isolation Detection & Warning Indicator	If re-generative feedback between indoor and outdoor antennae is detected, condition will be indicated with an amber LED indicator	
Maximum Possible Exposure (MPE)	Human exposure to non-ionizing radiation meets or exceeds the permissible FCC mandated MPE specification	

¹ The RF output power specification is for a multi-carrier environment of up to 3 simultaneous TDMA carriers or 1 CDMA Carrier

General Specifications

Power Requirements	12V DC, 0.5 Amp typical, 1.0 Amp max
Remote Alarm Output	An open collector output, third pin in the power connector. Contact rating: 12V, 200mA. Pin is at ground potential on fault condition.
Operating Temperature Range	-40 to +60°C (-40 to 128°F), indoor use only
Dimensions	161mm L x 152mm W x 33mm H (6.38" L x 5.98" W x 1.30" H) without RF connectors

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Net Weight	1.5 kg (3.2 lbs)
RF Connectors	TNC Female
Subscriber Antenna	Customer Supplied
Donor Antenna	Customer Supplied
Included Accessories	120V AC adapter, the adapter complies to UL and CSA safety standards
Optional Accessories	Power Inserter

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