PIFF 2

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1. Welcome

This documentation describes the second-generation PTAGIS Interrogation File Formatter (PIFF) utility. PIFF is a PC-based utility that imports raw interrogation data files and outputs observation records in a standard M4 interrogation file, which PIFF can upload to PTAGIS using the upload feature.

PIFF is primarily used by Columbia Basin researchers to transform data downloaded from transceiver buffers and/or data loggers that are installed at remote interrogation sites. Typically, multiple files representing a continuous period of operation at a single site are imported into PIFF, defaults for any missing Transceiver ID or Antenna ID values are applied, and time stamps are adjusted as needed (when the source system's clock is off by a few hours, for example). The imported data is then transformed into an M4 interrogation file, and uploaded to PTAGIS.
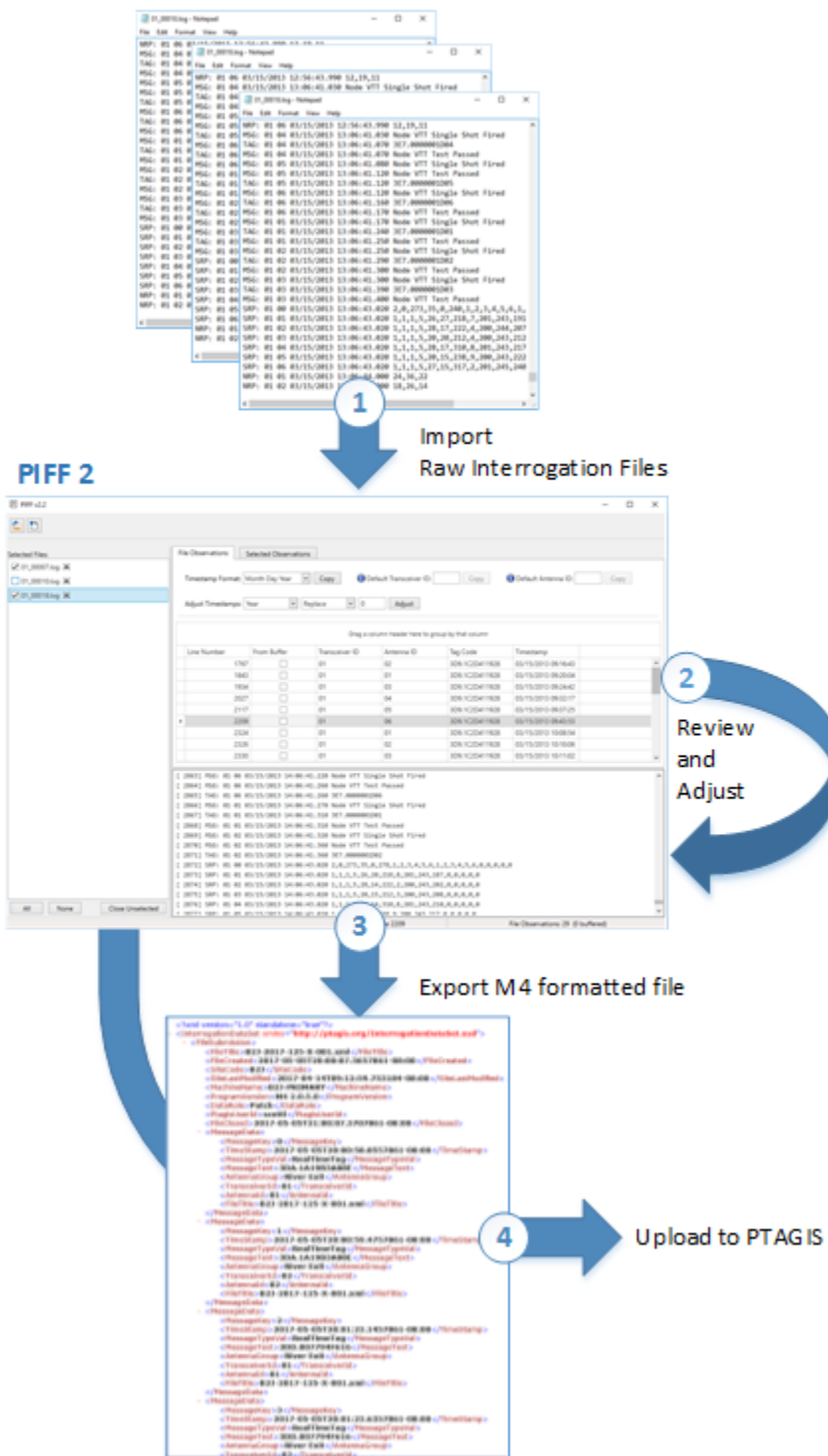
New features include:

- A streamlined user interface
  - The contents of raw data files are displayed along with the parsed Observation records
  - Selecting an Observation record will highlight where the data was found in the file
  - Observation records can be filtered and sorted per file, and files can be opened, closed and selected for export
  - No longer need to select the device type before opening files
- Easily adjust timestamps in a file and modify file parsing options
- Submit M4 interrogation files to PTAGIS
- Automatic software updates

2. Installation

The PIFF utility can be installed by downloading the installer from ptagis.org. If an Internet connection is available while installing PIFF, the installer will automatically download and install the prerequisite Microsoft .NET Framework library. An offline .NET framework installer is also available from ptagis.org if an Internet connection is not available. The installer will add shortcuts to the desktop and Start menu for launching the program.

PIFF automatically checks for updates each time it is launched and will prompt if there is a newer version available for download. The current version of the software is displayed on the upper left corner of the program.

Supported Operating Systems:
- Windows 7 SP1 (x86 and x64)
- Windows 8 (x86 and x64)
- Windows 8.1 (x86 and x64)
- Windows 10
- Windows Server 2008 R2 SP1 (x64)
- Windows Server 2012 (x64)
- Windows Server 2012 R2 (x64)

Minimum Hardware Requirements:
- 1 GHz or faster processor
- 512 MB of RAM
- 4.5 GB of available hard disk space

3. Observation Records

When a raw interrogation data file is imported, PIFF scans each line of the file looking for tag codes, timestamps, transceiver/antenna IDs, and if the record originated from a transceiver buffer download. These data from a single line are combined into an observation record, which is described further in this topic. The previous version of PIFF required the type of device (transceiver, data logger, etc.) the data file originated from before importing. This is now unnecessary, as the software uses conventions from a variety of well-known transceiver and data logger output formats to identify data in raw interrogation files.

