EM1 Modem Configuration Application

User Guide

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Contents

1 Introduction

1.1 Overview

This document is a User Guide for the EM1 Modem Configuration Application.

The document assumes that the Users are familiar with the general operating principles of the EM1 Modem and how internal or external power can be supplied.

The Application is used to configure user definable parameters with the EM1 Modem, update the Modem Firmware and provide a performance test capability.

The Application is designed to be used with standard CSignum Comms and Debug cables.

1.2 Document Holds

A HOLD is a major item that needs to be confirmed before the subsequent system and/or sub-system is designed. Minor items that are not yet specified are denoted with TBC or TBD throughout the document. The following holds are active in this document.

Table 1: Document Holds

HOLD #	Hold Description	Section

1.3 General Information and terminology – please read carefully

Modem Physical Addressing Protocol – local and remote
Modems have a physical coded network address of either 'local' or 'remote'. This is to ensure managed flow of data between them.
Nominally, the Modem configured as 'local' is topside and 'remote' is subsea.
This would normally mean that the Topside/'local' Modem would be connected to the Laptop or other control device.
This address can be changed via the Configuration Application.

Modem Configuration Application – LOCAL and REMOTE
When using the Modem Configuration Application, the Modem connected to a laptop is described as LOCAL (this can be different from the Modem Physical Network Address).
The Modem connected over the air (via the LOCAL Modem) is described as REMOTE
Most actions and tests require only the COMMS port on the LOCAL Modem connected.

To change Modem Physical Network Address, the Target Modem must be connected to a laptop via both the COMMS port and the PWR (Debug) Port. This cannot be done over the air.

The COMM (and Debug, if required) Ports should identified via Device Manager.

1.4 Acronyms, Abbreviations, and References

Acronyms, abbreviations, and document references are available in Appendix A at the back of the document

2 Safety

2.1 Assumptions

This User Guide assumes that personnel are familiar with general operating principles, safety guidelines, and test practices associated with the types of equipment represented herein.

The following notes are for information only and the local on-site safety guidelines shall take precedence.

2.2 On-site Safety

All personnel shall undertake the local on-site safety induction and report any safety concerns to the local on-site representative. Where any unsafe practices are observed, work shall be immediately stopped and reported.

2.3 Tool Box talks

If required, daily toolbox talks shall be held at the start of each shift. These shall outline the days planned activities, lessons learned from previous days testing, and highlight any dangerous work being carried out.

2.4 Electrical Safety

Personnel working on electrical systems should be aware of potentially live circuits and ensure that any isolated circuits cannot be energised by anyone else. All test personnel should be aware of all relevant emergency shutoffs on site.

2.5 Mechanical Safety

Always adhere to authorised working practices and use the correct tools for the job. To facilitate this, make sure that these are available before commencing and use the appropriate personal protective equipment.
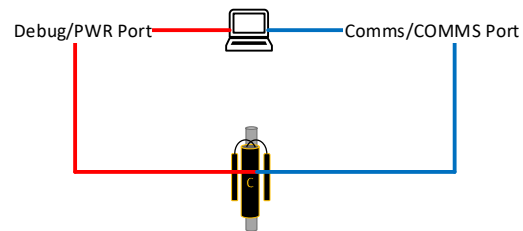
3 Overall Test Setup

There are two possible setups mentioned in this document.

Setup 1 – Standard setup for configuration and test

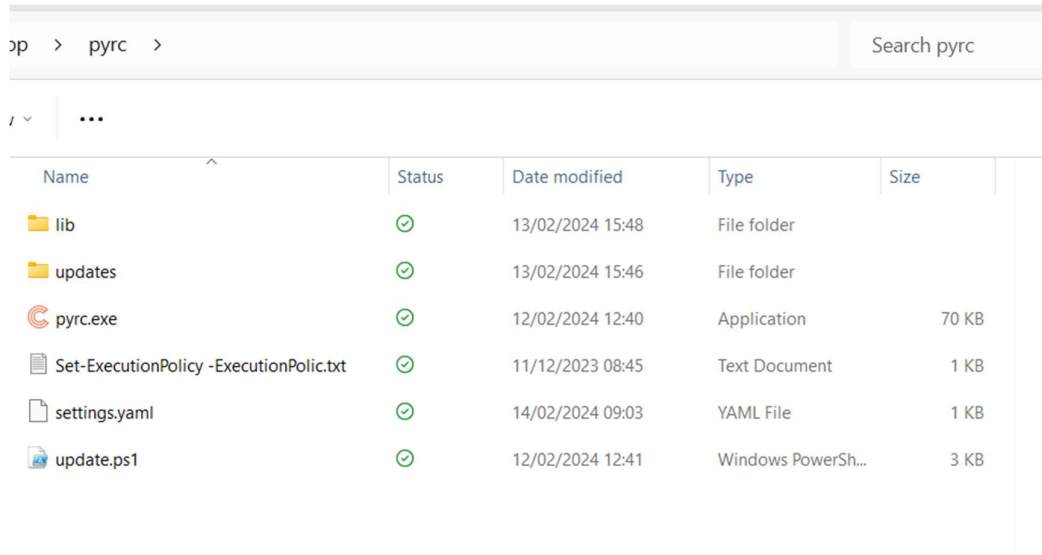*Unless stated otherwise, this is the default setup method.*

