COMTRADE File Collector (CFC)

Version 3.4.1

User Guide

SOFTSTUF INC.

Contents

CHAPTER 1

System Requirements and Installation

This chapter lists the system requirements and installation instructions needed to download and run the COMTRADE File Collector (CFC) software.

System Requirements

- Windows 11,10,7
- 5.3 MB of available memory
- 20 MB of available RAM

Download and Install from the Web

1. To download and install the software go to www.faultnet.com
2. Click on the link that reads, "COMTRADE File Collector (CFC)".
3. Enter the username and password provided to you by Softstuf. The username and password are case sensitive.
4. Click on the software link to download the software.
5. When you download the software click on the show in folder option, this should save a zip file to your download's directory.
6. Create a folder off the root called C:\CFC, take the contents of the zip file and unzip them to this folder.

CHAPTER 2
Application Purpose and Use

This chapter describes the purpose of the software and gives a detailed tutorial on how to use the software.

Software Purpose

The purpose of the COMTRADE File Collector (CFC) software is to extract files from digital fault recorders (DFRs), and digital relays that use the file transfer protocol (FTP and FTPS), the SSH file transfer protocol (SFTP), the IEC 61850 manufacturing message specification file service (MMS), or the XMODEM data transfer protocol. The application is designed specifically for the download and renaming of COMTRADE records although it can still be used to download and rename non-COMTRADE files. The extracted files will be saved to a folder specified by the user and renamed to be compliant with the COMNAME standard.

CFC User Interface

The CFC User Interface is a GUI which allows the user to easily specify which devices to collect files from, track the applications progress when collecting files, and check for errors in COMTRADE records. For more information on using the User Interface please see the "CFC User Interface User Guide" which comes included with any download of the CFC software.

Task File

The task file (TaskFile.INI) is how the software knows what devices to extract files from, how to rename those files, and what directory to save those files in. The task file can be created by using the CFC User Interface or through notepad. This file is created by the user and must contain the following fields in the following order.
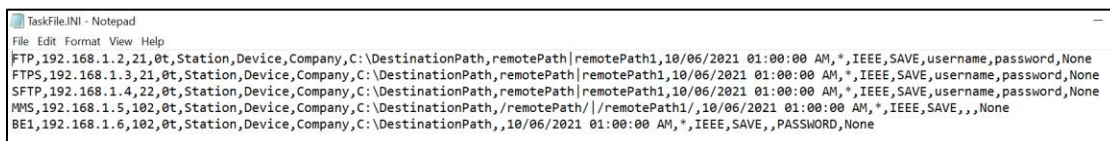
1. Transfer protocol field. (Options: FTP, MMS, SFTP, FTPS, BE1)
2. The IP address of the device to extract from.
3. The port number of the device.
4. The time code the record was created in.
5. The name of the substation.
6. The name of the device.
7. The name of the utility that owns the substation.
8. The directory that the records will be saved to.
9. The remote directories the user would like to extract files from, separated by pipes "|". For an FTP connection please list the name of the directory with no slashes before or after. For an MMS connection please list the name of the directory with the appropriate

slashes.* For example, if the user wanted to extract files from multiple remote directories using FTP this field would read: directory1|directory2|directory3

10. The time tag of the oldest file the user wants extracted (no records that occurred before this time tag will be extracted) This time needs to be listed in the following format: MM\DD\YYYY HH:MM:SS

11. The file extensions the user wants extracted from the device, separated by pipes "|". A star "*" can be used to download all files. For example, if the user only wants COMTRADE records to be extracted this field would read: CFG|DAT|HDR|INF

12. Naming Standard files will be renamed to comply with (options: IEEE – COMNAME, CLNS – Chilean Naming Standard)

13. Download Date and Time Option, allows the user to choose between using a COMTRADE CFG files trigger time or determine if the file should be downloaded, or the file's save date and time provided by the relay. Using the CFG file's trigger time guarantees accuracy down to the millisecond but takes longer to poll relays. Using the file's save and date time provided by the relay may not be as accurate but will poll relays much faster. This feature has been added for all connection types. (options: TRIG – Trigger time, SAVE – file save and date time provided by the relay).

14. (Only filled in for FTP, FTPS, or SFTP Connections) The device username.