Observation Record Fields

Once PIFF has scanned an imported file, it presents observations records with the following fields:

- **File:** indicates the imported file this observation record was found in. This field is only included with observations displayed in Selected Observations.

- **Line Number:** corresponds to the actual line number in the imported file where this record was obtained from.

- **From Buffer:** indicates the observation record originated from a transceiver buffer and was not output from a transceiver as a real-time tag detection.

- **Transceiver ID:** unique identifier of a transceiver attached to one or more antennas.

- **Antenna ID:** unique identifier of an antenna attached to a transceiver device.

- **Tag Code:** tag code associated with the detection event.

- **Timestamp:** Date and time the detection event occurred for an observation. All observations records selected for exporting should have a common timezone.

Observation Record Conventions

PIFF uses standard transceiver and data logger output formatting conventions to identify observation data and to determine if a detection was stored in a transceiver buffer. Other conventions include:

- Observations within a raw interrogation file must be on separate lines

- Observations require a valid PIT tag code in the 3.10 hexadecimal format
    - e.g. 3D9.1BF123456A

- Observations require a corresponding timestamp in one of 3 formats:
    - Month Day Year (e.g. 3/10/2013 16:02:43)
    - Day Month Year (e.g. 10/3/2013 16:02:43)
    - ISO8601 (e.g. 2013-03-10T16:02:43)

Observations from Transceiver Buffer Download

PIFF will check the From Buffer field if it determines the observation record originated from a transceiver buffer and was not output from a transceiver as a real-time tag detection. This field provides an important distinction in case real-time tag detections are interspersed with downloaded detections from a transceiver's buffer within the same file -- a potential duplication of observation records. The two types of records can be separated using a filter on the From Buffer column. See File Observations topic for more information on filtering observations from a file.

Timezone Considerations

Any observations recorded in different timezones at a given site should be exported into separate files. During the export process, PIFF will prompt for the local timezone at the site from when the detections

were observed. This timezone information will be appended as an offset to each observation timestamp within the M4 file. Upon submission, PTAGIS will convert this timezone offset to Pacific Standard Time (PST) as the observations are loaded into the database.

4. Feature Overview

1 Import Files

Press this button to import one or more text files containing raw interrogation data into PIFF. The imported files are displayed in the Imported Files Panel.

2 Upload to PTAGIS

Press this button to upload one or more M4 interrogation files (already exported from PIFF) to PTAGIS.

3 Imported Files Panel

Select a file to review or adjust observations in the **File Observations** tab page. Checking the file adds observations from that file to the **Selected Observations** tab page, which contains the observations that can be exported out of PIFF.

4 File Observations

This tab page displays the contents of any observations found in the currently selected file. Adjustment features are provided to a adjust the importing and modification of timestamps, as well as applying default Transceiver/Antenna ID values.

5 Selected Observations

This tab page displays the combined observations from all files checked in the **Imported Files Panel**. Observations can be exported to single M4 interrogation file from here.

5. Importing Files

Pressing the **Import** button, located in the upper left portion of the PIFF tool bar, will prompt to select one or more text files containing raw interrogation data. Once the files are selected, press the **Open** button in the prompt to continue importing into PIFF.
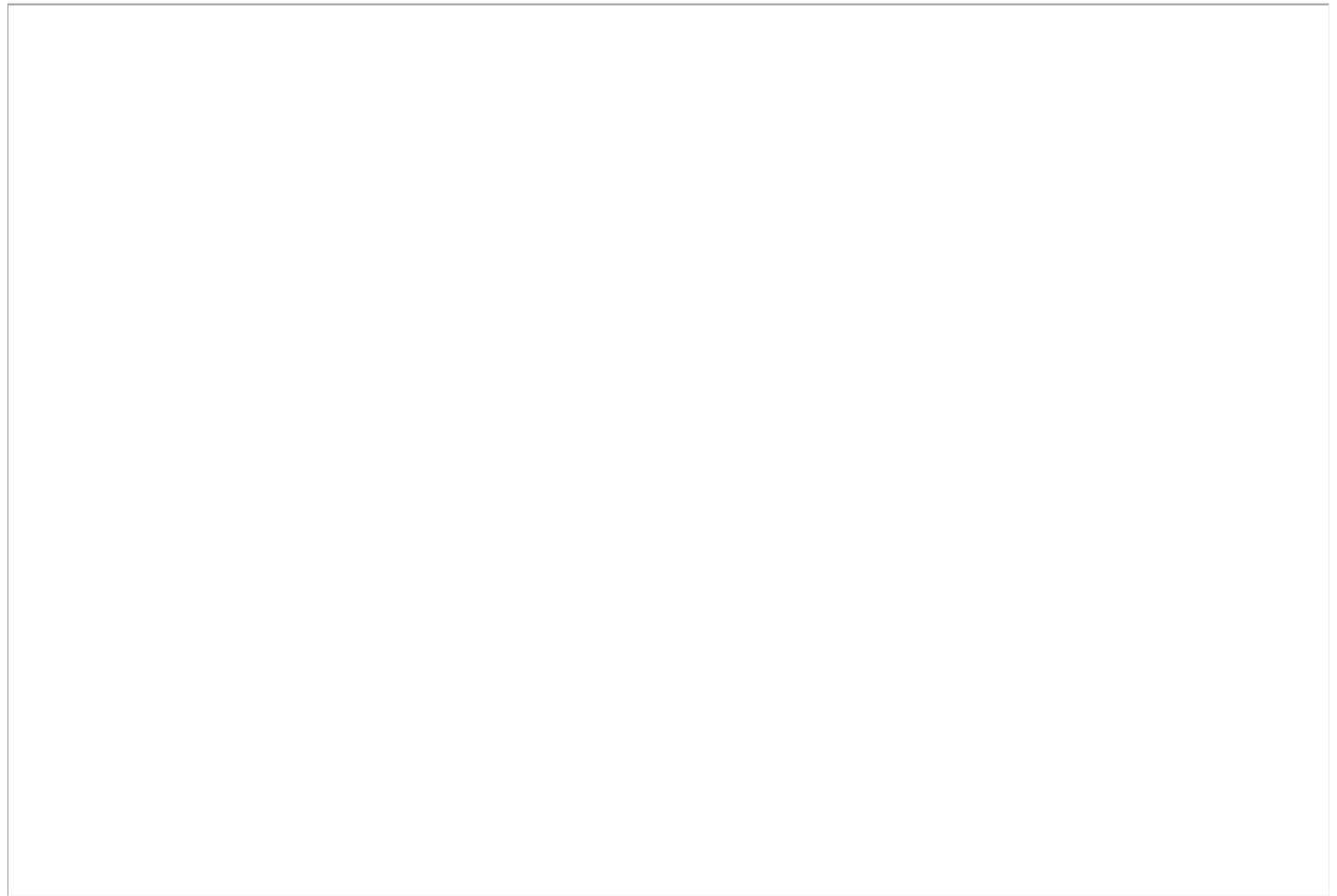
PIFF will scan each line of each imported file looking for observations records. Once imported, the files will be displayed in the Imported Files Panel. Additional files can be imported into the same PIFF session by clicking the **Import** button again. However, a file cannot be imported more than once into the same PIFF session.

