

> Itron white paper

OpenWay® Fatal
Error Recovery
SR 3.0

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Introduction

With the release of OpenWay service release (SR) 3.0, Itron has introduced new *Fatal Error Recovery* functionality. This functionality creates a process for an electric meter to recover after a fatal error condition has occurred, while still maintaining as much data as possible.

Overview

Upon implementation of SR 3.0, based on customer preference, all OpenWay meters will be configurable to allow meters to utilize Fatal Error Recovery. This configurable setting will be a part of the meter's configuration as defined in the OpenWay Collection Engine (CE). If Fatal Error Recovery is enabled at the CE, it will allow meters to recover after any Fatal Error 2, 6, or 7 (described later in this paper).

NOTE: Upon activation of SR 3.0 in the OpenWay meter population, Fatal Error Recovery is not enabled by default at the register. It must be enabled as described in this document.

Fatal Error Recovery: Meter Settings/Operations

A new option in the *Register Operation* tab of the meter configuration is available to "Enable Fatal Error Recovery". If Fatal Error Recovery is desired, this box **must** be checked.

The screenshot shows the 'Edit Configuration' window for a meter. The configuration details are as follows:

Name:	Demo1 Enh1
Device Class:	OpenWay CENTRON
Version:	6 - 7/27/2010 5:02:54 PM
Description:	Demo1 E5 W/Enhanced

Validation Errors (0): No Validation Errors
Warnings (0): No Warnings

Navigation tabs: TOU/Time, Security, Quantities, **Register Operation**, Device Multipliers, Load Profile, Volta

Register Operation

Demand Interval Length (minutes)	60 Minutes
Number of Subintervals	1
Cold Load Pickup Time (minutes)	0
Power Outage Recognition Time (seconds)	60
Test Mode Demand Interval Length	60 Minutes
Number of Test Mode Subintervals	1
Clock Synchronization	Line Synchronization
Daily Self Read Hour	Disable Daily Self Read
Daily Self Read Minute	0
Enable Fatal Error Recovery	<input checked="" type="checkbox"/>
Enable Asset Synchronization	<input type="checkbox"/>

A red box highlights the 'Enable Fatal Error Recovery' checkbox, which is checked. A red arrow points from this checkbox to the text: 'Check to enable Fatal Error Recovery'.



If Fatal Error Recovery is enabled, the following will occur in the meter:

- Fatal Error Recovery Mode Status is Set**
Indicates to the CE that meter has entered Fatal Error Recovery.
- “Fat rECory” is displayed**
This will be displayed on the meter between every configured display item until Fatal Error Recovery is cleared.
- Core Dump is saved**
Core Dump will only be retrievable at the meter using Field-Pro. This information will need to be collected and sent to Itron for evaluation. Only the most recent Core Dump data is stored in the meter.
- Meter enters “Failsafe” mode**
Internal disconnect/reconnect (service limiting) commands prevented until Fatal Error Recovery status is cleared.
- Exception Message & Event Logging**
Fatal Error Occurred event is logged in the Meter Event Log. A Fatal Error Exception is sent upstream.
- Normal Operations Resume**
Energy data will be maintained during Fatal Error Recovery. Event Log data will be maintained when possible. Time is restored or updated. Disconnect/Reconnect switch will maintain state during the recovery process. Load Profile, Demand, Voltage Monitoring data and all ZigBee bindings will be lost.
- Fatal Error Recovery Cleared**
A meter must have the Fatal Error Recovery cleared prior to the next recoverable Fatal Error. If the meter has not been cleared and subsequent Recoverable Fatal Error occurs, the meter will not be recoverable and will enter “default” Fatal Error State.

Fatal Error Recovery: Collection Engine Settings/Operations

System Setting

A new System Setting in the Collection Engine is introduced to determine how meters are handled if they enter Fatal Error Recovery. This setting will define how the meter is to recover from the Fatal Error; either “Clear Errors” automatically or “Manual Recovery” manually. This setting can be found in the Control tab, “Meter Fatal Error Recovery”.

The screenshot shows the Itron web interface. At the top, there is a navigation bar with the Itron logo and the tagline "Knowledge to Shape Your Future". Below the navigation bar, there is a breadcrumb trail: Home > Meter Management > System Management > Tools > Administration > Reporting. The main content area is titled "System Settings" and contains several configuration options. The "Meter Fatal Error Recovery Mode" setting is highlighted, and its value is set to "Clear Errors". Other settings visible include "Configuration Discrepancy Handling (In Family)", "Configuration Discrepancy Handling (Non-Family)", "Job Record Initialization Timeout", "Use Pulse Overflow Logic", and "Value Scaling Type".

