

# G500-4002 | G500\_100 ARRM Job Aid v1

## Overview

This Job Aid is essentially the script used for recording the ARRM module video but it was felt there may be times where it would be beneficial to have a paper copy available when setting up you device(s).

## Slide 3

In this video we'll be looking at the Automated Record Retrieval Manager or ARRM. We'll start with the File Retrieval Trigger and then move to Configure Applications like Company and Station, Device and File Server 1 & 2, File Set, and Duplicate Selected Configuration. Next up is the Configure File Set Template – Standard, Sel ASCII and lastly Pre-defined File Set Templates. We'll then move into Oscillography Files and IEEE Files, the ARRM Viewer, ARRM Application Pseudo Points, the ARRM Connection Status File and last but not least ARRM Storage and Records Deletion. Due to the lengthy detailed nature of this content it was felt that an additional pdf job aid might be helpful as a reference for times when you want to drill down to access specific details for a given topic. To that end please note there is a companion pdf accessible via a link in the description of this video. With that out of the way, let's get started with the main content of this video.

## Slide 4

The Automated Record Retrieval Manager (ARRM) retrieves and stores record files from devices connected to your MCP (G500/G100). Examples of files are: Oscillography COMTRADE, SOE logs, Events, Generic data, Information about the IED, IEC 61850 SCL files (IID).

ARRM application requires an additional license (see Software Licensing Tools for more details).

ARRM uses the Trivial File Transfer Protocol (TFTP) or File Transfer Protocol (FTP) or Secure File Transfer Protocol (SFTP) or IEC61850 MMS to retrieve the files from the IEDs to the MCP device over a local area network (LAN). It also supports SEL Binary or Generic ASCII to retrieve the files over a serial connection.

You can then retrieve downloaded records from the MCP using any **FTP/SCP/SFTP** client as needed or on a scheduled basis. You can also configure the MCP to automatically push the files to a remote location using the **Sync Manager** utility. Please refer to **Sync Manager** for more information.

The ARRM has the following primary features and functions:

- Automatic, manual, or connection poll-based retrieval of records from devices
- File naming based on configurable parameters or the IEEE C37.232-2007 File Naming Convention for Time Sequence Data
- File storage organized by device and/or station
- Clearing the file available status on the GE D25 IED
- An easy to use interface accessible through the Online HMI
- Visual indication of the device's online/offline status
- A simple configuration interface
- Pseudo points to trigger file retrievals and to view the application status as well as
- Support for MCP system redundancy

In a redundant system setup, the active unit is responsible for retrieving records from devices.

Redundancy is supported by mirroring retrieved files on both the active and standby units. The MCP

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redundancy manager is notified of file or directory changes by the active unit and automatically synchronizes them on the standby unit. This is done as soon as possible but notifications are not made more than every 10 seconds to reduce network traffic.

The **ARRM** tab on the DSAS Editor's Configuration allows you to configure the ARRM application. The page is split into two sub-tabs: Applications which include (stations, devices, and file sets) and the File Set Template which includes (parameters for retrieving files from different types of devices).

During runtime, the **ARRM Viewer (Status)** on the Power Bar of the Runtime HMI can be used to view the status of the application and to initiate manual retrieval. Also, ARRM pseudo points are presented to the operator under the ARRM application name on the **Application** tab on the **Point Details** page.

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Depending on the IED types and schema used, ARRM file retrievals are triggered by:

Automatic:

- The transition of the *RcdMade* digital input point from 0 to 1
- A change in the *FaultNumber* analog input or accumulator point

Manual:

- Operation of the file retrieval pseudo point, or
- Manual activation through the ARRM application

### Periodic Connection Polling

The ARRM Connection Polls are required because, in absence of any events, there are no potential ARRM file transfers for days or weeks at a time; consequently, ARRM files will not appear with an up-to-date status.

- The file sets configured for polling will be triggered by the Configured Polling interval (either *Global Connection Polling Interval* or *Device Connection Polling*) Interval in addition to their configured event trigger
- No restriction on files to be included – none, one, more or all
- An asterisk (\*) is appended to each file set that is supported by periodic polling once configured
- Can be activated or deactivated through the runtime HMI - ARRM viewer.

In the case of fault number-based file sets which are included in connection polling, ARRM always retrieves files with the last fault number value. Consideration must be given to the files included in connection polling so redundant files are not created unnecessarily.