Troubleshooting

A file that is in use by another system cannot be imported into PIFF and a resulting error message will indicate this condition. A file already imported into PIFF cannot be imported again without closing it first. Binary files such as photos can be imported but obviously no tag codes will be discovered in them.

Observation records require a valid tag code and associated timestamp of detection. Two digit Transceiver and Antenna IDs may also be discovered by PIFF if they are present in the file. If no observations records are discovered in a file, it may be the tag code format is invalid. PIFF and PTAGIS only support tag codes in the 3.10 hexadecimal format e.g. 3D9.1BF1234567. A parsing error message may be displayed in the Imported Files Panel if a tag code could be discovered but the associated timestamp could not be found. Adjusting the Timestamp Format field described in File Observations topic may correct this issue.

6. Imported Files Panel

This panel lists all of the files currently imported into PIFF containing raw interrogation data .
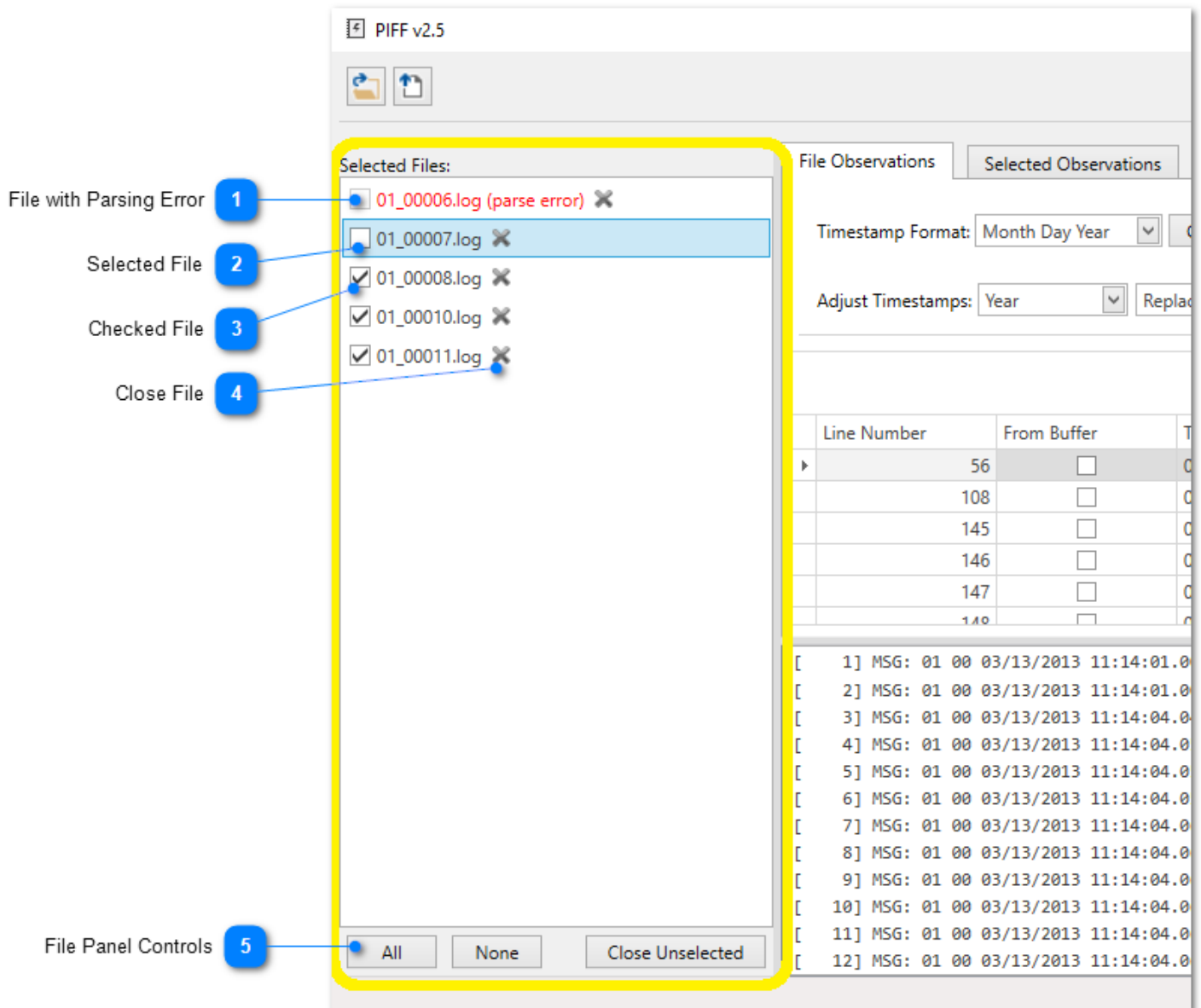
File with Parsing Error

A file displayed in red with a parse error message appended indicates PIFF could not discover observation records in the file. Typically, this can be corrected by selecting a different Timestamp Format described the File Observations section.

☐ 01_00006.log (parse error)

Selected File

The selected file is highlighted in the panel and will display its contents in the corresponding File Observations page. Selecting a different file in the panel will display that file's content instead.

☐ 01_00007.log

Checked File

Observations from checked files will be included in the **Selected Observations** tab page. Unchecking a file will remove all observations found in that file from the **Selected Observations** tab page.

☑ 01_00008.log

4   **Close File**

Clicking this button will close the corresponding file. If a checked file is closed, all observations found in that file will be removed from the **Selected Observations** tab page.

✖

5   **File Panel Controls**

These buttons apply actions described below to all files in the panel.

All	None	Close Unselected

- Pressing **All** will check the box for all files in the panel that do not have a parsing error.
- Pressing **None** will clear the check box for all files listed in the panel.
- Pressing **Close Unselected** will close all files that are not checked.