15. (Only filled in for FTP, FTPS, or SFTP Connections) The device password.

16. (Always Defaulted to "None" for FTP, FTPS, or SFTP Connections) IEC61850 Driver.

17. (Only used for FTP or FTPS Connections, Optional) The port number to connect via TCP.

18. (Only used for FTP or FTPS Connections, Optional) The username to connect via TCP.

19. (Only used for FTP or FTPS Connections, Optional) The password to connect via TCP.

* - for MMS devices there is no consistency with how forward slashes are used. Some devices return the directory listing when the path is listed like this: "/remotePath". Others require paths to be listed like this: "/remotePath/", for this reason the user must enter the appropriate forward slashes in the task file.

The 14th and 15th fields only need to be filled in for a device that is using FTP/SFTP. For MMS devices these fields can be left empty.

Example Task File:

```
📄 TaskFile.INI - Notepad                                                                            —
File  Edit  Format  View  Help
FTP,192.168.1.2,21,0t,Station,Device,Company,C:\DestinationPath,remotePath|remotePath1,10/06/2021 01:00:00 AM,*,IEEE,SAVE,username,password,None
FTPS,192.168.1.3,21,0t,Station,Device,Company,C:\DestinationPath,remotePath|remotePath1,10/06/2021 01:00:00 AM,*,IEEE,SAVE,username,password,None
SFTP,192.168.1.4,22,0t,Station,Device,Company,C:\DestinationPath,remotePath|remotePath1,10/06/2021 01:00:00 AM,*,IEEE,SAVE,username,password,None
MMS,192.168.1.5,102,0t,Station,Device,Company,C:\DestinationPath,/remotePath/|/remotePath1/,10/06/2021 01:00:00 AM,*,IEEE,SAVE,,,None
BE1,192.168.1.6,102,0t,Station,Device,Company,C:\DestinationPath,,10/06/2021 01:00:00 AM,*,IEEE,SAVE,,PASSWORD,None
```

IEC61850 Driver Field

Digital relays that support the IEC 61850 MMS communication protocol come with an IEC 61850 data model. The IEC 61850 data model is used to store relay settings and measurements in a

hierarchical data structure. The structure is as follows; each individual relay is referred to as an IED (Intelligent Electronic Device), each IED is divided into multiple logical devices. The logical devices are then divided into logical nodes, which in turn are then divided into data objects. Each logical node contains numerous data objects, making the logical nodes containers of objects, where objects can be defined as either a single data point or a structure of data points.

Each digital relay vendor has their own implementation of the IEC 61850 data model. The IEC 61850 driver field is used to specify how the data model will be polled. The list of available drivers and what fields they poll is listed in Chapter 4.

Optional Fields
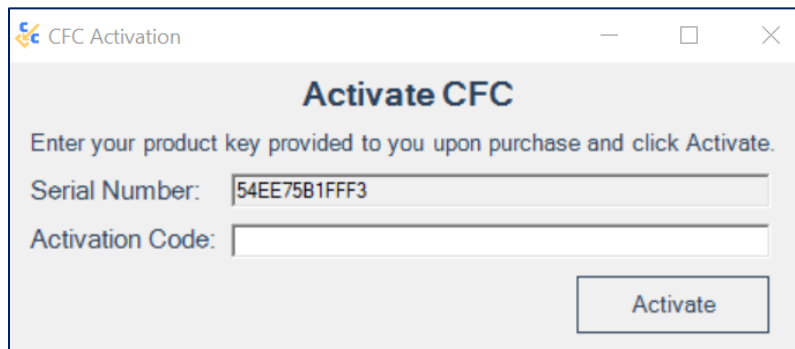
The optional 17th, 18th, and 19th fields can be included to connect to a device via TCP prior to connecting via FTP or FTPS. This TCP connection is established to get the time the latest event file was created. This time will then be compared to the time in the task file, if the time in the task file is not greater than the time provided by the TCP connection the application will not attempt to connect to the device via FTP. This functionality has been added to prevent excessive level two access errors when connecting to SEL devices via FTP. The optional 17th, 18th, and 19th fields will only work with SEL relays, please do not include these fields for any non SEL devices.