COMM Cable

LOCAL (Topside)
Modem

REMOTE (Subsea)
Modem
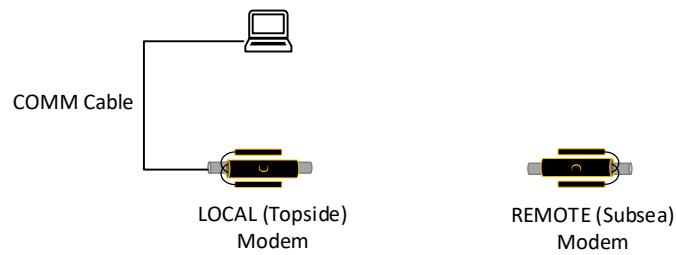
Setup 2 – Configuration of local or remote Modem Physical Address

Debug/PWR Port

Comms/COMMS Port

4 User Guide

4.1 Application Installation and Updating

The Application does not need to be installed on a device as it is delivered as a standalone *.exe file (pyrc.exe as standard) with relevant libraries and settings etc.

When in the CSignum Office and on the company network, you can check for and download updates by right-clicking on file "update.ps1" and running it under PowerShell

4.2 Running Application

Open the utility by double clicking the icon or pyrc.exe:

The following will be displayed:

The application opens on the Configure page

4.3 Configure Page
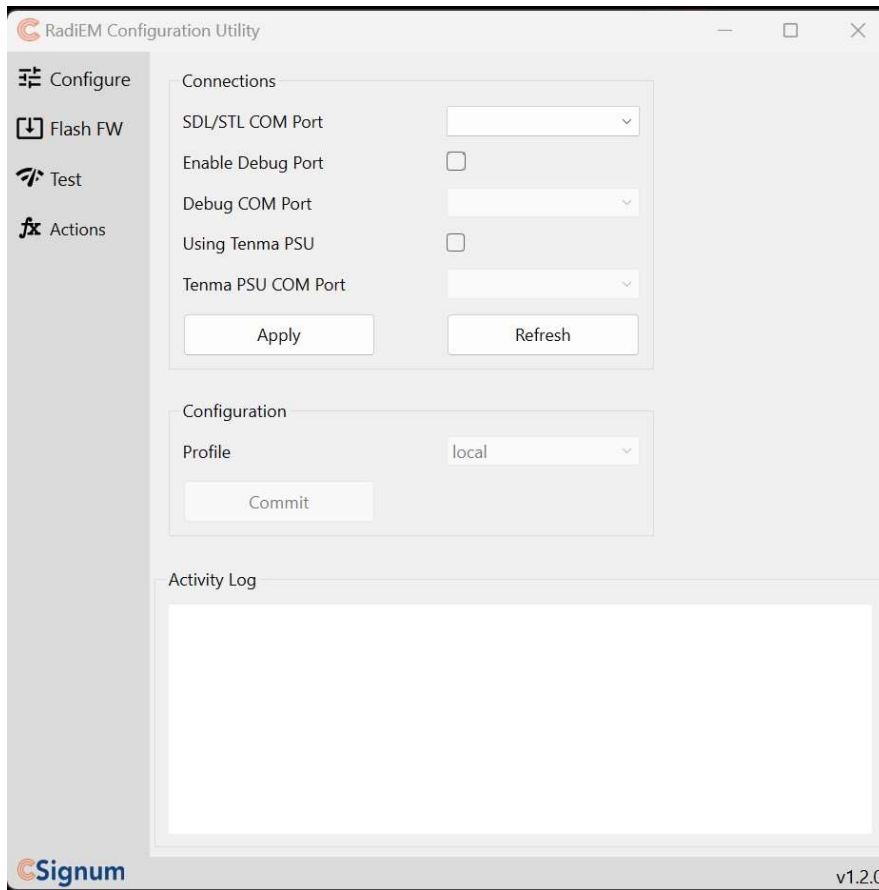
Connections

SDL/STL COM Port: Use the drop down menu to select the correct COM port

Debug COM Port: If required, use the drop down menu to select the correct COM port.