7. File Observations

The **File Observations** tab page displays the contents of the currently selected file in the Imported Files Panel. In addition to content, there are features discussed further in this topic related to timestamp formats, date adjustment, and applying default values.
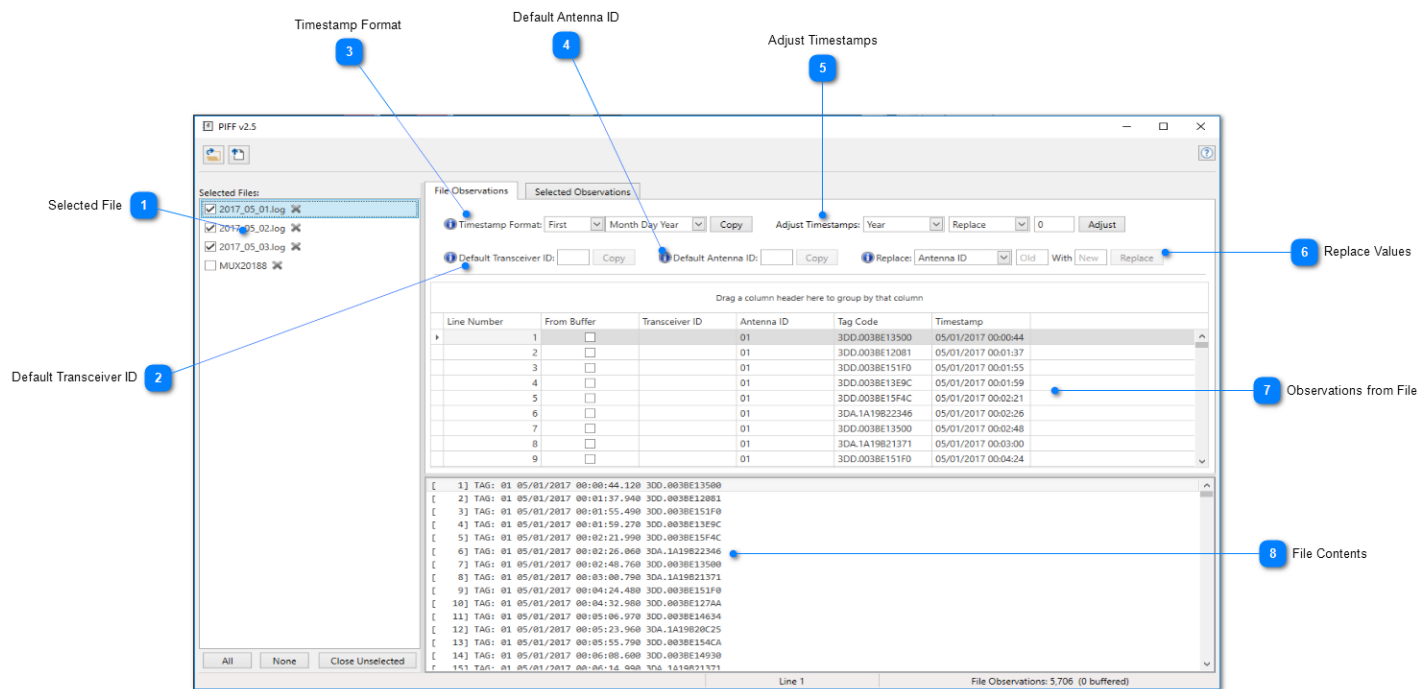
1 Selected File

The currently selected file in the Imported Files Panel. The displayed contents and other features (with exception of the **Copy** features noted below) are related only to the selected file.

2 Default Transceiver ID

This feature will apply a default transceiver identifier to any observation records that are missing this information in the currently selected file. This value will be applied to all observation records once entered.

Press the **Copy** button to apply the same Default Transceiver ID value to observations for all files selected in the Imported Files Panel.

Timestamp Format

This format provides a hint to PIFF on how to parse timestamp information from the contents of the selected file. If a file contains multiple timestamps on each line that can be parsed using the selected format, use the drop-down to choose the First or Second timestamp to use as the observation date.

If the selected file displays a parse error in red text as shown below, most likely you need to select a different format. Selecting a different format will automatically re-scan the selected file for observation records.

Pressing the **Copy** button will apply the chosen timestamp format to all other files listed in the Imported Files Panel.

Default Antenna ID

This feature will apply a default antenna identifier to any observation records that are missing this information in the currently selected file. This value will be applied to all observation records once entered.

Press the **Copy** button to apply the same Default Antenna ID value to observations for all files selected in the Imported Files Panel.

Adjust Timestamps

This feature modifies timestamp values of the observation records that are currently displayed for the selected file. Use this feature to correct timestamps originating from a device that has an incorrect date or time. Applying a timestamp adjustment will only affect the observation records displayed in the grid and no others that may be currently filtered. For example, update only the timestamps for a particular transceiver that was off by one hour by filtering on the transceiver ID column and adding or subtracting an hour from it.

Note: please review the Timezone Consideration section described in the observation records topic before adjusting dates.

The following timestamp components can be adjusted:
- Year
- Month
- Day
- Hour
- Minute
- Second

The following adjustment operations can be applied to the selected timestamp component
- Replace
- Add
- Subtract

Replace Values

This feature will replace Antenna ID and/or Transceiver ID values that were found in the file. Use this feature to correct values originating from a device that has an incorrect Antenna ID or Transceiver ID. This feature should be used as a final step before exporting Selected Observations to an M4 file, as replaced values will be overwritten if the file is re-parsed.

Observations from File

PIFF displays any observation records detected in the selected file within a grid. Columns in this grid can be grouped, sorted and filtered; and any adjustments can be applied to the observation timestamps before exporting. The observation records displayed below were grouped by the Antenna ID column by dragging-and-dropping the Antenna ID column header to the area above the column headers.

Antenna ID ▲				
Line Number	From Buffer	Transceiver ID	Tag Code	Timestamp
▸ Antenna ID: 01				
▸ Antenna ID: 02				
▴ Antenna ID: 04				
194	☐	01	3E7.0000001D04	03/12/2013 16:02:43
1402	☐	01	3E7.0000001D04	03/12/2013 17:02:43
2785	☐	01	3E7.0000001D04	03/12/2013 18:02:44
4174	☐	01	3E7.0000001D04	03/12/2013 19:02:43
5736	☐	01	3E7.0000001D04	03/12/2013 20:02:43
7333	☐	01	3E7.0000001D04	03/12/2013 21:02:43
8929	☐	01	3E7.0000001D04	03/12/2013 22:02:43

To filter a column:
- hover the mouse over the column header to be filtered
- press the filter icon that will display in the header, for example Transceiver ID ⏛
- select value or values to filter by from the pop-up menu.