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The **Applications** tab of the **ARRM** configuration window allows you to configure company, stations, devices, and file sets. A company named "GE" is created by default. In the **Company -> General** subtab, you can configure:

- Company Name:

The name of the company that is saved to the oscillography data filename. Range is 1 to 32 alphanumeric characters. Default is GE.

- MCP Gateway Name:

The name of the MCP Gateway that is included in the ARRM Connection Status File. Range is 1 to 32 alphanumeric characters. Default is Gateway.

- Maximum Num of Concurrent Retrievals:

The number of files that can be retrieved at the same time. This setting is useful in reducing the load that ARRM places on poor networks or networks with many devices. Range is 1 to 256, default is 10.

- Default Time Tag Reference:

Select whether stations belonging to this company apply a time tag based on first sample or time trigger. Stations can be configured to override this setting on a case-by-case basis. Default is on First Sample.

- Create Station Subdirectories:

Select whether to create a separate folder within the storage folders for each station. If this setting is not enabled, all device directories are stored within the root folder. Default is True)

- Create Device Subdirectories:

Select whether to create a separate folder within the storage folders (and, if selected, the station subfolder) for each device. Default is True.

In the **Company -> Global TFTP** subtab, you can configure:

- Block Size:

Block size for TFTP communication. Default is 2048 bytes

- Retries:

The number of times ARRM is to retry a file transfer that has timed-out. Valid range is 0 to 10 times. Default is 2 times.

- Retry Interval:

If there is a network error, ARRM retries the file retrieval at a configured interval. Enter the amount of time, in seconds, that ARRM must wait before retrying a file transfer that has failed. Valid range is 1 to 86400. Default is 5.

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Click the “+” button to create a new **Station** when the company is selected. A default device with a default File Set is also created automatically.

- Station Name:

The name of the station that is saved to the oscillography data filename. Valid range is a name that is between 1 and 6 characters in length and must be unique from any other configured station name. Default text is in the format “St x” where x is a system-generated number.

- Use Default Time Tag Reference:

If set to True, the default time tag reference defined on the *Company* level is used for this station. If set to **false**, an override can be specified. Default is true.

- Time Tag Reference:

Select whether the station applies a time tag based on first sample or time trigger. This field is disabled when *Use Default Time Tag Reference* is set to *true*. Default is disabled.

- Default Time Zone:

The default time zone for devices within the selected station. Devices can be configured to override this setting on a case-by-case basis. Default is UTC.

- Devices Adjust for DST:

Specify whether devices within this station automatically adjust for daylight saving time. Default is false.

- Global Connection Polling Interval:

Specify the Global Connection Polling Interval of the Station in minutes. Range is 1 to 1440 minutes. Default is 5 minutes.

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You can click the “+” button to create a new **Device** when the Station is selected:

- Device Name:

The name of the device saved to the oscillography data filename. A Valid range is a name that is between 1 and 14 characters in length and must be unique from any other device within the station. Default text is in the format “Device x” where x is a system-generated number.

**Notes:** ARRM supports Directory Delta for different FTP ls formats. You must provide the suffix for each format in the device name configuration. Refer to the SWM0101 Software Configuration Guide for more details on this.

- Use Default Time Zone:

Specify if the selected device should use the time zone configured on the station level. Default is true.

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- Time Zone:

Select the time zone that the device is located in. Disabled when Use Default Time Zone is set to true. Default is disabled.

- Devices Adjust for DST:

Specify whether the device automatically adjusts for daylight saving time. Default is disabled.

- Logical Device Name:

The device name that the ARRM application uses to replace the "%s" format specifier in the file set template configuration, during the file set retrieval operation. A Valid range is a name that is 32 characters or less in length. Default is Empty.

- Use Global Connection Polling Interval:

Specify if the Global Connection Polling Interval configured for the station allows for poll-based File set retrieval. Default is True.

- Device Connection Polling Interval:

Specify if the Device Level Polling Interval (in minutes) allows for poll-based File set retrieval. This parameter is enabled when the Use Global Station Connection Polling Interval is set to False. Range is 1 to 1440 minutes. Default is 5 minutes.

In **Device -> File Server** subtab, you can configure:

- Server Type:

Select the type of server to use when connecting to the device. MMS is only available if an IEC 61850 configuration is loaded on the MCP. UR/SFTP is only available if Modbus TCP IED is configured with the protocol TCP/SSH. SELB is only available if an SEL Binary IED is configured, and GENA is only available if a Generic ASCII IED is configured. Default is TFTP.

- Retrieval Retry Interval:

If there is a communications error, ARRM retries the file retrieval at a configured interval. Enter the amount of time (in seconds) ARRM waits before retrying a file transfer that has failed. Valid range is 1 to 60000, default is 60.