On completion, press Apply

Note: Use of the Tenma PSU COM Port and its connections will not be described.

Note: On all screens, the Activity Log will show data, progress messages and status messages for any actions or tests undertaken.

Configuration (Modem Physical Address)
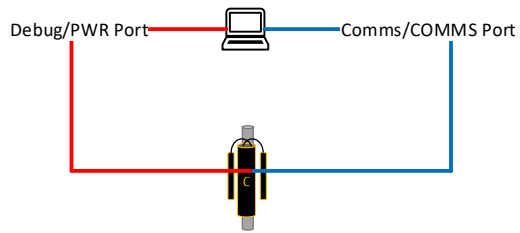
This allows the Modem Physical Address configuration to be changed/set from 'local'

or 'remote'.

This requires the Debug/PWR Port connection, as well as Comms/COMMS Port.

From Profile, select either local or remote.

Press Commit

Confirm selection

The configuration of the connected Modem will now be changed.
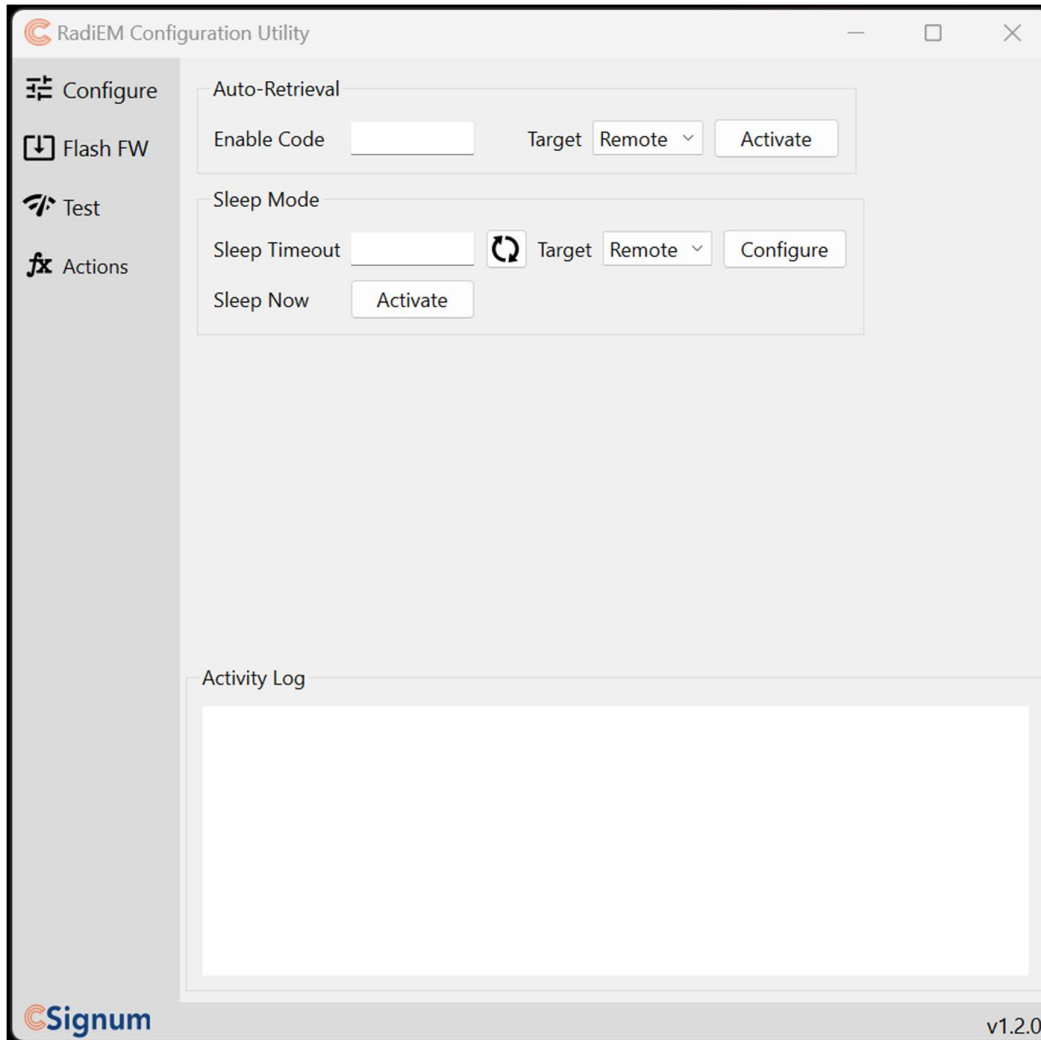
4.4 Flash FW Page

