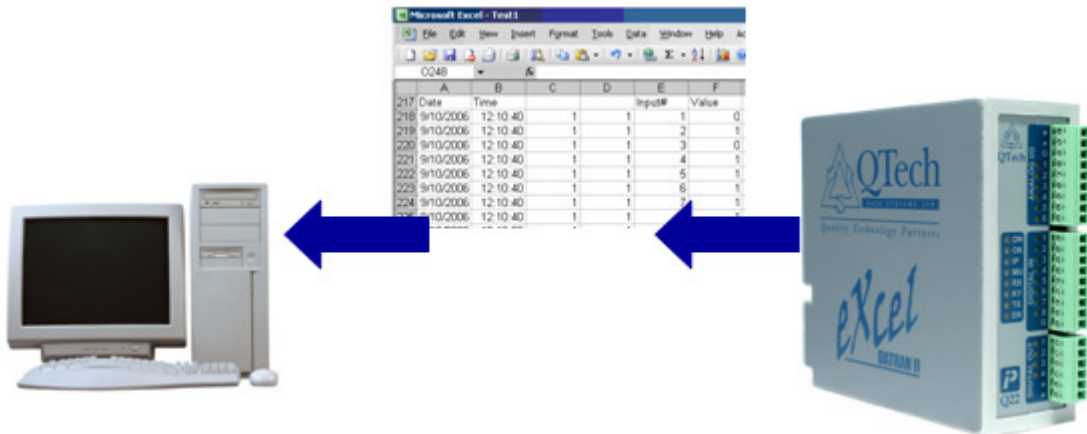


DATRAN RTU Data Logging



Introduction

RTU Data Logging is a powerful feature of DATRAN VI allowing RTUs to log time stamped data, which is then periodically retrieved over the existing communication channels. This allows data to be logged with a much higher sampling rate than may otherwise be available using conventional polling and also means that data will not be lost if communications to a site is lost for a period.

RTU Data Logging can be implemented on a site-by-site basis allowing DATRAN to log key parameters such as turbidity, chlorine and pH levels etc. for legislative requirements such as Drinking Water Standards NZ.

RTU Data Logging can also be used to log certain data that changes frequently, rather than allowing the RTU to transmit this change immediately to the base station, reducing comms channel loading.

RTU Data Logging is a cost effective and seamless extension to the existing DATRAN functionality, preventing the issues surrounding the compatibility of data formats used by stand alone data-loggers.

The time stamped logged data is captured in the DATRAN SCADA database and can then be graphed or reported on with DATRAN Trending and DATRAN Reporting etc.

Prerequisites

- Master RTU to have a Q03 processor.
- RTU Data Logging has been available in Q03 for many years. However, many features and enhancements have been incorporated so it is strongly advised, and our recommendation, that any sites considering RTU Data Logging should have Q03 **v5.20** firmware or greater.
- The DATRAN Base Station requires the Historical Data Interface service to be installed and licensed.
- DLP-IDE version 2.04 R01 and firmware v5.17 or greater are required to take advantage of the *Dynamic Data Logging* controls in the DLP.
- DATRAN Base Station software v6.62 or greater.

Configuration

RTU Data Logging is achieved via configuration inside the DATRAN TBD file on the Base Station computer. No specific configuration is required at site.

Configuration of RTU Data Logging begins with the insertion of a `_Comms_Hist_Data_` node under a given site. This will automatically open a dialog box to allow the configuration for the data logging at the site.

Historical Data Configuration

Properties

Request Rate: 10 min

Request Offset: 0 msec

Request Byte Count: 200

Comms Path: `_Comms_Object_`

Request Timeout: 5 min

Interval Rate: 10 min

Start up Delay: 1 min

Request Start: 17/09/2010 2:36:10 a.m.

Request Stop: 1/01/2031 12:00:00 a.m.

IO Configuration

Point Type: RAI

RAI1

Configuration for RAI1

Interval

Event

Deadband: [] Raw (0-65535)

Update Delete Advanced

Apply Cancel Help

Properties:

Request Rate: How often the base station will download the data from the RTU. This time is aligned with the computer clock so that if the request rate is set for every 20 mins, the requests will be sent on the hour, twenty past the hour, and 40 minutes past the hour.

Request Offset: This allows to offset the timing of the requests by a certain amount so that the requests for multiple sites can be evenly spaced over given period.