- File Set Trigger Delay:

The amount of time (in seconds) after which the ARRM application starts processing file set retrieval, after receiving a file set trigger request. Default is 0 second.

Only one **Server Type** can be configured for a device. **Hint:** If an IED requires more than one protocol for different file types – create alias Devices. And depending on the **Server Type**, these parameters are enabled:

When the server type is **TFTP**,

- TFTP Primary Server IP Address:

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The IP Address of the Primary TFTP server. Default is Empty.

- TFTP Secondary Server IP Address:

The IP Address of the Secondary TFTP server. Default is 0.0.0.0.

- TFTP Timeout:

The amount of time (in milliseconds) ARRM waits for each block in a TFTP transfer. Valid range is 1 to 60000. Default is 10000.

When server type is **MMS**,

- MMS Device:

Select the already configured IEC 61850 device in Connections that is used as the file server. Default is Empty.

When server type is **SELB (SEL Binary)**,

- SelBin Device:

Select the already configured SEL Binary device in Connections that is used as the file server. The default is Empty.

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When the server type is **GENA (Generic ASCII)**,

- GenericASCII Device:

Select the already configured Generic ASCII device in Connections that is used as the file server. Default is Empty.

When server type is **UR/SFTP**,

- UR/SFTP Device:

Select the already configured UR SFTP device in Connections that is used as the file server. Default is Empty.

- UR/SFTP Timeout:

Timeout (in milliseconds) for the UR SFTP connection. Valid range is 1 to 60000, default is 30000.

when the server type is **FTP**,

- FTP Primary Server IP Address:

The IP Address of the Primary FTP server. Default is Empty.

- FTP Secondary Server IP Address:

The IP Address of the Secondary FTP server. Default is 0.0.0.0.

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- FTP Server TCP Port:

FTP Server TCP port. Default is 21.

- FTP Timeout:

Timeout (in milliseconds) for the FTP connection. Valid range is 1 to 60000, default is 10000.

- FTP Allow Anonymous Login:

Allow Anonymous Login to FTP Server. Default is false.

- FTP Anonymous Login Password:

Password for Anonymous Login to FTP Server. This field is enabled when “FTP Allow Anonymous Login” is set to true. Default is Disabled.

- FTP Login Name:

Login ID for FTP connection. This field is enabled when “FTP Allow Anonymous Login” is set to false. Default is empty.

- FTP Password:

Password for FTP connection. This field is enabled when the FTP Allow Anonymous Login field is set to false. Default is empty.

- FTP Connection Mode:

FTP Data Connection Mode (Active/Passive). Default is Active.

- FTP Data Representation Mode:

Is the Mode in which data must be retrieved from FTP Server (ASCII/Binary). Default is Binary.

when server type is **SFTP**,

- SFTP Primary Server IP Address:

The IP Address of the Primary SFTP server. Default is empty.

- SFTP Secondary Server IP Address:

The IP Address of the Secondary SFTP server. Default is 0.0.0.0.

- SFTP Server TCP Port:

SFTP Server TCP port. Default is 22.

- SFTP Timeout:

Timeout (in milliseconds) for the SFTP connection. Valid range is 1 to 60000, default is 10000.

- SFTP Authentication Mode:

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The Authentication Mode for SFTP Connection (Password/Public Key). Default is Public Key. The user needs to configure the SFTP Login name and Password if the Password mode is selected. For the Public Key Authentication mode, you need to generate and copy the SSH public key to the location in IED specified by the vendor. (click the **Utilities** power bar button in the MCP HMI to a **Generate Gateway Key Pair**).

- SFTP Login Name:

Login ID for SFTP Connection. This field is enabled when “SFTP Authentication Mode” is set to Password. Default is Disabled.

- SFTP Password:

Password for SFTP Connection. This field is enabled when “SFTP Authentication Mode” is set to Password. The default is Disabled.

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You can click the “+” button to create a new **File Set** when the **Device** is selected. Each **File Set** defines the file set template to be used, the file retrieval trigger and pseudo points’ references and descriptions.

- File Set Name:

A unique identifier for the file set. Range is 1 to 32 ASCII characters. Default is in the format “File Set x” where x is a system-generated number.

- File Set Template:

Select one of the available File Set template. Default is Empty.

- Include in Connection Polling:

Specifies whether polling is enabled or disabled. If this parameter is True, File Set retrieval occurs through connection polling. Default is False.