Activating the Software

To use CFC the application must first be activated. Please note the task file must be set up before activating the software, as once CFC is activated it will immediately start attempting to connect to devices listed in the task file. The steps needed to activate CFC are described below:

Upon purchase of CFC, Softstuf will provide the purchaser with a product key.

Run the CFC application, when CFC is run for the first time the following dialog box will appear:

The serial number listed is the unique identifier which will tie this copy of CFC to the machine it is running on. To activate using the serial number the user has two options.

Email Activation Option:

The serial number can be emailed to **zach@softstuf.com** and the activation code will be emailed back to the user as soon as possible.

Softstuf Activation Code Generator

The serial number can be copied and pasted into our automatic activation code generator available through the Softstuf website, **https://softstuf.com/activate.html**. To use the automatic activation code generator the user will also have to paste in the product key provided by SoftStuf at time of purchase.

Paste the product key into the textbox labeled "Product Key" and the serial number into the field labeled "Serial Number", after this is complete click the "Get Activation Code" button. This will redirect the user to our Generated Activation Code page where the user's activation code will be displayed. Once the code is displayed the user can copy it.

Once the user has copied the activation code, either from the email received from Softstuf or the Generated Activation Code webpage, paste this code into the field labeled "Activation Code" in the CFC

Activation Dialog box displayed on the first page of this guide. Once the code has been pasted, click the Activate button.

If the application is successfully activated CFC will immediately start running, and a "CFC_TXT.txt" file will be created. Do not move or alter the "CFC_TXT.txt" file as CFC uses this to confirm that the application has been activated.

Please note that this activation process will lock CFC to the machine it is running on. If a user attempts to move the CFC application to a different machine it will not run.

Running the Software

This software is designed for automated use and can be ran from the Windows scheduler or third-party software such as AlwaysUp. To run the software manually please double click on the EXE file titled "CFC.exe".
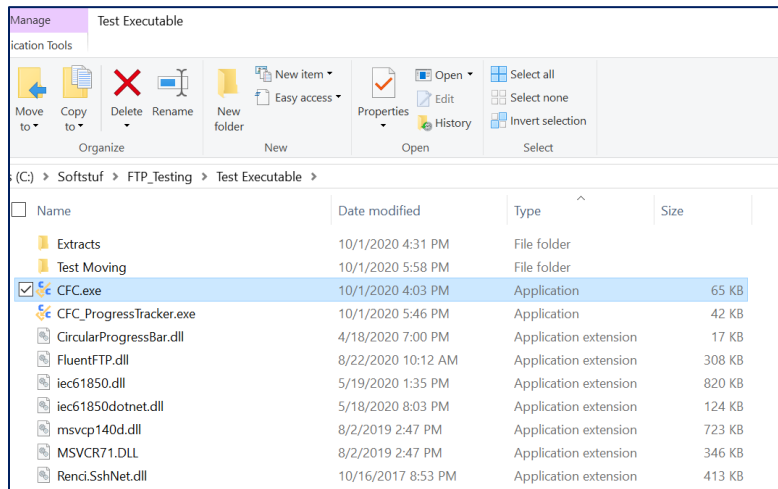
Downloading and Renaming Files

Depending on the download option selected in the task file the application handles the process of downloading and renaming files differently for COMTRADE and non-COMTRADE files.

If the TRIG option is selected, when attempting to download COMTRADE records the application will download a CFG file, check its trigger time, then determine whether the rest of the record should be downloaded and renamed. If the trigger time is older than the time listed in the task file the CFG file will be deleted. For non-COMTRADE files the time saved in the task file will be compared to the file's last modified time received from the server. If the last modified time is older then the time listed in the task file it will not be downloaded.

If the SAVE option is selected the file's last modified time received from the server will be used to determine the download of both COMTRADE and non-COMTRADE files.

The application will also extract and rename the contents of all downloaded zip files.

FTPS Connections

When making an FTPS connection please ensure that the "TLS Session Resumption" setting is unchecked on the device CFC is attempting to connect with. This setting is not supported by the Windows .NET platform which this application is built off. This is currently an open issue with the Windows .NET development team, which hopefully will be resolved as soon as possible.