This page allows the connected Modem to be flashed with new Firmware

COMM Cable

LOCAL Modem
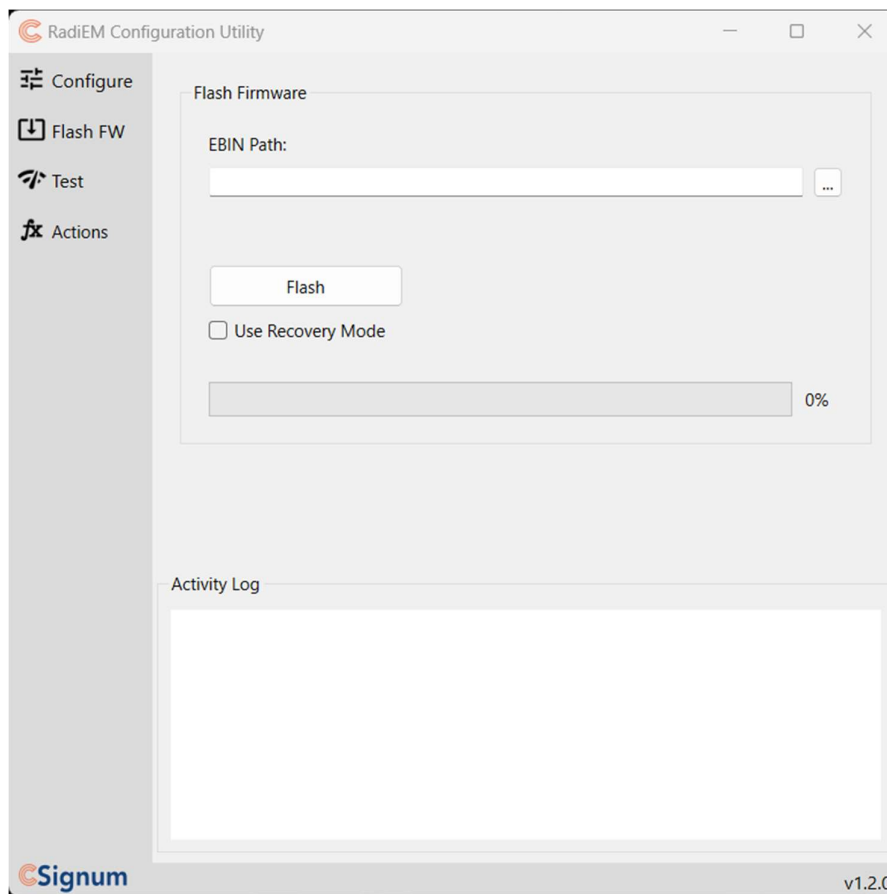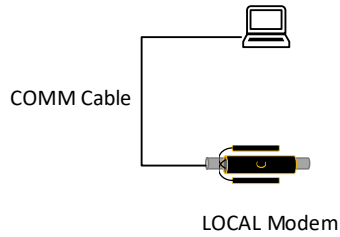
If/when a new firmware image is made available, browse the location of the *.ebin file.

To update the EM1 Modem, press Flash button and confirm any messages.