- Use File Trigger Event Timestamp:

If set to true, event time that triggers file retrieval operation is used as a timestamp for creation of files in the New File with the Timestamp File Storage method. Otherwise, file retrieved time is used. This is only applicable to a New File with the Timestamp File Storage method. Default is false.

- Recording Made (RcdMade) Enable:

If enabled, ARRM monitors a configured digital input point mapped to the Recording Made indication of the device. When a specific File Set Template - Standard is selected, this field is enabled. Default is disabled.

- RcdMade Mapped DI Point:

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If the Recording Made (RcdMade) setting is enabled, select a system point to monitor for RcdMade indications. When the Recording Made (RcdMade) Enable field is set to true, this field is enabled. Default is disabled.

**NOTE:** To avoid duplication, the RcdMade DI point must be in the OFF state and turn ON momentarily to signal that a new file is available or remain ON until the file is read by ARRM. This is only required if the File Set Templates File Type is General.

- Fault Number Point Enable:

If enabled, ARRM monitors a configured analog input or accumulator point mapped to the Fault Number indication of the device. When a specific File Set Template – Standard is selected, this field is enabled. Default is disabled.

- Fault Number Point:

If the Fault Number Point Enable setting is enabled, select a system point to monitor for fault number indications. Default is disabled.

**NOTE:** File retrieval using Fault Number requires %u in the “File Set Template → Retrieved file Absolute Path Name” field (e.g.: Osc%u) and mapping an AI point under “Fault Number Point”, regardless of “Include in Connection Polling” being True or False

- Reset Recorder Memory (MemRs) Enable:

If enabled, ARRM operates the “MemRs” command after the file set is retrieved. This command may also be used to clear the file trigger point in D25 devices. Default is false.

- DO MemRs Point:

If the *Reset Recorder Memory* setting is enabled, select a system point to operate after a file retrieval operation is completed. Default is disabled.

Also, a list of pseudo points are created for each File Set by the ARRM application. Each pseudo point has a reference and a user-definable description. Pseudo point’s reference is a name that can be used for quick indexing and filtering. Pseudo point’s description is a user-defined block of text (maximum 128 characters ) that provides a detailed and localized description of the group. These pseudo points are:

- DI point: Automatic Retrieval Disabled
- DO point: Clear Recorder Memory
- DO point: Disable Automatic Retrieval
- AI point: Retrieval State
- DO point: Retrieve File Set
- DO point: Enable Connection Polling
- DI point: Connection Polling Enabled

More details about these pseudo points will be presented later in the module.

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## Slide 10

The "Duplicate" button on the **Applications** tab of the **ARRM** configuration window allows to quickly replicate or clone entire levels when many devices are the same and only addresses and IDs differ. You can then rename the ID and modify the needed parameters based on that.

Click the button shown on the screen to duplicate the selected configuration.

When a **Station** is selected,

- The whole station with all associated devices will be duplicated.
- Action required at least to rename the **Station Name** as Station Name must be unique across the Company.

When a **Device** is selected,

- The Device with all associated File Sets will be duplicated.
- The duplicated Device will be placed under the same Station.
- Action is required at least to rename the **Device Name** as Device Name must be unique across the same Station.

When a **File Set** is selected,

- The File Set will be duplicated.
- The duplicated File Set will be placed under the same Device.
- Action required at least to rename the **File Set Name** as File Set Name must be unique across the same Device.

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The **File Set Template** sub-tab of the ARRM configuration window allows you to configure file set templates to be used by ARRM when retrieving records. Several pre-defined templates are provided for some popular IED models. (We'll talk more about it later in the module) Users have the flexibility to create and save new custom templates for other devices by entering specific file types, locations, and naming parameters.

To create a new standard File Set Template, Click the "+" button to create a new file set template and then choose the **Standard** option. Select this option to support for File Retrieval using TFTP, MMS, FTP, or SFTP protocol. In the New Template window, you can configure:

- Template ID:

A unique identifier for the file set template.

- Storage Directory:

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This is the location on the MCP that records are stored in. This directory is located within */mnt/datalog/armm/*. The “&” character is used as a placeholder in the Storage Directory to specify a Local File Extension for retrieved files.

- File Extension:

Files with this file extension are retrieved by the ARRM from the IED. The downloaded files are saved with the same file extension if the local file extension is not configured in the Storage Directory setting. This field is not used if the File Type is set to COMTRADE.

- Delete Files Automatically:

If enabled, ARRM automatically deletes files in the Storage Directory created based on this template when the storage quota is exceeded.

