Configuring Ciseco radio units

This configuration guide applies to all Ciseco radio units: SRF, XRF and related and derived products.

Please note: our radio units come ready configured and work out-of-the-box. Only make changes if you know what you are doing!

Ciseco radio units have three configuration stores, that each play a different role:

1. Factory Configuration can only be changed by re-programming by the manufacturer.
2. Config Flash Memory holds the configuration settings that are adopted at power up.
3. Config Settings holds the settings that are in force during current operational mode.
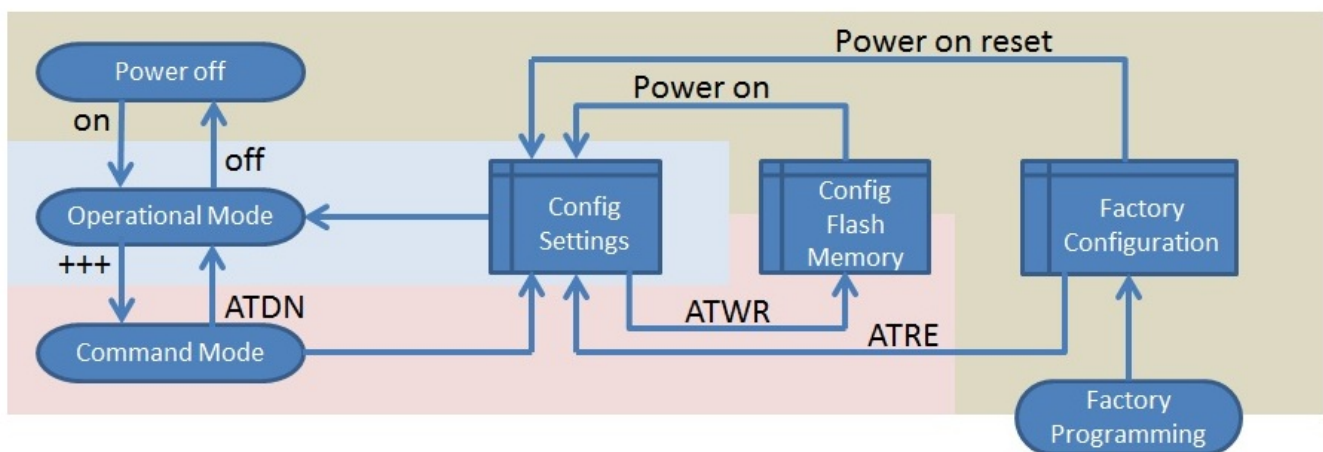
The diagram shows the three configuration stores with arrows showing how the contents of one store can be replaced by another.

When the Ciseco radio unit ships Config Flash Memory is identical to Factory Configuration.

When the RF unit powers up, the settings from Config Flash Memory are transferred to Config Settings.

All radio units have a Command Mode that allows Config Settings to be queried and modified. All changes are made to Config settings only and will be lost after the next power cycle. To make changes permanent across power cycles, the command ATWR must be issued. This will copy the content of Config Settings to Config Flash Memory so they will be loaded upon the next power up. Note that Config Flash Memory has a flash write cycle limit of 8000 over its life time.

Some of the changes to Config Settings (e.g. baud rate) affect communications with the device.

Such changes will only take effect after an explicit commit command (ATAC).

Entering and exiting Command Mode

You can enter Command Mode from Operational Mode by

1. Waiting at least one second since the last character was sent
2. Sending a string of exactly three Guard Characters and nothing else. The default Guard Character is +, so you would send +++ to a device with factory settings.
3. Awaiting the response from the radio unit: OK

You can exit Command Mode by

- Issuing the ATDN command (AT Done)
- Not sending any characters for a period of 5 seconds, after which the radio unit will exit Command Mode.

Reset to factory default

At times it may be useful to place a device in its default settings for testing or for recovery when an unknown configuration issue is encountered. There are two ways to get back to Factory default settings, without removing the settings in Config Flash Memory:

1. By shorting pins 12 and 13 during power up, the SRF will power up and copy Factory Configuration to Config Settings before entering Operational Mode.
2. When in Command Mode, issuing the ATRE command will load the content of Factory Configuration to Config Settings.

If you wish to retain Factory default configuration then you need to use the ATWR command to apply these settings to Config Flash Memory, otherwise at next power up the previously saved configuration will be used.

AT Commands

The table below sets out the commands available in AT mode.