Request Byte Count: The maximum amount of data to request in a single packet. 30 to 200 bytes. The bigger this value, the more efficient the transfer will be, but smaller packets can make the

communications more robust if the radio coverage is not very good.

Comms Path: This is the path to the comms object for the site. It is needed for system reasons and will almost always need to be “_Comms_Object_”.


Request Timeout: The maximum amount of time that the DATRAN VI base station will wait for a response to a request for data before it determines that the request has failed.

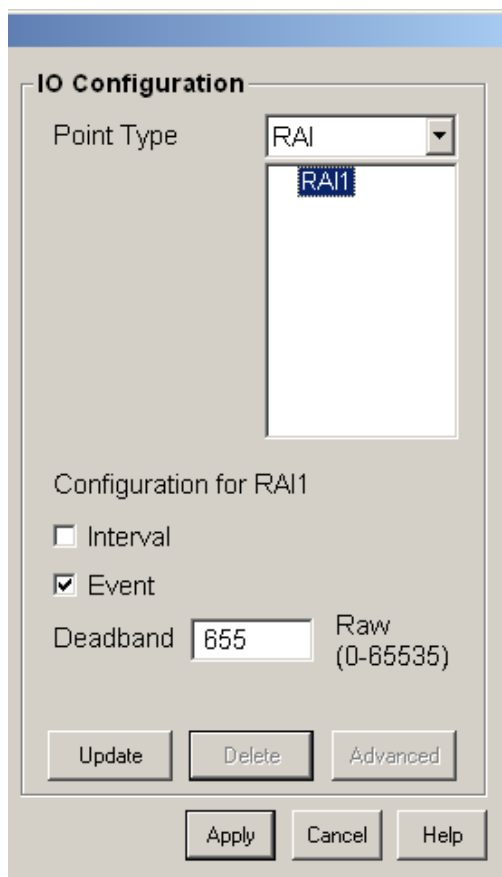
Interval Rate: Specifies how frequently points that are configured for interval logging will be sampled. Note this is a site global property that applies to all points on this site that are configured to interval log.

Start Up Delay: This setting allows the user to specify how long the DATRAN VI base station will wait after starting up before it does its first data request from this site. This can be used to decrease the initial comms load on the system that occurs at start up.

Request Start & Stop: When the DATRAN VI base station requests data from the site, it will only ask for data between these two timestamps. Request start will automatically update when data is received to equal the time stamp of the most recent piece of data that has been transmitted to the base station.

IO Configuration:

To configure a specific IO point to log, one must first select it in the list on the right hand side of the screen. First, use the “Point Type” dropdown box to select the type of IO you wish to log. Once the type is selected, the list will populate to show you the total number of IO of that type the site is configured for. Points that already have logging turned on will have an icon next to them: 



Once the appropriate point is hi-lighted, the Event or Interval box can be ticked to specify which kind of logging is required for this point. Both types of logging can be turned on at the same time, if desired.

If Event logging is required on an analog value, the user will also need to enter a deadband. This deadband describes how much the input must change by in order to trigger the system to log a sample. For physical inputs (RAIs), the deadband is specified in terms of its RAW 16 bit value, where 0 to 65535 represents zero to full scale on the analog input.

Once the appropriate settings have been chosen, click the update button to confirm. DATRAN will then calculate the scaled version of the deadband that has been entered and will display it below the RAW deadband.

Clicking on the “Advanced” button will then open a dialog to allow you to change various parameters such as the description of the

point being logged, its units and scaling values etc.

The screenshot shows a dialog box titled 'InSqlCM Logging Properties'. It is divided into two main sections: 'General Properties' and 'Analogue Properties'.
General Properties:
 - Site Name: Example Site
 - Equip Name: Flow
 - Point: Instantaneous
Analogue Properties:
 - Units: (checkbox unchecked)
 - Y-Axis Min: (checkbox unchecked)
 - Y-Axis Max: (checkbox unchecked)
 - Use Scaling: (checkbox checked, dropdown set to True)
 - Scale Min: (checkbox checked, value 0)
 - Scale Max: (checkbox checked, value 100)
 - Raw Min: (checkbox checked, value 0)
 - Raw Max: (checkbox checked, value 65535)
 - Decimal Places: (checkbox checked, value 2)
 - Formula: (checkbox unchecked)
 At the bottom right are buttons for 'OK', 'Cancel', and 'Help'.

