

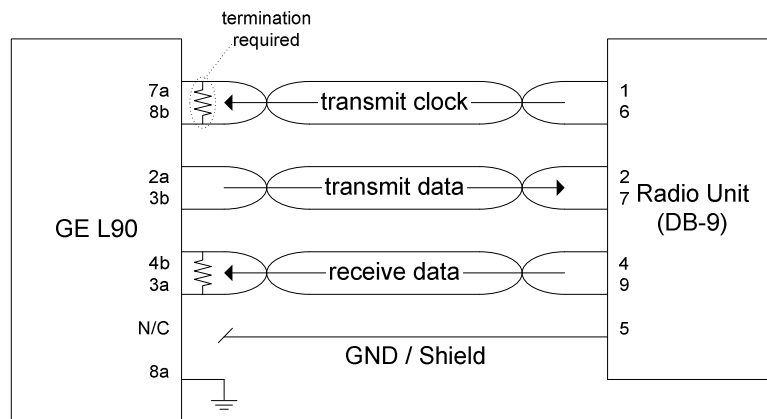
OPV Series I Radio Unit Connection to GE L90 LDR (RS-422)

Description

To perform its protection function the General Electric L90 Line Differential Relay requires a dedicated end to end communications link. The required characteristics of this link are low delay (< 4 power system cycles round trip), minimal asymmetry (< 1ms), minimal jitter (< 0.13ms) and low error rate (10^{-6} or better). The OPV Radio Unit provides a suitable link that is RS-422 compliant.

The L90 RS-422 interface requires three signals: receive data, transmit data and transmit clock. No receive clock is required as the L90 generates an internal receive clock which is synchronised to the receive bit stream. The transmit clock is 64 kHz where transmit data transitions on the falling edge.

Serial Cable Wiring



The recommended cable is shielded twisted pair similar to Belden 1868E fitted with a male DB9 connector.

The following table outlines the required connections.

GE L90 LDR Channel 1			OPV SI		
Termination (ohm)	Signal	Screw Terminal	Pin – DB9 (male)	Signal	In / Out
None	Tx Data +	2a	2	Tx Data A	I
	Tx Data -	3b	7	Tx Data B	
N/A		N/C	3	Rx Clock A	O
		N/C	8	Rx Clock B	
100 - 150	Rx Data +	4b	4	Rx Data A	O
	Rx Data -	3a	9	Rx Data B	
100 - 150	Clock +	7a	1	Tx Clock A	O
	Clock -	8b	6	Tx Clock B	
			5	Signal common	N/A
			Body	Shield / GND	N/A
N/A	GND	8a			

Cable Termination: Although operation will not normally be prevented if the connecting cable is incorrectly terminated at the user equipment end, proper termination is strongly advised. As well as ensuring maximum signal integrity over longer cables, correct termination is necessary to ensure that compliance with CISPR22/EN55022 EMC standards is maintained. Note that the OPV provides internal termination of the Tx Data lines.

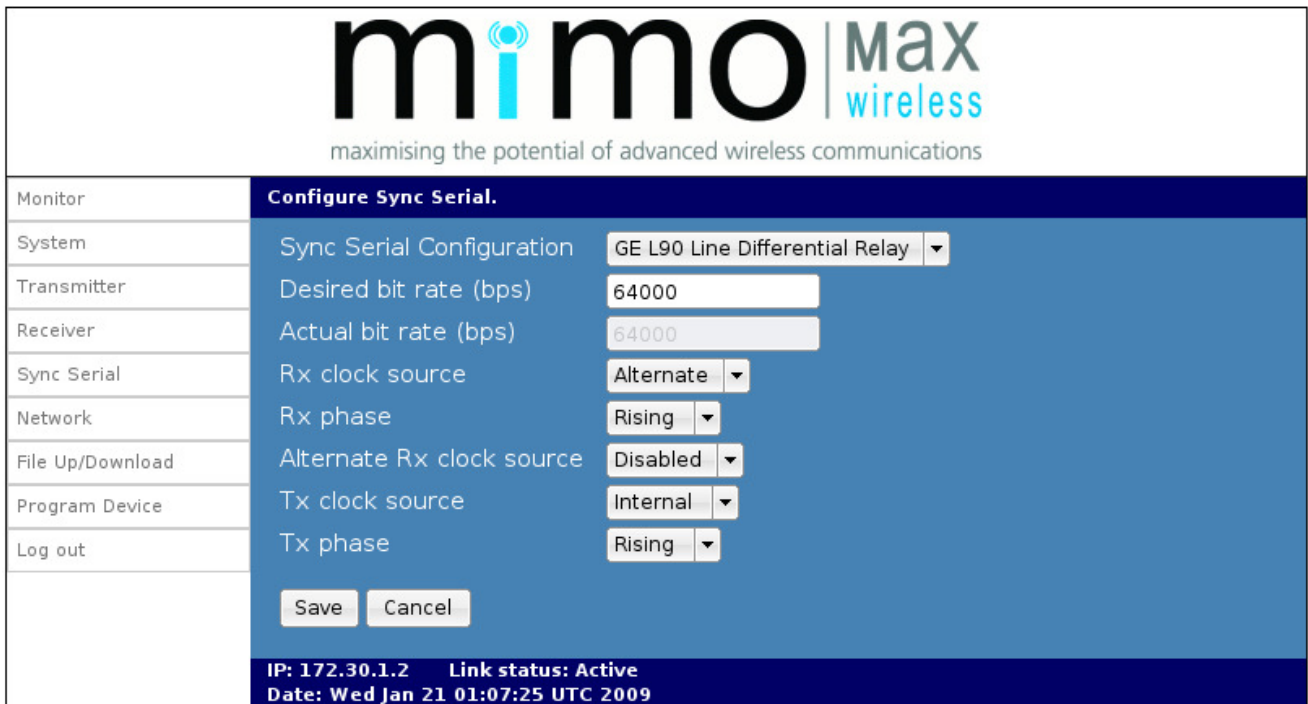
Grounding: The ground pin and shield on the cable between OPV S1 and GE-L90 should only be connected on one side only (i.e. either the GE-L90 or the OPV radio, not both).

Radio Unit Configuration

Following are the required CCMS settings. NOTE: Only those applicable to L90 connection are shown.

CCMS – Sync Serial Configuration	GE L90 Line Differential Relay
----------------------------------	--------------------------------

The following image is of the radio’s web page showing the application of the above settings (Access is through the ‘Sync Serial’ tab). The settings are all filled in automatically when GE L90 Line Differential Relay is selected from the drop down menu.



L90 Status Reporting

The following image is of a PC displaying the channel status page for an in service L90. Channel 2 in this case is not used. (Access is through 'Actual Values' 'Status' 'Channel Tests')

Channel 1 Status	OK
Channel 1 Lost Packets	0
Channel 1 Local Loopback Status	n/a
Channel 1 Remote Loopback Status	n/a
Channel 1 Loop Delay	23.7 ms
Channel 1 Asymmetry	0.000 ms
Channel 2 Status	n/a
Channel 2 Lost Packets	0
Channel 2 Local Loopback Status	n/a
Channel 2 Remote Loopback Status	n/a
Channel 2 Loop Delay	0.0 ms
Channel 2 Asymmetry	0.000 ms
Validity of Ch Config	n/a
PFLL Status	OK