NOTE: any filtered observations records will be excluded from exporting as described in the Selected Observation topic.

Clicking on a column header will sort that column in ascending or descending order. Right-clicking a column provides a context menu to group, sort, and resize columns; a search feature can also be accessed from this menu. Columns can be reordered using drag-and-drop.

Selecting an observation record in the grid will automatically highlight where the data was found in the File Contents section.

Columns for observation records are described in the Observation Record topic. The following fields can be edited individually in the cell of the grid:
- Transceiver ID
- Antenna ID
- Timestamp

File Contents

This section displays the contents of the selected file. A line number is added to the beginning of each line and is associated with the Line Number column in the resulting observation record. This is useful for reviewing observations with the original source file before exporting and submitting to PTAGIS. Selecting an observation record in the grid above will automatically scroll and select the line of text it originated from in the file contents.

8. Selected Observations for Exporting

The **Selected Observations** tab page displays observation records from the checked files in the Imported Files Panel; these are the observations that will be exported to an M4 file. For the example displayed below, observations from imported file 01_00006.log are not displayed and will not be exported because that file is not checked. Any observation records that have been filtered out, as described in the File Observations topic, will also not be included in the export.

Observation Records

Displays observation records from the files that are checked in the Imported Files Panel and are not filtered out. These records can be sorted and grouped but they cannot be edited. Use the features in the File Observations tab page to edit or filter records. Selecting a record in the grid will scroll to and select the line from the File Contents that it was found in.

Columns for observation records are described in the Observation Record topic.

Export M4 File

Pressing this button will prompt for information before exporting the observation records to an M4 file:

The following fields must be completed before exporting:

- **Site Code:** enter the registered PTAGIS interrogation site code associated with the observation records. Do not combine observation records from more than one interrogation site.

- **File Created:** date and time when data collection began for this file. The date entered cannot be after the earliest observation date in the file and should represent the start of data collection, not just the first record in the file.

- **File Closed:** date and time when data collection concluded for this file. The date entered cannot be before the last observation date in the file and should represent the end of data collection, not just the last record in the file.

- **File ID**: an identifier associated with the M4 file name ensuring it is unique within a give day.

- **File Type:** indicates the intention of this file and how PTAGIS should process it:
    - **Primary:** this data will be processed as the primary dataset for a given interrogation site
    - **Secondary:** this data is backup data originating from a redundant system and will be stored but not processed by PTAGIS
    - **Patch:** this file provides additional observation data to be applied to an operational period previously submitted to PTAGIS

- **Source Timezone:** indicates the timezone to be associated with observation timestamps as they were captured in the field. This information will be used by PTAGIS to convert the timestamps to Pacific Standard Time (PST). Do not combine observations into the same file that were collected in different timezones.

- **PTAGIS User ID:** enter a PTAGIS user account ID for the person responsible for submitting this data. Use an email address instead if a person does not have a PTAGIS account.

Pressing the **Export M4 File** button will prompt for a folder and generate the M4 file as specified.
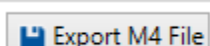
3 **File Contents**

The file contents associated with each observation record. A line number is added to each line of text from a file and corresponds to the same line number in the observation record. Ancillary data such as noise/status reports from transceivers are also displayed.

**4** **Record Count**

Indicates the total number of observation records found in all of the checked files that are not filtered out.
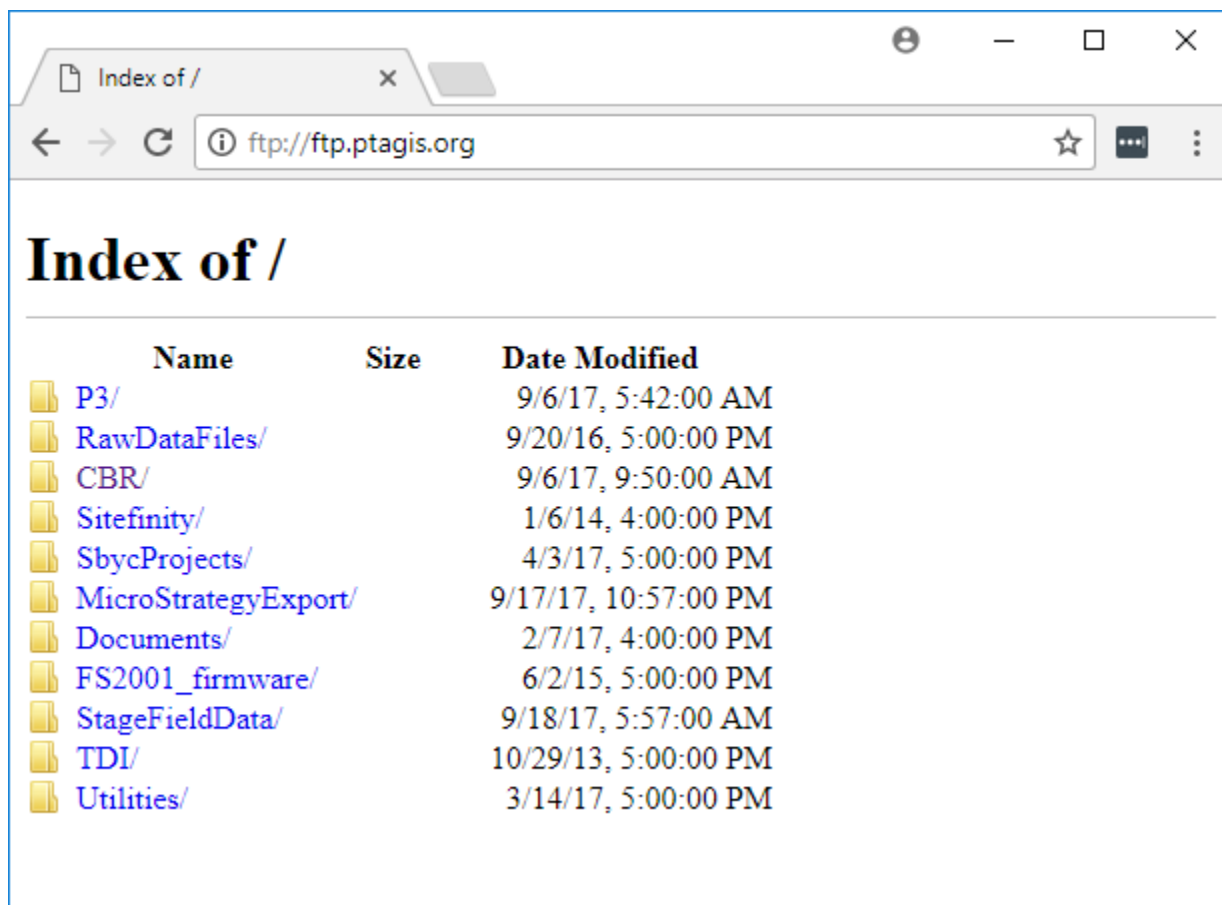
9. Upload to PTAGIS