The window above is accessed by clicking on the “Advanced” button in the IO Configuration section described previously. These properties are used to define how the data will be stored in the DATRAN Database. Most of these properties will be populated automatically for you if your TBD file follows established QTech standards.

**Site Name,
Equip Name
And Point**

Site name, Equipment Name and Point are all used to determine how the data will be named in DATRAN Trending. The pen name will be a concatenation of the three properties. In this example the pen name will be “Example Site, Flow, Instantaneous”.

Units:

Allows the user to specify the txt that will be displayed in DATRAN Trending showing the units of the value being logged.

Y-Axis Min & Max:

Specifies the default range that the pen will be scaled for, if it needs to be different from Scale Min and Scale Max.

Use Scaling:

Tells DATRAN if the number coming from the RTU needs to be scaled or not.

**Scale Min
Scale Max
Raw Min
Raw Max**

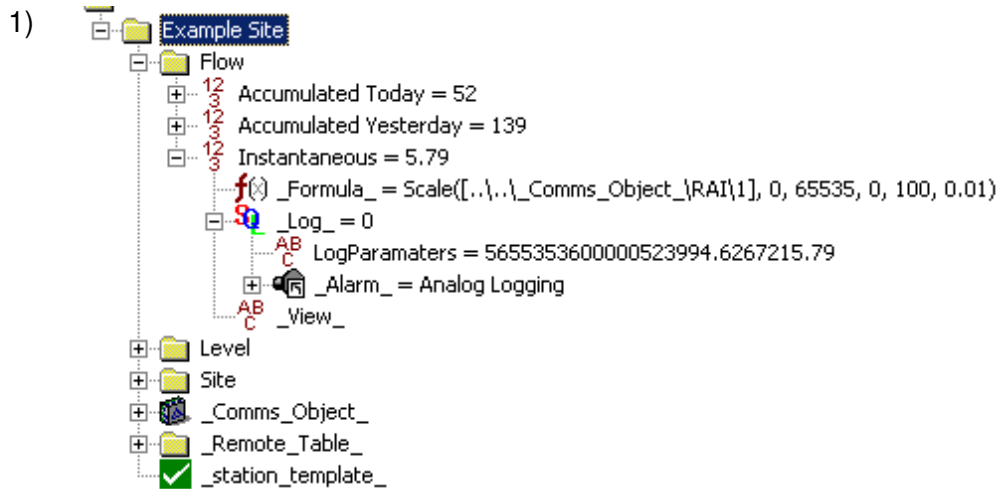
These values are used to determine the scaling of the value before it is logged to the database. In this example, a RAW value from the RTU from 0 to 65535 will be scaled to a logged value of 0 to 100. If no Y-Axis Min or Y-Axis Max are specified then the scaled min and max values will be used instead.

Decimal Places: Specifies the number of decimal places to use when rounding off the scaled number.

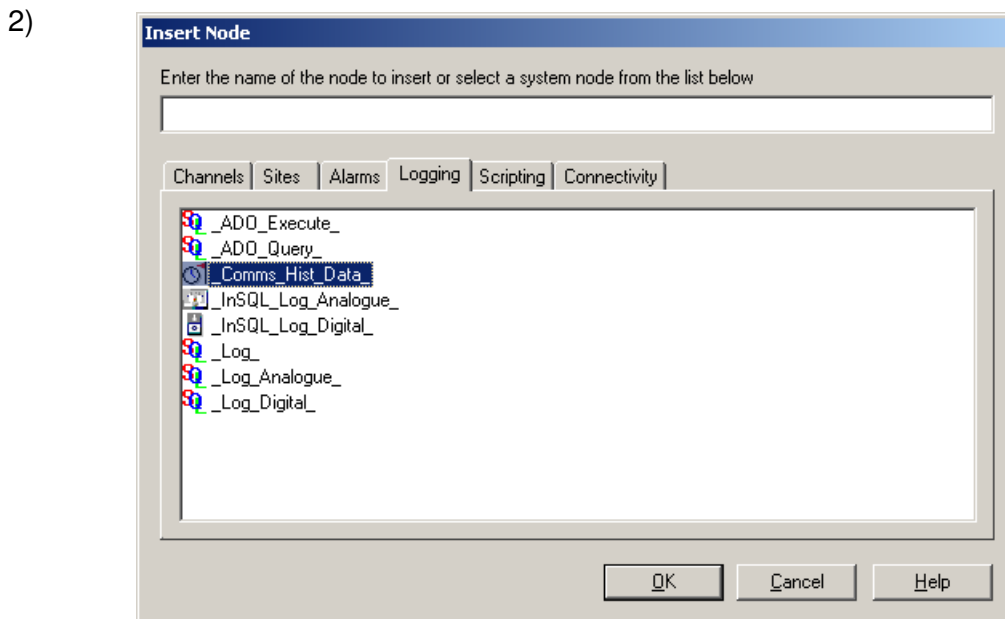
Formula: Specifies the calculation that is performed on the raw value before it is scaled and logged into the database/s. For example, to invert the raw value, use this formula: "1/x". Always use the alphabet 'x' to denote the location of the raw value in the formula. Historical Data Interface utilizes the DVG TCP port to perform the calculation. It is the same as using the `_Formula_` node.