- File Type:

For COMTRADE-based Templates, select COMTRADE file type otherwise select GENERAL.

- File Storage: (Select a value)

- Append:** If the file does not exist, ARRM creates it. If the file exists and it is not larger than the specified maximum size, ARRM appends the contents of the retrieved file to the existing one. ARRM appends an incrementing number to the filename to distinguish between different files (for example, *dfr\_001.txt*). Available for GENERAL file type only.

**Max File Size:** Enter the file size, in bytes, that the download is limited to. The range is 1 to  $4^{32}-1$ , default is 65535.

- New file with IEEE naming:** A new file is created whenever information is downloaded. The file name is defined using the IEEE naming convention. Available for COMTRADE file type only.

**User Type:** Specify the type of data being retrieved. This information is then appended to the file name using the IEEE naming convention. For example, you can enter DFR, PQ, or ADCP. Range is 1 to 4 ASCII characters.

- New file with timestamp:** A new file is created whenever information is downloaded. Enter both a file name (to which the timestamp is appended) and a valid extension. Available for GENERAL file type only.
- Overwrite:** When the parameter Include in Connection Polling is set to True, it is recommended to use this option for retrieval of fixed files from IEDs to avoid high disk usage in the MCP due to connection polling of file sets. Available for the GENREAL file type only.

- File Retrieval: (Select a value)

- Static Name:** Select this option if the data to be retrieved is stored in a fixed location on the target device.

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**Retrieved File Absolute Path Name:** Enter the path to the data file on the remote device. Do not enter a file extension. Add a logical device placeholder into the filename to create dynamic filenames that change based on which Device is using the template. The logical device placeholder "%s" is replaced with the Logical Device Name from the Device that is using this template. For example, /SOE/event%s.

**Enable Record Number:** If enabled, you can enter a number to be appended to the filename of retrieved records. This can be used for D25 SOE logs which have a record number as part of the filename (for example, enter 1 for A027\_DISOE\_LOG1.CSV).

**Enable File Name to Save:** If enabled, the retrieved remote data file is saved locally using the specified file name.

- Fault Number:** Select this option if a new record is created on the device each time a fault occurs.

**Retrieved File Absolute Path Name:** Enter the path to the data file on the remote device. Do not enter a file extension. Add placeholders into the filename to create dynamic filenames that change based on which fault number is being retrieved and which Device is using the template. The logical device placeholder "%s" is replaced with the Logical Device Name from the Device that is using this template. The fault number placeholder "%[fw]u" is replaced with the fault number currently being retrieved. In place of [fw], specify either no number or a number between 1 and 20 to give the field width. For example, %3u is replaced with 003 if the retrieved fault number is 3. Specify at least 1 fault number placeholder but no more than 4. Specify 1 or no logical device placeholders.

**Max Number of Files:** The maximum number of files that can exist in the remote device before older files are deleted to make room for new ones. This setting prevents the MCP from attempting to retrieve files that no longer exist.

**Fault Number Rollover:** This is the highest fault number that the device uses before the internal fault number counter rolls over specified as "n" in 2n-1. Range is 8, 16 or 32. Default is 16.

- Directory Delta:** This option monitors a fixed location on the target device and downloads any new files as they are created.

**Directory Name:** Enter the path to the data file on the remote device. Do not enter a file extension.

**File Retrieval Expression Type:** This is a Unix shell-style wildcard that is used to specify the files within a directory that are considered for retrieval. Default is \*, which specifies all files in the directory. The specific pattern matching symbols are as follows:

- \* matches everything
- ? matches any single character
- [seq] matches any character in sequence
- [!seq] matches any character not in sequence

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ARRM provides an interface to the Sel Binary DCA and the GenASCII DCA applications to retrieve and archive the Event Log files from the SEL IEDs/numerical relays using automated ASCII commands. Two types of fault/event log files can be retrieved and archived: **EVE** (Event Report Files) and **CEV** (Compressed Event Report Files).

Click “+” under **File Set Template** sub-tab and choose the **SelASCII** option to create a new Sel ASCII File Set template to support for File Retrieval using **Sel Binary** or the **Generic ASCII** protocol.

The ARRM application automatically tabulates the number of files present in the SEL IEDs and periodically directs the DCA applications connected to the SEL IEDs to retrieve the event files one after another, sequentially.

In the New Template window, you can configure:

- **Template ID:**

A unique identifier for the file set template.