Upload [M4 interrogation files](#) exported from PIFF to PTAGIS by pressing the ⬆ button in the tool bar. After pressing this button, select one or more files to upload, then press **Open** on the dialog to continue the upload process. Note that only M4 interrogation (XML) files are supported by this feature.
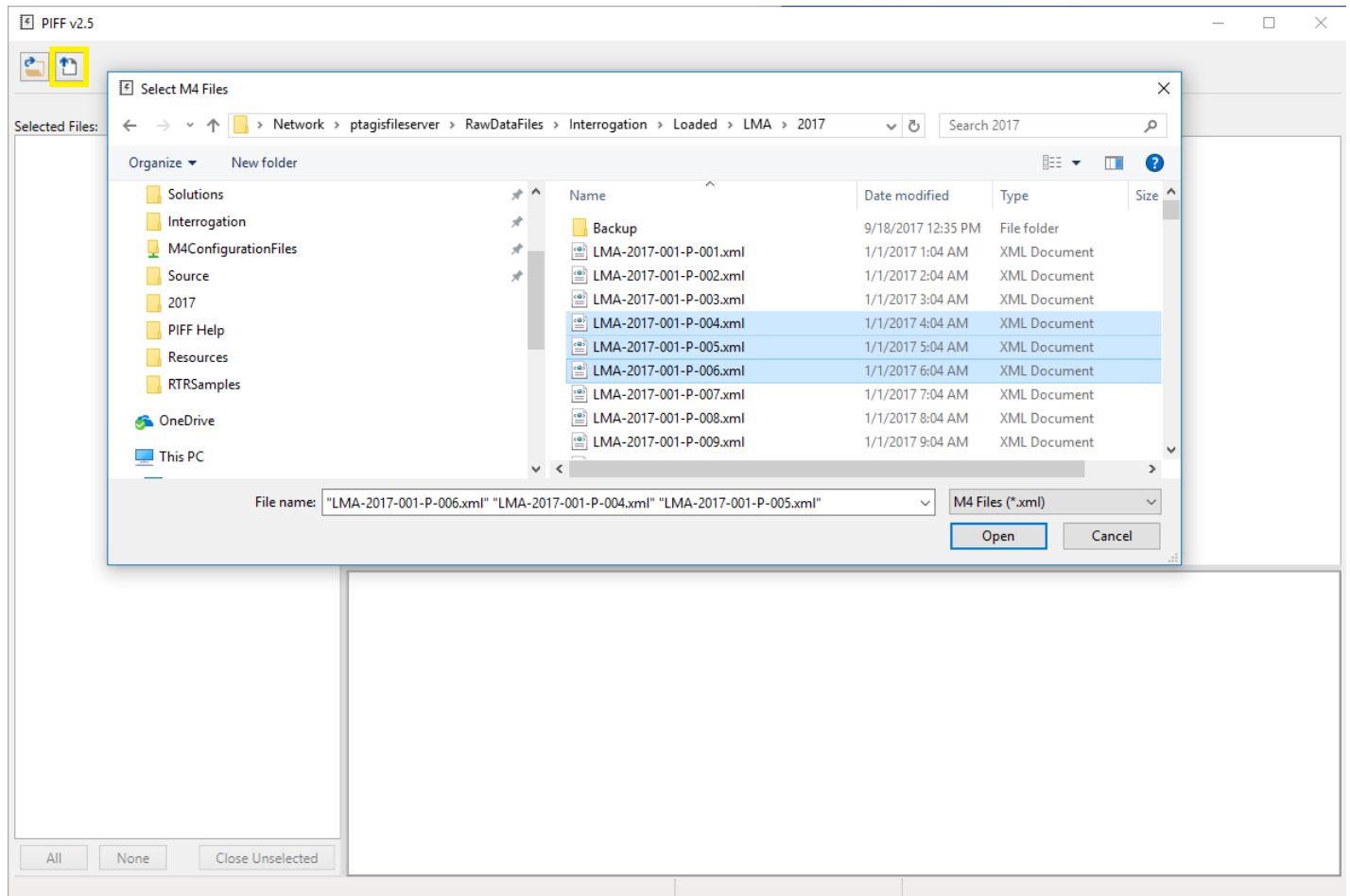
The upload process will package the selected files into one or more compressed archive files (ZIP) based upon the PTAGIS site code associated with each file name. From there it uses the standard File Transfer Protocol (FTP) to upload the compressed archive file(s) to the PTAGIS server for further processing. Once the upload is complete, the compressed ZIP files created during the upload process will remain in the local folder from where the data files were selected.

Troubleshooting

Security restrictions on your local network may cause errors when uploading. Please contact your system administrator to ensure the network allows FTP operations to **ftp.ptagis.org** using **passive mode**. Another way to test if FTP connections are allowed from your network is to open a web browser and type **ftp.ptagis.org** into the address bar. If successful, you should see something like this:

Please contact PTAGIS Support if you continue to have trouble uploading data files to PTAGIS.

10. Appendix

10.1. M4 File Format

An M4 file contains observation records and other field data captured at a single interrogation site to be uploaded and processed by PTAGIS. The M4 file format is based upon XML and has a well-defined schema available upon request. This topic provides additional detail about the file structure and related file naming conventions.

M4 File Naming Convention

M4 has a standard file naming convention to ensure uniqueness and easily identify the interrogation site and starting period of the data collection. The file name components are separated by a dash (-) and a standard XML file extension is used.