User Interface

A new user interface, Meter Fatal Error Recovery, has been created under Meter Management that will display a list of meters that have entered Fatal Error Recovery Mode. The following information will be provided for each meter in the list:

OpenWay Fatal Error Recovery

- Meter Serial Number
- Cell Relay: Cell Relay associated with the meter
- Count: Fatal Error Recovery count known by CE
- Fatal Error Type: 2, 6 or 7
- Error Time: Time at which Fatal Error occurred
- Recovered Time: Time at which meter exited Fatal Error Recovery
- Reason Code: Reason code provided by endpoint
- Status: Recovered or Not Recovered

Serial Number	Cell Relay	Counts	Fatal Error Type	Error Time	Recovered Time	Reason Code	Status	Action
53091185	14057	1	Unknown	8/4/2010 9:13:43 PM		0		

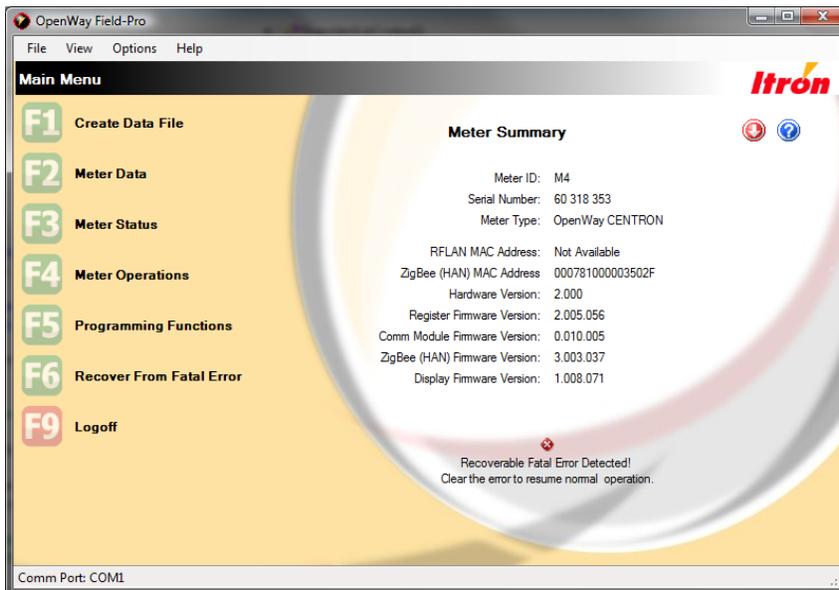
This UI can also be used to “recover” endpoints if the CE system setting is set to manually recover endpoints.

NOTE: *The Meter Fatal Error report can also be requested via “GetMeterFatalErrorReport” Web service.*

Fatal Error Recovery: OpenWay Tools Operations

Fatal Error Recovery Notification

If a meter is in Fatal Error Recovery mode, when a user logs onto the meter an error message will be displayed to indicate that a Recoverable Fatal Error has been detected.