- **Storage Directory:**

This is the location on the MCP that records are stored in. This directory is located within */mnt/datalog/armm/*. The valid value for Storage Directory has a minimum length of 2 characters (that is, cannot be blank) and must not start or end with special characters.

- **Delete Files Automatically:**

If enabled, ARRM automatically deletes files in the Storage Directory created based on this template when the storage quota is exceeded.

- **File Type:**

Select the Report file type to be retrieved. ARRM supports file retrieval of **EVE**, **CEV** and **BOTH** file types from the SEL IEDs.

The “**Options**” configuration allows you to choose the frequently used command options used with EVE and CEV commands such as C, L and Lyyy. The default value in the “Options” field is None.

The template also allows you to choose “other” supported command options with EVE and CEV where you can enter the command extensions supported in the **Additional Option** field.

Refer to the Instruction Manual of SEL Devices to determine which file type(s) is available.

Ensure that the options configured in the File Type setting are supported by the SEL relay before configuring the Template. If a configured option is not supported, this is indicated by the Transaction Failure flags on the ARRM viewer.

- **File Storage: (select a value)**

- FileName with timestamp:** A new file is created whenever information is downloaded. This option saves the event files in the format: *EVE\_YYMMDDHHMMSS\_Msec.EVE* or

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*CEV\_YYMMDDHHMMSS\_Msec.CEV*. For example, *EVE\_090416082335\_123.EVE* will be created for a file that was generated on April(MM) 16(DD), 2009(YYYY), at 08(HH):23(MM):35(SS).123(mSec)

- ❑ **FileName with Event Number:** A new file is created whenever information is downloaded. This option saves the event files in the format: *EVE\_EventNumber.EVE* or *CEV\_EventNumber.CEV*. For example, *EVE\_100009.EVE* will be created when the end device sends a command response when this specific file is queried.

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Several pre-defined templates are provided for some popular IED models that include Multilin UR, 8 Series, F650, UR Plus, D25, D2X, MICOM, ABB, SEL and Siemens 7SJ.

For example, pre-defined File Set Templates for the **Multilin UR** device are listed here. They can be used to retrieve Oscillography Files, Event Files, Security Event Files, Datalog Files, COMTRADE Datalogger Files, Production Information Files, Fault Report Files, User Fault Report Files, and ICD/CID/IID Files from the UR device using the TFTP/MMS/SFTP protocol.

Normally, pre-defined File Set Templates are named in the convention of [Device]\_[File Type]\_[Protocol]. For example, sample File Set Template name: **MULTILIN\_UR\_OSC\_MMS** is to retrieve Oscillography files using MMS (IEC61850) from GE Multilin UR device.

A good practice to create a new template is to duplicate an existing pre-defined template and then rename the Template ID and modify the needed parameters based on that. Click the button shown on the screen to duplicate an existing template.

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Oscillography files are saved in the **COMTRADE** format. The COMTRADE standard defines a file format that contains transient waveform and event data collected from power systems. Each oscillography record consists of a file set. The files have the same file name but different extensions: .hdr, .cfg, and .dat for header (optional), configuration, and data files respectively. ARRM downloads oscillography files directly from IEDs and automatically generates a new file name for each COMTRADE file set based on the IEEE File Naming Convention for Time Sequence Data.

#### IEEE File Naming Convention for Time Sequence Data

<Start Date>, <Start Time>, <Time Code>, <Station>, <Device>, <Company>, <Type>. <Extension>

Where:

- <Start Date>

The date when the file was updated and has the format: YYMMDD (6 characters) where YY = Year, MM = Month, DD = Day

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- <Start Time>

The time when the file was updated and has the format: HHMMSSMMMMMM (12 characters) where HH is hours, MM is minutes, SS is seconds, MMM is milliseconds, and MMM is microseconds.

- <Time Code>

The time zone offset for the start date and time field. It is the difference between the time used for start time and Universal Time (or Greenwich Mean Time). The time code ends with an "s" if the device always reports standard time, or an "a" if the device adjusts for daylight savings time. If the device is using Universal Time, neither character is appended.

- <Station>

It is the configured station name.

- <Device>

It is the configured device name.

- <Company>

It is the configured company name.

- <Type>

It is either DFR, PQ, or ADCP.

- <Extension>

It is either DAT, CFG, or HDR.

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During runtime, the **ARRM Viewer (Status)** on the Power Bar of the Runtime HMI can be used to view the status of the application and to initiate manual retrieval. Note that ARRM Viewer is **NOT** for viewing files content.