4.5 Actions Page

Auto-Retrieval

This is a special function and should only be used after consultation with engineering

Sleep Mode

COMM Cable

LOCAL (Topside)
Modem

REMOTE (Subsea)
Modem
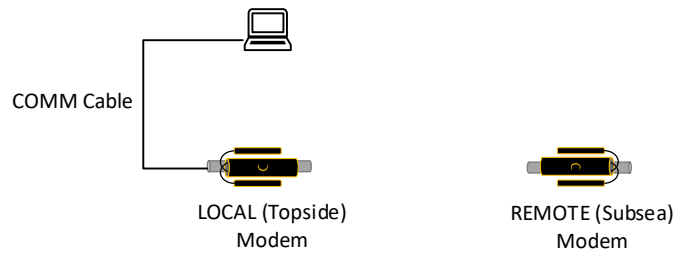
Description

This allows the Sleep Timeout period for both the LOCAL and REMOTE units to be interrogated and set.

The Sleep Timeout is the period after the last activity before the Modem goes into Sleep Mode (Low Power State). Once in Sleep Mode, activity on the Serial Bus will cause the Modem to wake.

If the Sleep Timeout is set to 0, then the Modem is in Always On mode

Checking the current Sleep Timeout

Select the correct Target (LOCAL or REMOTE).
Press the Refresh button and the corresponding timeout will be displayed.

Setting the Sleep Timeout

To change, Select Target (LOCAL or REMOTE), input the timeout period in seconds and press Configure.

This will send the commands to either LOCAL or REMOTE Modem to change to timeout period.

Sleep Now

This command sets the selected Modem into Sleep mode (Low Power State).

Set the Target to either LOCAL or REMOTE
Press Activate button

4.6 Test Page
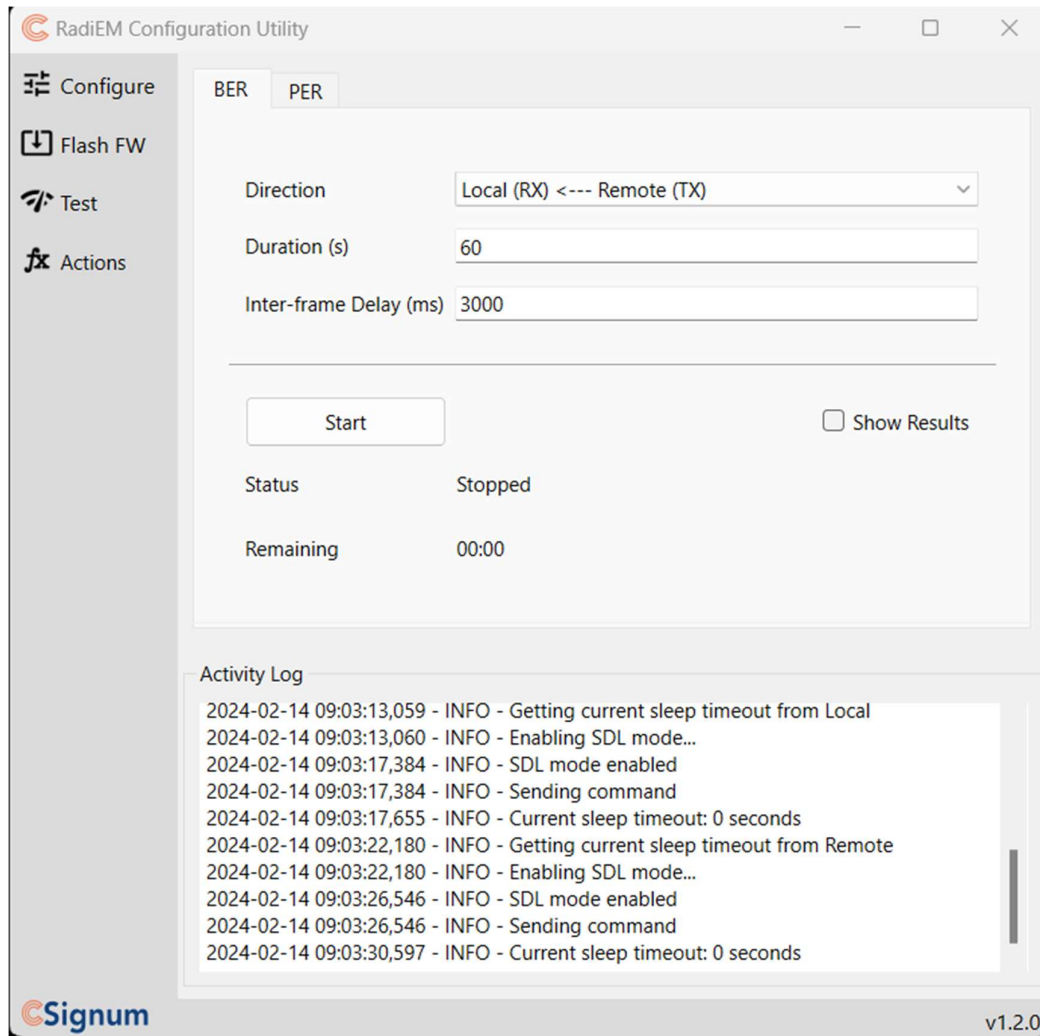
There are two test modes available:

BER – Bit Error Rate

PER - Packet Error Rate

BER Test Description

The BER Test (Bit Error Rate) provides a means of testing the comms link quality.