XMODEM Connections

XMODEM connections unlike FTP, MMS, SFTP, and FTPS connections cannot be used generically to download records from different types of relays. XMODEM connections need to make use of proprietary commands to access COMTRADE records, therefore the task file is filled in differently for XMODEM connections.

Currently CFC supports the use of XMODEM for Basler BE1 relays, via ethernet only. CFC cannot connect via serial. To create a XMODEM connection to a Basler BE1 use the information listed below.

- BE1 is used in the transfer protocol field
- The remote path field must be left blank
- The only extensions allowed in the extension list field are CFG, DAT, and HDR
- The username field is left blank, only a password is needed to login to a Basler BE1
- The download option field must always be set to SAVE, XMODEM is too slow to use the TRIG setting

Activity Log

While the software is running an activity log will be updated informing the user of the software's activity. An example of an Activity Log is shown below.

Task File Upon Completion

Once the software has finished extracting, renaming, and moving records the time field in the task file will be updated to reflect the latest file downloaded from that device.

CHAPTER 3
Contact Information and Technical Support

Technical Support

If you have any questions about the software please contact Zach Makki, Monday through Friday between 9 AM and 6 PM.

Email: zach@softstuf.com

CHAPTER 4

IEC 61850 Data Model Drivers

There is currently only one IEC 61850 driver available in CFC. If you would like to poll IEC 61850 data models for relay types not listed below please contact Zach Makki (contact information listed in Chapter 3).

Drivers

ABB/Hitachi-650/670

Relays this Driver works with:

- ABB/Hitachi 650 and 670 relay series

What this driver polls:

Current Measurements

- IA_Mag (1-4)
- IB_Mag (1-4)
- IC_Mag (1-4)

Voltage Measurements

- VA_Mag (1-4)
- VB_Mag (1-4)
- VC_Mag (1-4)
- VAB_Mag (1-4)
- VBC_Mag (1-4)
- VCA_Mag (1-4)

Sequence Components

- I1_Mag (1-4)
- I2_Mag (1-4)
- 3I0_Mag (1-4)
- V1_Mag (1-4)
- V2_Mag (1-4)
- 3V0_Mag (1-4)

Impedance Values

- ZAB_Mag
- ZAB_PH

- ZBC_Mag
- ZBC_PH
- ZCA_Mag
- ZCA_PH
- ZA_Mag
- ZA_PH
- ZB_Mag
- ZB_PH
- ZC_Mag
- ZC_PH

Commissioning Info

- Hardware Revision
- Device Type
- Device Name
- Serial Number
- Software Revision
- Vendor
- Health Status Value
- Relay Location
- Relay Owner
- Relay Latitude
- Relay Longitude
- Relay Unique Identifier

Date/Time Information

- Daylight Savings Support
- Daylight Savings Usage
- UTC Offset (Minutes)
- Relay Date Time
- Time Source

Channel Information

- Primary Channel Usage (1-4)
- Primary Channel Name (1-4)
- Redundant Channel A link status (1-4)
- Redundant Channel B link status (1-4)
- Redundant Channel Name (1-4)
- Redundant Channel A Frame Error Rate (1-4)
- Redundant Channel B Frame Error Rate (1-4)

LED Status

- LED 1 Status
- LED 2 Status
- LED 3 Status
- LED 4 Status
- LED 5 Status
- LED 6 Status
- LED 7 Status
- LED 8 Status
- LED 9 Status
- LED 10 Status
- LED 11 Status
- LED 12 Status
- LED 13 Status
- LED 14 Status
- LED 15 Status
- LED 16 Status

Power System Values

- Three Phase Current RMS
- Three Phase Voltage RMS
- Frequency
- Three Phase Power Factor
- Three Phase Real Power
- Three Phase Reactive Power
- Three Phase Apparent Power

Breaker Control

- Circuit Breaker Operation Count (1-4)
- Time of Last Circuit Breaker Operation (1-4)
- Circuit Breaker Operating Capability (1-4)
- Circuit Breaker Health Status (1-4)
- Remaining Life of CB in number of operations (1-4)
- CB Accumulated currents power (1-4)
- Charging Time of the CB Spring (seconds) (1-4)

Switch Control

- Circuit Switch Operation Count (1-4)
- Time of Last Circuit Switch operation (1-4)