The **ARRM Viewer** window is comprised of several areas:

- Left pane – Tree View:

It provides a hierarchical overview of the stations and devices in your network.

- Upper right pane – Device View:

It shows a tabular listing of devices in your network, including device status and file retrieval status. Selecting a station or device in the left pane filters the grid to only show the selected entries.

- Lower right pane – Message log:

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It contains a listing of all communication events (transfer attempts, file downloads, error reports) that have occurred since polling was started. Entries are ordered as they are received, and not necessarily chronologically by their timestamp.

- Bottom right icon – Status Icon

This icon indicates the current connection status of the application.

### To perform actions on devices:

Select the station containing the desired device. A listing of devices and file sets within the station is shown. Right-click the row containing the desired file set.

On the popup menu, select:

- **Trigger File Set Retrieval:**

This is to manually initiate a file set download. If you select this option, the **Status** field changes to show the progress of the transfer. Status definitions are shown on definition for the Retrieval State pseudo point.

- **Clear Recorder Memory:**

This is to trigger ARRM to operate the configured digital output point that is mapped to the *MemRs* command. In addition, if the control is successful and the file retrieval method is set to *Fault Number*, ARRM clears the last reported fault number.

- **Download Files:**

This is to save retrieved records from the MCP to your local computer.

### Slide 16

The ARRM application makes a list of pseudo points available which are presented to the operator on the Application tab on the Point Details page. The point description for each Per-File Set pseudo point can be defined when you configure ARRM Device -> File Set. These pseudo points are:

Per-Application Pseudo Points:

- Current Disk Usage (as a percentage of Total)

This Analog Input pseudo point reports the current disk usage of ARRM on the MCP as a percentage of the total disk space available in the */mnt/datalog/* partition.

Per-File Set Pseudo Points:

- Automatic Retrieval Disabled

This Digital Input pseudo point is set to 1 when automatic retrieval is disabled and is set to 0 when automatic retrieval is enabled. Automatic retrieval can be enabled or disabled using the *Disable Automatic Retrieval* digital output pseudo point.

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- Clear Recorder Memory

This Digital Output pseudo point triggers ARRM to operate the configured digital output point that is mapped to the *MemRs* command. In addition, if the control is successful and the file retrieval method is set to *Fault Number*, ARRM clears the last reported fault number.

- Disable Automatic Retrieval

This Digital Output pseudo point can be used to disable or enable automatic retrieval of the associated file set. Latch On, Pulse On, or Close to disable automatic retrieval and Latch Off, Pulse Off, or Trip to enable automatic retrieval. The status of automatic retrieval is reported with the *Automatic Retrieval Disabled* digital input pseudo point.

- Retrieval State

This Analog Input pseudo point reports the status of the associated file set with the following status numbers:

- 0 - Not Available. This is the initial state of a file set after creation.
- 1 - Available. This is the state reported when ARRM detects the file set is available for retrieval, but automated file set retrieval is disabled.
- 2 - Queued. File retrieval has been postponed. This may occur if ARRM is at the maximum number of configured retrievals.
- 3 - In Progress. ARRM is in the process of retrieving the associated file set.
- 4 - Complete. The last file transfer has been completed successfully.
- 5 - Failed. The last file retrieval operation has failed and a retry attempt has been scheduled.

- Retrieve File Set

Any control on this Digital Output pseudo point triggers a manual retrieval of the associated file set.

- Enable Connection Polling

This Digital Output pseudo point can be used to disable or enable inclusion of the file set into connection polling.

- The Latch On, Pulse On, or Close states enable inclusion of file set into connection polling.
- The Latch Off, Pulse Off, or Trip states disable inclusion of file set into connection polling.

The status of file set inclusion into connection polling is reported with the *Connection Polling Enabled* digital input pseudo point.

- Connection Polling Enabled

This Digital Input pseudo point is set to:

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- 1 when file set inclusion into connection polling is enabled
- 0 when file set inclusion into connection polling is disabled.

File set inclusion into connection polling can be enabled or disabled using the *Enable Connection Polling* digital output pseudo point.

### Slide 17

The ARRM Connection Status file contains connection status lines for each File-Set and is constantly updated whenever ARRM performed and finalized an action on a file, either because of a trigger or by periodic polls. This file can be used by the enterprise system to monitor the connection status per-File Set.

The name of the ARRM Connection Status file is *ARRM\_Conn\_Status.txt* and is stored in the */mnt/datalog/Logs* folder in the MCP. In case of Warm Standby Redundancy, this file is mirrored to the standby unit to a temporary location, and whenever the Standby unit becomes Active it is copied to */mnt/datalog/Logs* folder.