A test pattern is sent from (typically) the REMOTE/subsea modem to the LOCAL/topside modem. The test pattern is compared to the expected pattern and any errors are reported. Also, reported are the rssi_v (Received Signal Strength in Volts) and rssi_noise_v (RF noise in volts).

BER Test Pattern:

The Test pattern (packet) that is sent contains two parts:

SYNC Bytes

Used to commence the decode/analysis of the Test Pattern and must be received and valid before this will occur. If SYNC not valid this is considered a missed packet

Test Pattern

2048 bits (1's and 0's). This is a preset pattern that is sent, and when successfully received (SYNC valid), compared to expected with results displayed as a ratio of 2048. No errors is displayed as ber=0.000. 1024 errors would be ber = 0.500 etc
(There is no Forward Error Correction (FEC) used when decoding the Test Pattern)

Rssi_v

This is a measure of the received signal strength (of RF signal) in volts.
At close range (saturated), this will be approx.. 0.800
As the range is increased (or interference encountered), this will drop to a point where the signal is not strong enough to be received.

Rssi_noise_v

This is a measure of the background RF noise the receiver measures once the BER Test pattern for that cycle has been completed.
In a very quiet (RF) noise environment this will be as low as possible (less than 0.100V)
As the background noise increases, this can stop the transmitted signal being received properly.

PER Test Description

The Packet Error Ratio (PER) Test is a more representative test of the ability of the Modems to send and receive data successfully than the BER Test.

It is different from BER by allowing the Packet Count (no. of complete packets to be sent and received) and the Packet Size (in bytes) to be defined. As such can be used to test more representative comms situations than BER. Also, the PER employs Forward Error Correction to the packets and can give a better overall indication of the quality and stability of the link, with representative data.

Based on 4 Test Packets sent, a PER Ratio of:
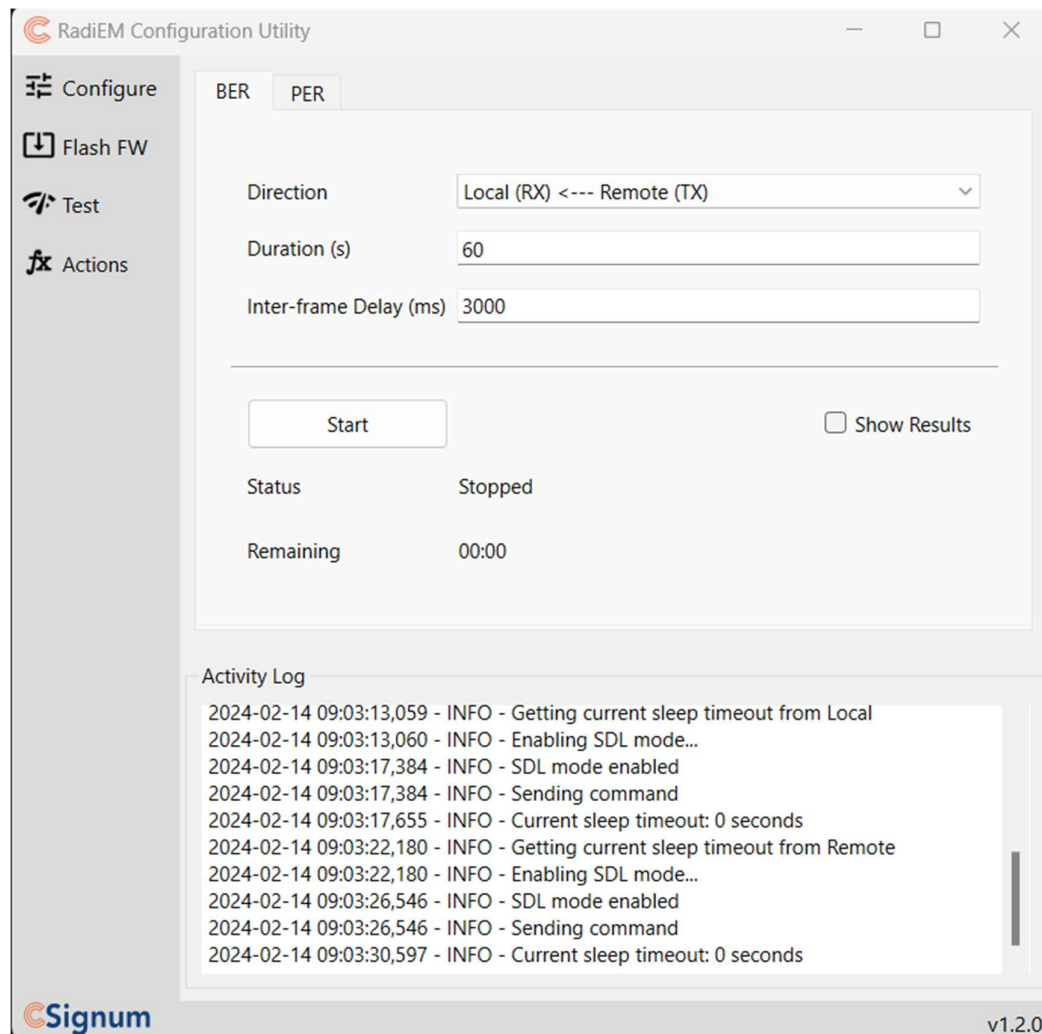
1.0 = 4 Packets Received and decoded (including any FEC corrections) successfully