The following table explains the components of the M4 file name format **SITE-YYYY-DOY-R-UID.xml** with an example of B2J-2012-305-P-016.xml:

Component	Example	Description
SITE	B2J	three-character interrogation site code registered with PTAGIS in upper case
YYYY	2012	four-digit year representing the starting period of data collection or the first observation in the file
DOY	305	three-digit day-of-year representing the starting period of data collection or the first observation in the file. PTAGIS systems pads this value with zeros for display purposes; the first day of year would be '001'.
R	P	single character representing the role of the collected data within the file and provides clear processing instructions for PTAGIS: • **P**: file is a primary dataset and site operational period can be inferred from contents within. • **S**: file is a backup dataset from a redundant system. PTAGIS will stored file but not load the contents into the database. • **X**: file provides additional observation data to be applied a primary dataset already processed by PTAGIS. Typically used to patch data from a system or component failure. • **T**: contents are for testing submission system only. File will not be stored or processed by PTAGIS.
UID	016	one-to-three-character sequence identifier to ensure file is unique. PTAGIS systems pad numerical sequence values with zeros for display purposes; the 16th file of the day at a given site would use '016'.

For system implementers, the regular expression used for parsing M4 file names is (?<sitecode>\w{3})-(?<yyyy>\d{4})-(?<doy>\d+)-(?<role>\w)-(?<seq>\w{1,3})\.(?<ext>\w+).

M4 Package Naming Convention

When submitting data files to PTAGIS, applications such as M4 and PIFF will package the file or files into a zip archive before transferring over the network. This package, or zip file, has a naming convention to ensure it is unique and will not conflict with previously submitted packages. Files contained within the package must be from the same interrogation site.

The following table explains the components of the M4 package file name format **SITE-YYYY-DOY-R-TS.zip** with an example of B2J-2012-305-P-0851242514.zip:

Component	Example	Description

SITE	B2J	three-character interrogation site code registered with PTAGIS in upper case
YYYY	2012	four-digit year when package was created
DOY	305	three-digit day-of-year the package was created
R	P	single character representing the common role of all files contained within the package. Do not package together M4 files with different roles. • **P**: file is a primary dataset and site operational period can be inferred from contents within. • **S**: file is a backup dataset from a redundant system. PTAGIS will stored file but not load the contents into the database. • **X**: file provides additional observation data to be applied a primary dataset already processed by PTAGIS. Typically used to patch data from a system or component failure. • **T**: contents are for testing submission system only. File will not be stored or processed by PTAGIS.
TS	0851242514	Timestamp in the format HHMMSSFFFF when the package was created, typically generated from the system submitting data to PTAGIS. This timestamp contains FFFF format provider that represents ten thousandths of a second on the local system to guarantee uniqueness.

For system implementers, the regular expression used for parsing M4 package file names is (?<sitecode>\w{3})-(?<yyyy>\d{4})-(?<doy>\d+)-(?<role>\w)-(?<timestamp>\d{10})\.(?<ext>\w+).

M4 File Specifications

The M4 file is based upon XML with a two table schema FileSubmission and MessageData:
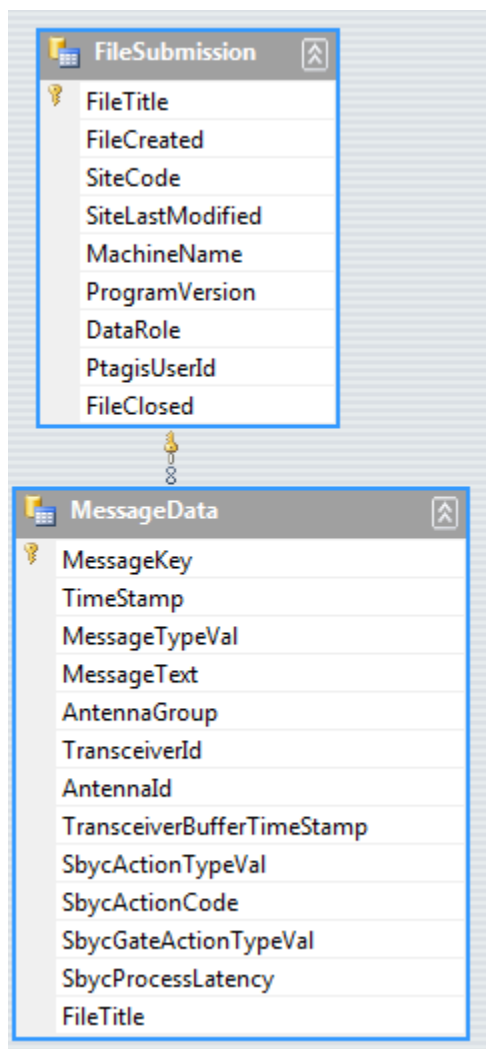
FileSubmission Table

An example of a FileSubmission XML row from a data file:

```
<FileSubmission>
    <FileTitle>MCJ-2012-332-P-013.xml</FileTitle>
    <FileCreated>2012-11-27T12:00:14.5863987-08:00</FileCreated>
    <SiteCode>MCJ</SiteCode>
    <SiteLastModified>2012-10-26T10:53:58.1412334-07:00</SiteLastModified>
    <MachineName>MCJ_M4-PC1</MachineName>
    <ProgramVersion>M4 1.4.7.0</ProgramVersion>
    <DataRole>Primary</DataRole>
    <PtagisUserId>scottl</PtagisUserId>
    <FileClosed>2012-11-27T13:00:14.6014387-08:00</FileClosed>

    Message Data Rows…
</FileSubmission>
```

The columns in the FileSubmission table (Figure 2) represent the "header" portion of a data file and are used for validation and processing purposes. All fields in this table are required.

Header Field	Example Value	Description
FileTitle	MCJ-2012-332-P-013.xml	File name
FileCreated	2012-11-27T12:00:14.5863987-08:00	DateTimeOffset the file was opened
SiteCode	MCJ	PTAGIS Site Code
SiteLastModified	2012-10-26T10:53:58.1412334-07:00	DateTimeOffset the site configuration was last modified.
MachineName	MCJ_M4-PC1	Name of the PC the file was created on
ProgramVersion	M4 1.4.7.0	Version of software that created file
DataRole	Primary	Indicates how the file should be processed
PtagisUserId	scottl	PTAGIS user id representing site steward or technical staff responsible for submitting the file
FileClosed	2012-11-27T13:00:14.6014387-08:00	Time the file was closed as a DateTimeOffset

Table 3: Descriptions of each column in the FileSubmission table

MessageData Table

The MessageData table contains a row for each data output from a transceiver device or the M4 system. Each record has a MessageType that defines the type of message and how it should be processed; these types are defined in the subsequent table.