AT Commands are followed by a <CR>

Command	Description	Notes
AT	Null command	Does nothing. Can be used to keep the SRF from leaving Command Mode.
ATAC	Apply Changes	Returns OK and then applies changes to baud rate, flow control, radio data rate and radio freq. where supported.
		NOTE: If you have changed the baud rate then after the OK message you will need to change the baud rate at the other end.
ATBD	Baud rate	Requests / sets the Baud rate on the Serial data input. N
		Not changed until applied (ATAC).
		This command takes a hexadecimal parameter, as follows:

Baud rate	Parameter	
1200	4B0	
2400	960	
4800	12C0	
9600	2580	(Factory default)
31250	7A12	(MIDI)

	38400	9600
	57600	E100
	115200	1C200

Command	Name	Description
ATCC	Guard character	Change command mode guard character. Default is '+'
ATDN	Done	Exit AT command mode
ATEA	Encryption key - ASCII	Requests / sets the encryption key using a word or phrase of up to 16 ASCII characters, e.g. ATEA MyHouseName.

The text you enter will be encrypted using an internal key into a 128 bit encryption key. Entering the command without data will return the current encryption key de

The encryption key should be the same for all connected SRFs

| ATEE | Enable encryption | Requests / sets encryption on or off: |

0 – no encryption (Factory Default)

1 – enable encryption

Not changed until explicitly applied (ATAC)

| ATEK | Encryption key - Hexadecimal | Requests / sets the encryption key using a hexadecimal string of 32 characters, e.g. ATEK 8BAD3E4F5C2B9A34325G2G1ABDF5A2362D |

Note that the key has to have exactly 32 hex characters or an error will be returned.

The encryption key should be the same for all connected SRFs

| ATFC | Flow control | Requests / sets the serial output flow control: |

0 – no flow control (Factory Default)

1 – enable CTS (XRF Pin 4) to regulate flow of data from the XRF to the serial port

2 - enable RTS (XRF Pin 12) to regulate flow of data from the serial port to the XRF

3 - enable both CTS + RTS

No data will be output from the serial port whilst CTS is held high. Holding CTS low or leaving it floating will enable serial output as the pin is pulled low internally.

Not changed until explicitly applied (ATAC)

Note: There are conflicting standards here. To avoid confusion this is what we mean here by RTS and CTS:

- CTS is an input to the XRF when high the XRF will not send characters to the serial port, when low the serial port output is enabled as normal.

- RTS is an output from the XRF to allow an attached processor to control the flow of characters into the XRF serial port. When high the serial input buffer is

stop sending data, when low the serial buffer has enough space and sending data can be resumed.

ATFH	High threshold value	RTS (XRF pin 12) is set HIGH when there is less than this number of free bytes in the input buffer. Default ATFH 18 (24 decimal)
ATFL	Low threshold value	RTS (XRF pin 12) is set LOW when there is at least this number of free bytes in the input buffer. Default ATFL 30 (48 decimal)
ATID	PAN ID	Requests / sets the PAN ID using four hexadecimal characters in the range 0000 – EFFF. Values between F000 – FFFF are reserved.

The factory Default is 5AA5.

| ATI2 | PAN ID for repeater | Requests / sets the PAN ID when the SRF is in repeater mode. Allowable values are in the range from 0000 - EFFF |
| ATLI | LED indicator mode | Requests / sets the heartbeat: |

H – flash once a second

R - RSSI mode (PWM between 10-100% indicating RSSI level, clears to 0 after 5 seconds if no RX)

O - OFF mode (pin is taken to ground)

| ATMY | Set node ID | Requests / sets the node ID for remote programming, using 2 characters. The Factory default is -- |
| ATNT | Node Type | Requests / sets the node type: |

0 – Serial pass through mode (Factory Default)

Any data received from the Serial line will be broadcast on PANID.

Any data received on PANID or PANID2 will be sent to the Serial line.

1 – reserved

2 – Repeater mode

Any data received on PANID will be rebroadcast on PANID2.

Any data received on PANID2 will be rebroadcast on PANID.

Any data received from the serial line apart from AT commands and reprogramming will be ignored.

3 – RSSI - Test mode master: will transmit "aMMRSSI-----" once a second, anytime a packet is received will copy packet to serial and then send to serial "aMMRS

4 – RSSI - Test mode slave: any time a packet is received will transmit a packet "aSSRSSIS-nnn" indicating received RSSI, Will not output to serial unless in AT mode. For more details see: http://openmicros.org/index.php/articles/84-xrf-basics/146-rssimode

| ATPC | Program commit | Reprograms the chip with a downloaded program which has to reside memory, and restarts execution. If no such program exists, an error is returned. |

Note – only pre-certified firmware can be committed.

| ATPG | Program mode | Enters program download mode. |

Note – only pre-certified firmware can be downloaded.

| ATPK | Packet length | Requests / sets the maximum radio packet data length using an hexadecimal number between 1 – F0 (1 – 250 decimal) byties. |

Factory Default is 0C (12 bytes)

Note: The SRF will not receive packets that are longer than this setting, so it needs to be set on all connected SRFs.