Worked Example: Logging Instantaneous Flow on an interval.

The following example shows the step-by-step configuration of a site to do RTU data logging the Instantaneous Flow where no RTU data logging was previously present.



Firstly we need to determine which analog input the Instantaneous Flow has been wired into. Here we can see an example site that has been configured in the normal manner. The TBD file is open at the Instantaneous Flow node. From the formula we can see this has been configured for RAI 1 with a scaling of 0 to 100 L/sec.



With the site node highlighted as in part 1 above, insert a `_Comms_Hist_Data_` node in the TBD file on the same level as the site `_Comms_Object_`. This will automatically invoke the data logging configuration dialog box.

3)

The dialog box is titled "Historical Data Configuration". It is divided into two main sections: "Properties" and "IO Configuration".

Properties Section:

- Request Rate: 10 min
- Request Offset: 0 msec
- Request Byte Count: 200
- Comms Path: _Comms_Object_
- Request Timeout: 5 min
- Interval Rate: 10 min
- Start up Delay: 1 min
- Request Start: 24/09/2010 3:20:35 a.m.
- Request Stop: 1/01/2031 12:00:00 a.m.

IO Configuration Section:

- Point Type: RAI (selected in dropdown)
- List of points: RAI1, RAI2, RAI3, RAI4
- No Point Selected
- Interval
- Event
- Deadband: Raw (0-65535)
- Buttons: Update, Delete, Advanced

At the bottom of the dialog are buttons for Apply, Cancel, and Help.

After the data logging dialog has appeared, configure the request rate and interval rate as required. Most other options can be left as they are. In this case we will set the Request Rate to once every 15 minutes and the interval rate to once per minute.

After these settings have been made, select the appropriate point type and select the input that needs to be logged from the list, and tick the box for interval or event logging (or both).

This dialog box is identical to the one above, but with the following changes:

- In the "IO Configuration" section, the "Point Type" dropdown is still set to "RAI".
- The list of points (RAI1, RAI2, RAI3, RAI4) is visible, and "RAI1" is highlighted with a blue selection box.
- The "Configuration for RAI1" section shows the Interval checkbox is now checked.
- The "Event" checkbox remains unchecked.
- The "Update" button is now enabled and highlighted.

Click the "Update" button and then click on "Advanced" to carry on with the final part of the configuration.

4)

Properties | InSqlCM Logging Properties

General Properties

Site Name: Example Site

Equip Name: Flow

Point: Instantaneous

Analogue Properties

Units

Y-Axis Min

Y-Axis Max

Use Scaling: True

Scale Min: 0

Scale Max: 100

Raw Min: 0

Raw Max: 65535

Decimal Places: 2

Formula

OK Cancel Help

After the advanced button is clicked the dialog above will be displayed. This dialog is used to define how DATRAN will label and scale the data when it logs it to the DATRAN Database. As described earlier, if the point is already configured in the site with a `_formula_` node linking it to the `_Comms_Object_`, most of this configuration is automatically entered. In this example the only thing that needs changing is to add some text that describes the unit of measurement for this value (L/Sec).

Click OK when finished, and then click Apply.