0.5 = 2 Packets Received and decoded (including any FEC corrections) successfully

Etc

RSSI and Noise are the same as BER and measured in Volts.
However they are averaged over all the received packets.

BER Test

LOCAL (Topside)
Modem

REMOTE (Subsea)
Modem

COMM Cable

Direction

Sets the direction of test.

Either Remote (TX) to Local (RX) or Local (TX) to Remote (RX)

When Remote (TX) to Local (RX) is selected, the results for each test packet will be displayed immediately (As Local (RX) is connected directly to Laptop)

If Local (TX) to Remote (RX) is selected, the test cycle is completed then the Remote (RX) Modem is queried for all the results and they are sent to the Local Modem before being displayed.

Note: In Local (TX) to Remote (RX) direction, only data on the last 8 received packets can be returned.

Duration (s)

This allows the total test time to be set in seconds. This will determine how many Test Packets are sent/received.

To send a Test Packet is approx.. 10secs

If the inter-frame delay is set to 3000ms (explained below), then total time for a packet to be sent is 13secs.

If you want 8 complete Test Packets sent, then set the duration to (8 x 13 secs + 20 secs) = 124secs (set to 130 secs)

Inter-Frame Delay (ms)

This is the time (in milliseconds) between Test Packets being sent.

3000ms = 3s and typical for use.

Show Results Check Box

Selecting this opens a separate window where the test data can be displayed.