Note: If you have a much larger packet size than you expect to send to the node then you will find that spurious packets are more frequent and therefore more pac

For more details regarding the choice of packet length and time out, please refer to http://openmicros.org/index.php/articles/84-xrf-basics/151-packet-length-and-ti

| ATPL | Radio power level | Requests / sets the power level of the radio transmitter: |

0 = -30 dBm

1 = -20 dBm

2 = -15 dBm

3 = -10 dBm

4 = -5 dBm

5 =   0 dBm

6 =   5 dBm

7 =   7 dBm

8 = 10 dBm (Factory Default)

| ATRE | Load Factory settings | This command loads the Factory Configuration into Config Settings. |

		Note that baud rate, radio data rate and radio frequency changes (the latter two for non-certified models) will only take effect when changes are applied (ATAC). To save the configuration (ATWR).
ATRI	Set ID of node to remote program	Requests / sets the ID of the node to be remotely programmed, using 2 characters.
ATRO	Serial packet timeout	The Factory Default is "--" Requests / sets the serial packet time-out in milliseconds via a hexadecimal number in the range 1 – FFFF (1 – 65535 decimal).
		Factory Default is 10 (16ms)
ATRP	Enable remote programming	For more details regarding the choice of packet length and time out, please refer to http://openmicros.org/index.php/articles/84-xrf-basics/151-packet-length-and-ti Used at the host SRF to enable remote programming:
		0 – disable remote programming
		1 – enable remote programming
ATRT	Set Rx to Tx transition delay	Factory Default – 0 Requests / sets the delay (in mS) used when switching the radio from receive to transmit. This should not normally be changed.
ATRW	Set remote programming timeout	Default – 3 Requests / sets the wait (in seconds) used in remote programming. If no communication is received for this time then remote programming mode is exited and any
		Range: 1 to 10(hex). Only alter this if you are using ATRC and have problems with it timing out.
ATSM	Sleep mode	Default – 5 seconds Sleep mode – controlled by the SLEEP pin. The SRF module will not sleep in AT command mode.
		0 – no sleep, the SLEEP pin has no effect
		1 – normal sleep: when the SLEEP pin is set high or un-connected the SRF will run; when the sleep pin is set low the SRF will sleep (power consumption when sle
ATTR	Set Tx to Rx transition delay	2 – deep sleep: when the SLEEP pin is set low the SRF will run, when the sleep pin is un-connected or set high the SRF will sleep. This is the sleep mode with the Requests / sets the delay (in mS) used when switching the radio from transmit to receive. This should not normally be changed.
ATVR	Firmware version number	Default – 0 Returns firmware revision number
ATWR	Write changes to flash memory	Save config changes to flash memory. The config changes will be preserved for the next startup.
ATZZ	Support function - dump configuration	Note that Config Flash Memory has a limited number of write cycles (around 16000), this is based upon 16 configuration slots and the CC1110 data sheet which g Dump out configuration data in hexadecimal format to aid diagnosis for support.

The following are additional commands, not supported in certified modules:

ATCH	Frequency band	NOT SUPPORTED IN FCC/IC/EU CERTIFIED MODELS
		1 – 915MHz (Factory default US & Canada)
		2 – 903MHz
		3 – 868MHz
		4 – 433.5MHz
		5 – 868.3MHz (Factory default Europe)
		6 – 315MHz
ATCN	Channel number	Not changed until explicitly applied (ATAC) NOT SUPPORTED IN FCC/IC/EU CERTIFIED MODELS
		Requests / sets the Channel Number in the range 0-FF hexade (0-255 decimal); the Factory Default is ……??
ATCS	Channel spacing	Not changed until explicitly applied (ATAC) NOT SUPPORTED IN FCC/IC/EU CERTIFIED MODELS
		Requests / sets the Channel Spacing in kHz in the range 1-FF hexadecimal (1-255 decimal); the Factory Default is C8 (200 d

ATDR	Data rate	Not changed until explicitly applied (ATAC) NOT SUPPORTED IN FCC/IC/EU CERTIFIED MODELS Requests / sets the radio data rate. 1 – 250Kbaud (Factory Default) 2 – 38.4Kbaud 3 – 1.2KBaud 4 – 100KBaud 5 – 50KBaud
ATRC	Set channel offset - used in remote programming	Not changed until explicitly applied (ATAC) NOT SUPPORTED IN FCC/IC/EU CERTIFIED MODELS When remotely programming this command alters the radio ch used by the number specified. This is so that the remote progra traffic can be moved to an unused channel and other radio traf interfere. E.g. if the radio is set to use channel 3 (ATCN 3) and of 5 has been set (ATRC 5) then during remote programming will be used. Factory Default - 0