The Data Logging configuration will now be sent to the RTU

Notes:

- If this is the first time the RTU has been used for RTU data logging, then there has previously been no reason for the RTU real time clock to be kept to accurate time. It is advisable to carry out a time-synch when setting up RTU data logging to ensure the clock is as accurate as possible.
- In the picture in step #1 we can see that the point is configured to log using the Analog Logging alarm class in the normal manner. If no changes are made then this will continue to log data to the database as it always has. This can cause problems when viewing the data because at the same time as the TBD file is logging a value it received from site (say) 15 minutes ago, the RTU data logging will be logging data for the same point, but it will be a more accurate, up-to-date value. Both of these will be overlaid in the trends and will be combined into a single pen that jumps back and forward between the two values. To avoid this from happening, it is advisable to create and use a new alarm class similar to the Analog Logging alarm class, but one that does not log to the database. QTech commonly names this new class "HDI Analog".

Advanced Operation: Dynamic Data logging

While the data logging operations built into DATRAN are excellent for a wide range of applications, there is an even more powerful set of controls for more specific applications that is controlled in the DLP of the RTU.

From firmware version v5.17 and DLP IDE version 2.04 R01 or greater, a set of commands are available in the DLP so that the behaviour of the data logging occurring on the RTU is able to be modified at run time in response to any stimuli the DLP is able to determine.

The following examples are all possible while using Dynamic Data logging:

- Consider a waste water wetwell that normally logs the wetwell level at 10 minute intervals. The DLP can be configured to begin logging at 30 second intervals while the level is above a certain value, for calculating overflow volumes etc.
- The DLP can suspend all logging on the RTU if the data log memory gets too full
- The DLP can trigger a single log of a reservoir or well level at the moment a pump starts or stops.
- The DLP can change the dead band of the logging on a flow rate or a pressure so that fine detail is logged on a small dead band while the pump is running, but then when the pump turns off the dead band can drop back to a more coarse value.
- The DLP can monitor the amount of data that is waiting to be downloaded and can send a signal to the base station once it reaches a certain point. This signal could be used by a script at the base station to trigger a download rather than having a regular schedule at the base.

To use Dynamic Data logging the most important thing to know and remember is that any time the DLP commands cause a sample to be logged, these will appear to the base station as an EVENT log, and so the point must be configured for EVENT logging, even if the DLP is logging a point on regular intervals. The dead band can be configured at the base station to a very large value to prevent the value from logging because of the base station dead band. The base station dead band and the DLP dead band are not shared and are stored and manipulated separately.

DLP Commands:

LOGGINGOFF Suspends all logging on the RTU, including base-driven events and intervals. By default, this will be on unless the DLP specifies otherwise. This instruction is used to globally disable any configured interval and event logging. The data logging configuration will not change; it will merely become inactive.

LOGGINGON Resumes all logging on the RTU, including base-driven events and intervals. This instruction is used to globally enable any configured interval and event logging. The data logging configuration will not change; it will merely become active.

LOGINTR Causes the nominated point to begin logging at the interval specified in the analogue register, synchronized with the real time clock as the base-specified interval logs are. Only valid for Telemetry Digital Input (TDIN), Telemetry Analogue Input (TAIN), Notional Input (NDIN), Notional Analogue Input (NAIN) register types. A period of 0 will halt interval logging on this point. The second parameter is an analogue register containing a 16-bit unsigned number in seconds. This instruction alters the logging rate without deleting the current

logged data. The RTU will change the interval rate to the specified interval in seconds.

LOGINTS

Causes the nominated point to begin logging at the interval specified in the analogue constant, synchronized with the real time clock as the base-specified interval logs are. Only valid for Telemetry Digital Input (TDIN), Telemetry Analogue Input (TAIN), Notional Input (NDIN), Notional Analogue Input (NAIN) register types. A period of 0 will halt interval logging on this point. The second parameter is a 16-bit unsigned number in seconds. This instruction alters the logging rate without deleting the current logged data. The RTU will change the interval rate to the specified interval in seconds.

LOGPOINT

Causes the nominated point to be event logged at that instant in time. Only valid for Telemetry Digital Input (TDIN), Telemetry Analogue Input (TAIN), Notional Input (NDIN), Notional Analogue Input (NAIN) register types.

LOG_USED

A system analog that contains the number of bytes of data that have been logged but have not been retrieved by the base station yet. There are 65535 bytes of storage available in total.