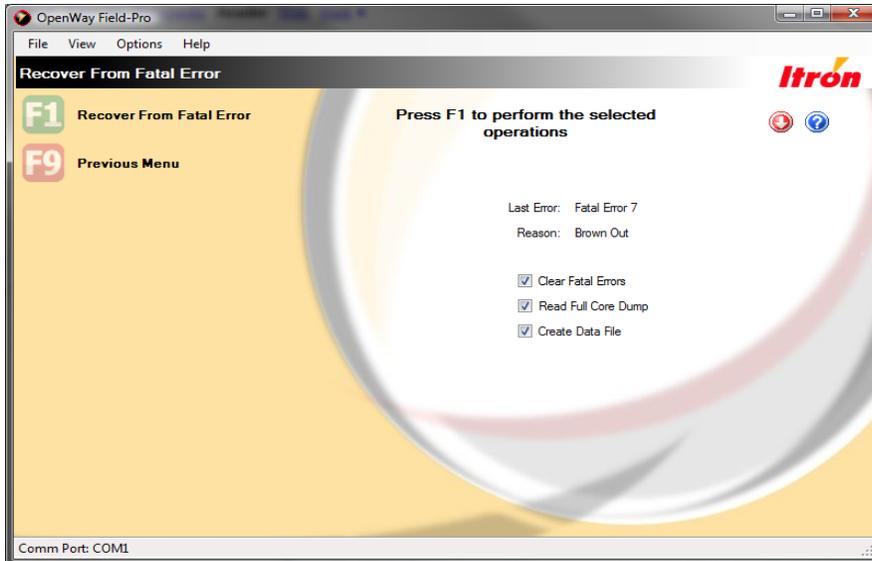


Fatal Error Recovery Dialog

A new dialog will be added to Field-Pro in order to support the Fatal Error Recovery process. This dialog can be used if the meter is in Fatal Error Recovery and has not been cleared or if a Core Dump is available in the meter. The Recover from Fatal Error dialog will allow any of the following operations:

- Clear Fatal Errors
- Read Full Core Dump (stored in *.bin format)
- Create Data File

The dialog will also display the last Fatal Error Type and Reason for Fatal Error, if available.



Fatal Error Recovery: System Implementation

Fatal Error Recovery: Disabled (Default State)

If Fatal Error Recovery is disabled, OpenWay meters perform in the same manner as before receiving SR 3.0. If a Fatal Error occurs, all meter functions will cease to operate and “Fat Error” will be displayed on the meter display. If possible, the meters will still communicate via the network.

This is also the process for Fatal Errors 1, 3, 4, and 5.

Fatal Error Recovery Enabled: Automatic Clearing

If Fatal Error Recovery is enabled and the CE is set to “Clear Errors,” the following process will occur for Fatal Errors 2, 6, and 7.

1. Meter enters Fatal Error Recovery mode, stores Core Dump, and sends Exception Event to CE.
 - a. Demand, Load Profile data, and ZigBee bindings are lost.
2. Exception Event received, initial endpoint information added to Meter Fatal Error Recovery UI.
 - a. If Exception Event is not received, information is added based on next Interrogation Read response (Interactive, Periodic or Contingency).
3. Additional Fatal Error Recovery information received on next Interrogation. Meter Fatal Error Recovery updated.

OpenWay Fatal Error Recovery

4. New Error Recovery Job created for the endpoint after receipt of Fatal Error information during Interrogation Read.
 - a. This job will clear the meter from Fatal Error Recovery.
 - b. The CE will retry this job a maximum of two (2) times.
 - c. If the job does not succeed after two retries, the job will be recreated on next Interrogation request. This process continues until the error is cleared.
5. Core Dump must be retrieved via Field-Pro and sent to Itron through the RMA process, which allows Itron the opportunity to investigate and determine root cause.
 - a. Specific details on RMA process to follow.

Fatal Error Recovery Enabled: Manual Clearing

If Fatal Error Recovery is enabled and the CE is set to “Manual Recovery,” the following process will occur for Fatal Errors 2, 6, and 7.

1. Meter enters Fatal Error Recovery Mode, stores Core Dump, and sends Exception Event to CE.
 - a. Demand, Load Profile data, and ZigBee bindings are lost.
2. Exception Event received, initial endpoint information will be added to Meter Fatal Error Recovery UI.
 - a. If Exception Event is not received, information is added based on next Interrogation Read response (Interactive, Periodic or Contingency).
3. Additional Fatal Error Recovery information received on next Interrogation. Meter Fatal Error Recovery updated.
4. In Meter Fatal Error Recovery UI, meters to be cleared are selected.
 - a. This creates a new Error Recovery Job for each endpoint.
 - b. This job clears the meter from Fatal Error Recovery.
 - c. The CE retries this job two (2) times. If the job does not succeed after the two retries, the job will be recreated on next Interrogation request. This process is repeated until error is cleared.
5. Core Dump must be retrieved via Field-Pro and sent to Itron through the RMA process, as to allow Itron the opportunity to investigate and determine root cause.
 - a. Specific details on RMA process to follow.



About Itron

Itron Inc. is a leading technology provider to the global energy and water industries. Our company is the world's leading provider of intelligent metering, data collection and utility software solutions, with nearly 8,000 utilities worldwide relying on our technology to optimize the delivery and use of energy and water. Our products include electricity, gas, water and heat meters; data collection and communication systems, including automated meter reading (AMR) and advanced metering infrastructure (AMI); meter data management and related software applications; as well as project management, installation, and consulting services.

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