

# Linux based software for Data Collection from Campbell Data Loggers

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## Summary

- A Linux based application (pbcdl\_comm) for collecting data from PAKBUS protocol based Campbell Dataloggers as CR1000 dataloggers.
- The application provides most of Loggernet's data acquisition functionalities except the graphical user interface. The implementation is considerably lightweight, and suitable for data collection scenarios where a GUI is not required.
- Deployed in production to collect data from new CR1000-based MFRSR instruments at Southern Great Plains site.
- Complete ownership of the source code allows customization of the data collection process. Also, the software can be extended for specific applications (example: real-time data transfer).

## Overview

- A wide range of dataloggers manufactured by Campbell Scientific are based on PakBus protocol.
- PakBus is a packet based protocol that defines communication and data transfer mechanism between datalogger and client-application. Therefore, PakBus enabled applications can communicate using any communication scheme (RS-232, TCP/IP).
- pbcdl\_comm is a PakBus enabled software designed to adhere to ACRF data collection standard.

## PakBus Protocol Layers

### SerPkt Link-State Sub Protocol Layer

Responsible for monitoring communication link state between an application and data logger.

### PakBus Control Protocol

Facilitate communication and network management By exchanging information between network nodes.

- Delivery failure messages
- Handshaking between devices
- Query/set data logger settings

### BMP5 Application Layer

Defines application message formats for different type of transactions:

- Clock Synchronization
- File Transfer and Management
- Manage Data Collection Programs
- Data Collection Commands
- Query/set metadata information for measurement tables.

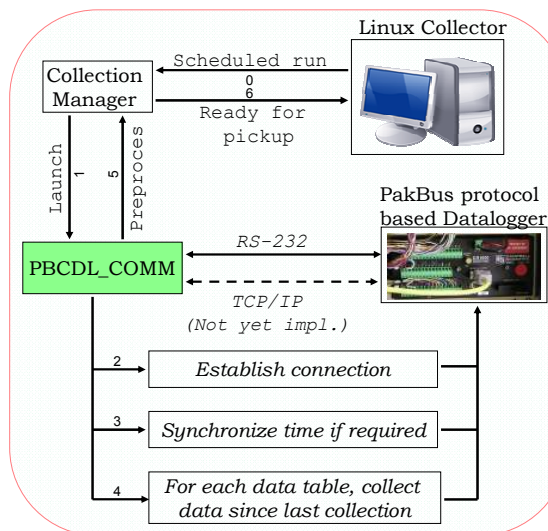


Fig. 1: Illustration of the dataflow process

### Technical Issues

The application can be compiled in any UNIX environment supporting C++ and STL. Currently supports RS-232 communication. Support for TCP/IP based collection can be added in future.

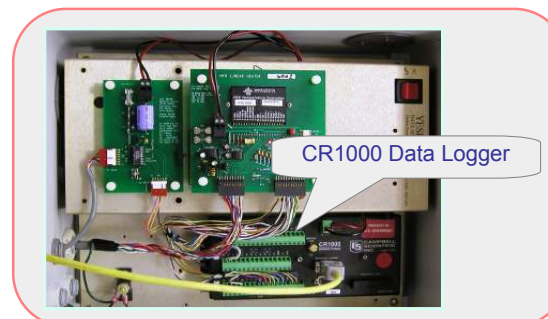


Fig. 2: Data acquisition system for the MFRSR instrument

## Benefits

- Customization of the data collection process. i.e. it would be possible to tailor or extend the application functionalities for specific instrument requirements.
- We anticipate the upcoming data acquisition instruments from Campbell Scientific to be based on the PakBus protocol. Therefore, an in-depth understanding of the technology provides with a significant advantage.
- Ownership of the code presents a significant cost advantage. There is no per-license expense.

## Application for Real-Time Data

- The data collection software can be configured to produce data files with arbitrary time span. Complete control on data file format provides greater flexibility in data management.
- Ownership of the source code would allow integration of the data collection module with other modules that can plug into data transfer applications as LDM or even assume the responsibility of pushing the data to a server.

## Acknowledgements

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