An excerpt of a MessageData row from an XML data file represents a real-time tag code transmitted from a transceiver and was subsequently diverted via M4 SbyC process:

```
<MessageData>
    <MessageKey>180484</MessageKey>
    <TimeStamp>2012-10-25T04:26:02.3212046-07:00</TimeStamp>
    <MessageTypeVal>SbycTagMessage</MessageTypeVal>
    <MessageText>3D9.1C2DE5A12C</MessageText>
    <AntennaGroup>B Separator Gate</AntennaGroup>
    <TransceiverId>B1</TransceiverId>
```

```
        <AntennaId>B1</AntennaId>
        <SbycActionTypeVal>Override</SbycActionTypeVal>
        <SbycActionCode>77</SbycActionCode>
        <SbycGateActionTypeVal>NoOp</SbycGateActionTypeVal>
        <FileTitle>GOJ-2012-299-P-005.xml</FileTitle>
    </MessageData>
```

Each column in the MessageData table is described below. Some columns are not required depending upon message type.

Detail Field	Example Value	Description
MessageKey	30599	Unique record identifier (per site)
TimeStamp	2012-11-27T12:00:14.5863987-08:00	DateTimeOffset associated with the record
MessageTypeVal	RealTimeTag	Indicates the type of record or message
MessageText*	3D9.1C2DE5A12C	Data represented as a text string (optional)
AntennaGroup*	B Separator Gate	An optional antenna group name
TransceiverId*	A1	Unique Identifier of the Transceiver
AntennaId*	01	Unique Identifier of an Antenna, usually the same as the TransceiverId unless a multiplexor device
TransceiverBufferTimeStamp*	2012-11-27T13:00:14.6014387-08:00	DateTime if this record originated from a transceiver buffer
SbycActionTypeVal*	Override	SbyC action type
SbycActionCode*	01	SbyC Project Action Code
SbycGateActionTypeVal*	NoOp	Defines action or non-action a physical SbyC gate performed
SbycProcessLatency*	8	Amount of time in ms SbyC process took if an actual gate action was triggered
FileTitle	GOJ-2012-299-P-005.xml	Foreign key to the FileSubmission table

Table 4: MessageData column definitions; *optional

The following table lists all message types generated by M4. The message types define how each record will be validated and processed.

ID	Message Type Val	Short Description	Type Description
0	None	No Message Type	Default: no message type.
1	RealTimeTag	Tag Code	Tag code captured from a reader device in real-time.
2	BufferedTag	Buffer Tag Code	Tag code downloaded from a reader's internal storage.
3	DeviceAlarm	Alarm	An alarm message generated from a reader device.
4	DeviceStatus	Device Status	A status report generated from a reader device.
5	DeviceMessage	Device Message	Information generated from a reader device.
6	SystemStatus	System Message	Information generated by the application or underlying system.
7	Error	Error	An error message generated by the application or system.
8	StartMonitor	Monitor Started	Data collection has started for the interrogation site.

9	StopMonitor	Monitor Stopped	Data collection has stopped for the interrogation site.
10	DataUpload	Data Upload	One or more data files has been uploaded to PTAGIS.
11	DataExport	Data Export	One or more data files have been exported to an external drive or folder.
12	DataMarker	Data Marker	Provides a user-defined marker within the data collection stream.
13	GPSCoordinate	GPS Coordinate	A GPS coordinate.
14	DeviceNoiseReport	Noise Report	A noise report generated from a reader device.
15	DeviceBitCounterReport	Bit Counter	A bit-counter report generated from a reader device.
16	SbycServiceStarted	SbyC Started	The separation-by-code sevice has been started.
17	SbycServiceStopped	SbyC Stopped	The separation-by-code sevice has been stopped.
18	DeviceExceptionError	Device Error	An application error associated with a specific device.
19	DeviceConnectionStatus	Connection Status	The connection status with a device.
20	DeviceBufferedStatus	Buffered Status	A status report generated and stored on a reader device.
21	DeviceIdMismatch	Reset of Device ID	Device identifier reported from a reader device is different from the one configured.
22	DeviceTagCountReset	Reset Tag Count	Tag counter has been reset on a reader device.
23	SequenceMismatch	Msg Out of Sequence	BCC Reader message sequence is mismatched.
24	StartMonitorPending	Monitor Start Pending	Configuration is loaded and data collection is about to start.
25	StartMonitorFailed	Monitor Start Failed	Data collection failed to start.
26	SbycErrorMessage	SbyC Error	An error occurred processing a separation-by-code request.
27	SbycTagMessage	SbyC Tag Code	A real-time tag resulted in a separation-by-code action.
28	ClusterStatus	Cluster Status	Status generated by the the M4 cluster system.
29	ClusterError	Cluster Error	Describes an error condition related to the M4 Failover Cluster.
30	DataUploadError	Data Upload Error	An error occurred uploading data files to the PTAGIS server.
31	DataExportError	Data Export Error	An error occurred exporting data files to an external drive or folder.
32	SpuriousRealTimeTag	Spurious Tag Code	A spurious real-time tag code was detected.
33	SpuriousBufferedTag	Spurious Buffer Tag Code	A spurious tag code was downloaded from reader storage.
34	BufferedDeviceError	Buffer Error	A reader error buffered and reported from the reader's internal storage.
35	BufferedDeviceAlarm	Buffered Device Alarm	A reader alarm buffered and reported from the reader's internal storage.
36	BufferedDeviceMessage	Buffer Message	Information from a reader that was buffered and reported from the reader's internal storage.
37	PlcMessage	PLC Message	Data acquired from a PLC device.
38	PlcDiagnostic	PLC Diagnostic	Diagnostic data acquired from a PLC device.
39	PlcError	PLC Error	An error occurred connecting to or reading from a PLC device.
40	StartSbycPending	Unknown	The configuration is loading and the separation-by-code service is about to be started.

41	StartSbycFailed	SbyC Service Failed	The separation-by-code service failed to start.
42	PlcSwitchState	PLC Switch	The value of a logical switch monitored by a PLC device has changed.
43	PlcSampleState	PLC Sample	The value of a facility sample monitored by a PLC device has changed.
44	SbycStateActive	SbyC Service is Active	The separation-by-code service is actively controlling the diversion gates.
45	SbycStatePassive	SbyC Service is Passive	The separation-by-code service is not sending gate divert requests and is in stand-by mode.
46	SbycStateFaulted	SbyC Service Fault	The separation-by-code service cannot send divert requests due to a hardware or network-related communication fault.
47	SbycStateRecoverd	SbyC Service Recovered from Fault	The separation-by-code service has recovered from a hardware or network-related communication fault.

Table 5: MessageTypeVal Descriptions