- Type of Circuit Switch (1-4)
- Circuit Switch Operating Capability (1-4)

Transformer Information

- Load dependent automatic reduction voltage (1-4)
- Actual voltage setpoint (1-4)
- Voltage setpoint set by user (1-4)
- Busbar voltage horizontal communication (1-4)
- Calculated active power (1-4)
- Calculated reactive power (1-4)
- The average of the measured busbar voltage (1-4)
- Magnitude of measured load current (1-4)
- Calculated compensated voltage (1-4)
- Relative tap position horizontal communication (1-4)
- Transformer reactance secondary side horizontal communication (1-4)

GOOSE subscription status

- GOOSE Subscription Status
- GOOSE Revision Number
- GOOSE Last Message State

Metering

- Reactive energy demand (count) (1-4)
- Reactive energy demand (mag) (1-4)
- Real energy demand (count) (1-4)
- Real energy demand (mag) (1-4)
- Reactive energy supply (count) (1-4)
- Reactive energy supply (mag) (1-4)
- Real energy supply (count) (1-4)
- Real energy supply (mag) (1-4)

Most Recent Fault summary

- Fault Summary IN_PH
- Fault Summary IN_Mag
- Fault Summary IA_PH
- Fault Summary IA_Mag
- Fault Summary IB_PH
- Fault Summary IB_Mag
- Fault Summary IC_PH
- Fault Summary IC_Mag

- Fault Summary VN_PH
- Fault Summary VN_Mag
- Fault Summary VA_PH
- Fault Summary VA_Mag
- Fault Summary VB_PH
- Fault Summary VB_Mag
- Fault Summary VC_PH
- Fault Summary VC_Mag
- Fault calculation made status bit
- Time of Calculation
- Fault distance [km]
- Fault impedance PH
- Fault impedance Mag
- Single multi and T line Fault distance [km]
- Single multi and T line Fault impedance PH
- Single multi and T line Fault impedance Mag

Transformer loss of life

- Transformer Actual ageing rate (1-4)
- Calculated winding hotspot temperature (C) (1-4)
- Percentage loss of life (1-4)
- Remaining transformer age (1-4)
- Calculated transformer top oil temperature (C) (1-4)

Insulation medium supervision gas

- Pressure of the insulating medium gas
- Temperature of the insulating medium gas (C)

Insulation medium supervision liquid

- Pressure of the insulating medium liquid
- Temperature of the insulating medium liquid (C)

Current Harmonics

- Current Crest factor of neutral
- Current Crest factor of phase A
- Current Crest factor of phase B
- Current Crest factor of phase C
- Current Harmonic RMS value of neutral
- Current Harmonic RMS value of phase A
- Current Harmonic RMS value of phase B

- Current Harmonic RMS value of phase C
- Current Total demand distortion value of neutral
- Current Total demand distortion value of phase A
- Current Total demand distortion value of phase B
- Current Total demand distortion value of phase C
- Current Total harmonic distortion of neutral
- Current Total harmonic distortion of phase A
- Current Total harmonic distortion of phase B
- Current Total harmonic distortion of phase C

Voltage Harmonics

- Voltage Crest factor of neutral
- Voltage Crest factor of phase A
- Voltage Crest factor of phase B
- Voltage Crest factor of phase C
- Voltage Crest factor of phase-to-phase AB
- Voltage Crest factor of phase-to-phase BC
- Voltage Crest factor of phase-to-phase CA
- Voltage Harmonic RMS value of neutral
- Voltage Harmonic RMS value of phase A
- Voltage Harmonic RMS value of phase B
- Voltage Harmonic RMS value of phase C
- Voltage Harmonic RMS value of phase-to-phase AB
- Voltage Harmonic RMS value of phase-to-phase BC
- Voltage Harmonic RMS value of phase-to-phase CA
- Voltage Total harmonic distortion of neutral
- Voltage Total harmonic distortion of phase A
- Voltage Total harmonic distortion of phase B
- Voltage Total harmonic distortion of phase C
- Voltage Total harmonic distortion of phase-to-phase AB
- Voltage Total harmonic distortion of phase-to-phase BC
- Voltage Total harmonic distortion of phase-to-phase CA

Thru-fault count

- Number of thru faults detected