The status line format is based on IEEE C37.232 with additional data fields as required for this functionality (i.e., Delimiters, Storage Directory, File Set Name, and File Transfer Result) as followed:

**<Start Date>, <Start Time>, <Time Code>, <Station>, <Device>, <Company>, <Type>, <Storage Directory> | <File Set Name> : <File Transfer Result>**

Where:

- <Start Date>

The Start Date in the first row always shows the value when the “*ARRM\_Conn\_Status*” file was last updated, for whatever reason. The date has the format: YYMMDD (6 characters) according to IEEE C37.232 standard. In subsequent rows, it shows the date when the row-specific File Set was updated.

- <Start Time

The Start Time in the first row always shows the value when the “*ARRM\_Conn\_Status*” file was last updated, for whatever reason. The time has the format HHMMSSMMMMMM (12 characters) according to IEEE C37.232 standard, where “H” = hour, “M” = minute, “S” = seconds and the remaining 6 “M”s refer to milliseconds and microseconds. In subsequent rows, it shows the time when the row-specific File Set was updated.

- <Time Code>

The Time Code contains from 1 to 7 formatted characters.

The Time code indicates the time zone offset for the start date and time fields. The offset is specified as the offset East of GMT time (e.g., +5h30 for IST). The first character is “+”, except if the offset is GMT. If the offset is GMT, then there is no “+” sign character, and the offset appears simply as 0. The character

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“t” is appended to each offset. (Enterprise systems should ignore the character “t” while parsing the ARRM Connection Status File)

All time code (zone) values in this file are driven by the MCP Local Time as configured in mcpcfg (independent from any time zone settings in ARRM). The rationale is the indicated times in this file reflect the moment when the MCP ARRM performed a check; these are not times received from IEDs or other files.

- <Station>

The first row is always set to “ARRM” to reflect a generic / virtual “station name” associated with the MCP Gateway. The station name has no meaning in the first row since this first row represents the collector status, and a single collector (i.e. MCP) can have multiple stations. For remaining rows, this is the configured station name.

- <Device>

For the first row, this is the name of the MCP Gateway executing the ARRM. For all other rows, this is the device name as configured in ARRM.

- <Company>

This is the configured company name.

- <Type>

The type is always “stat” (status) for the first row. The remaining rows in this file have the file type:

- As configured in ARRM under “User Type” where the file was configured as COMTRADE.
- As “genr” (generic) for the files not configured as COMTRADE.

- <Storage Directory>

This setting is not applicable to the first row. For subsequent rows, the identifier is the local “Storage Directory” configured in the ARRM File Set Template.

- <File Set Name>

For the first row, the identifier is always: Application (i.e. the ARRM application). For subsequent rows, the identifier is the “File Set Name” configured in ARRM.

- <File Transfer Result>

This value for the first row is associated with the ARRM application status and is always 1, even if all IEDs have their file transfers disabled or offline.

The remaining rows indicate the last known transfer state of those specific File Sets as follows:

- 0 = FAILED**; this is the file transfer result due to manual file trigger/automatic file trigger/connection poll file trigger.

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- ❑ **1 = SUCCESSFUL**; this is the file transfer result due to manual file trigger/automatic file trigger/periodic poll file trigger.
- ❑ **-1 = DISABLED**; this is the case when automatic file trigger is disabled.

### Slide 18

The **System -> Storage** under **Systemwide** tab on the DSAS Editor's Configuration allows you to allocate storage size for various subsystem including ARRM. You can change the storage settings, if desired and **Save and Commit Changes** to apply the changes to the MCP.

The retrieved files are stored on the MCP file system in the folder `/mnt/datalog/armm/` with the stored path defined in Storage Directory on the File Set template. You can use the **ARRM** menu of **MCP Settings GUI** or **MCP Local Configuration Utilities (mcpcfg)** to delete the contents of these folder structures, as well as temp and cache files, while leaving the directory structure intact for future downloads.

The **Delete Records** function is used to perform the following actions:

- Delete all Records
- Delete Storage Directory Specific Records
- Delete Station Specific Records
- Delete Device Specific Records

While selecting the above functions, a WARNING message appears stating that the *"Directory Delta records will not be retrieved again once deleted. Delete Cache Files to retrieve the old records."* Once confirmed, ARRM application will be restarted. Details of files deleted are updated in log file.

- Delete Temp
- Delete Cache

ARRM application will be restarted after deleting Temp or Cache files.