Note: The data will also be displayed in the Activity Log window.
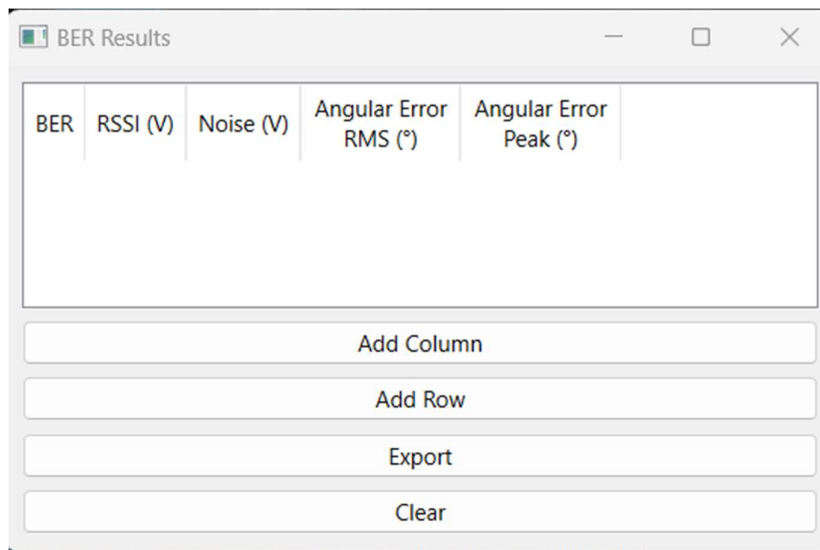
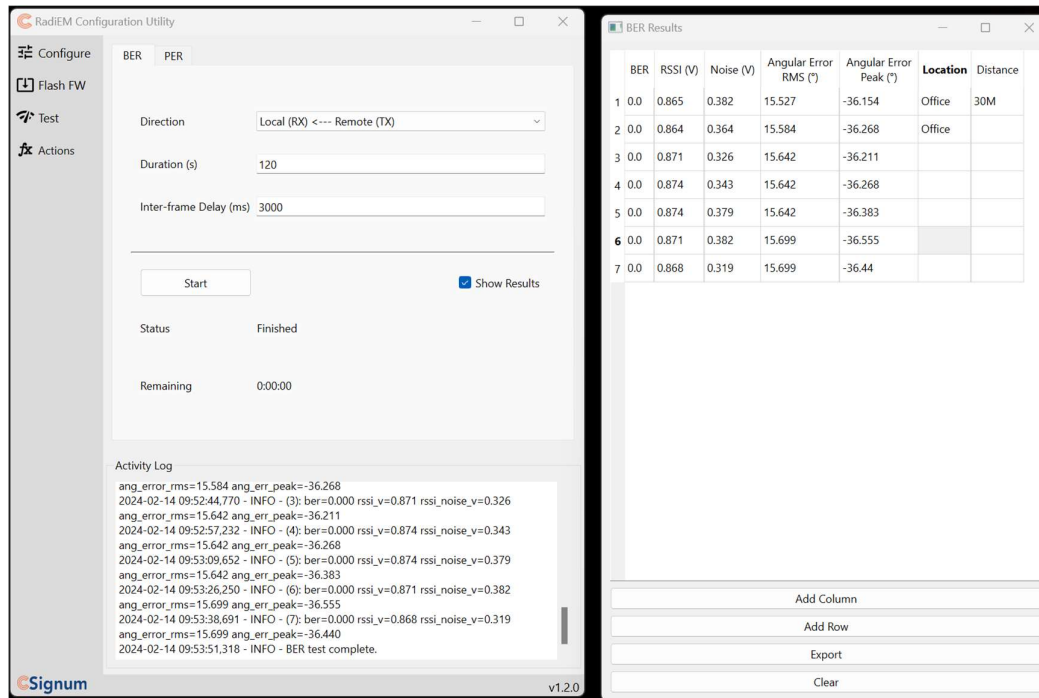Note: Angular Error data is for information only.

Using the Show Results pop-up allows extra Columns and Row's to be added. The column description and subsequent fields are free text.

Export allows the data to be exported as a *.xlsx file

Start
This commences the selected test based on the Direction, Duration and Interframe Delay settings

Example Test Results

PER Test

COMM Cable

LOCAL (Topside)
Modem

REMOTE (Subsea)
Modem

Direction
Sets the direction of test.
Either Remote (TX) to Local (RX) or Local (TX) to Remote (RX)

Note: Each complete PER Test Cycle (Packet Count) displays only one result and is displayed on completion.
Forward Error Correction (FEC) is used with PER Tests.

Packet count
Allows you to enter the number of test packets to transmit (1-1000).

Packet size (bytes)
Allows you to enter the size of each transmitted packet in bytes (0-236)

Inter-frame Delay (s)
Allows the user to enter the delay (in secs) between each PER packet sent (0-65535)

Show Results Check Box
Selecting this opens a separate window where the test data can be displayed.
Note: The data will also be displayed in the Activity Log window.

Using the Show Results pop-up allows extra Columns and Row's to be added. The column description and subsequent fields are free text.

Export allows the data to be exported as a *.xlsx file

Start
This commences the selected test based on the Direction, Packet Count, Packet Size and Inter-frame Delay settings.

Appendix A: Acronyms, Abbreviations & References

A.1 Acronyms

Table 2: Document acronyms

Acronym	Description
EMC	Electro-Magnetic Capability
TBC	To Be Confirmed
TBD	To Be Determined
BER	Bit Error Rate
PER	Packet Error Rate

A.2 Abbreviations

Table 3: Document Abbreviations

Abbreviation	Description

A.3 References

Table 4: Document References

No.	Document Name	Document Number