



Metal Tower

Remote Telemetry Unit (RTU)

HTTP Commands and XML Documents

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Purpose of This Document

All RTU settings, and other information such as logs, can be retrieved from the RTU using XML. This document explains what XML documents are available from the RTU, and the structure of these documents.

Commands can be sent to the RTU using the HTTP protocol. Responses to commands are received as XML documents. This document explains the commands and command formats available for the RTU, and the responses received from these commands.

Hardware and Firmware Versions

Metal Tower / RMS released a new version of software in October 2005. This version has several major differences from the previous versions, although it has a similar look and feel to previous versions. Users who are familiar with the previous versions will quickly feel comfortable with the new software.

The new software has been tested and validated on all existing models of the RTU. Different binaries (.bin and .mot files) need to be loaded into the RTU depending on its model, but all models are supported. Whilst the older (flat front panel) units work slightly differently to the current models (moulded plastic front panel) the user will not notice any differences in operation from one model to the next.

This document covers the standard (non customized) versions of the firmware.

It also covers the software released in June 2006.

Entry of Commands

Commands can be sent to the RTU via its HTTP and SNMP interfaces, using Ethernet or dialup PPP connections.

HTTP Interface

Commands using the HTTP interface are entered by issuing GET requests. The format of commands entered via the HTTP interface is

```
command~password~arguments~
```

where

- `command` is the 3-character acronym identifying the command name.
- `password` is the encrypted password, as explained in a subsequent section.
- `arguments` is a string containing the values applicable to the command.
- `~` is the tilde character, which is used in commands as a field separator. All commands must end with a tilde character.

The password field must always be present. If passwords have not been enabled on the RTU this field must still be present but it is ignored, so it can be left blank.

SNMP Interface

Commands using the SNMP interface are entered by means of a SET on the `rtuWebCommand` variable. The format of commands entered using this SNMP variable is

`command~arguments~`

where

- `command` is the 3-character acronym identifying the command name.
- `arguments` is a string containing the values applicable to the command.
- `~` is the tilde character, which is used in commands as a field separator. All commands must end with a tilde character.

The SNMP interface relies on the SNMP community strings for security so there is no password field in the command strings entered using the `rtuWebCommand` variable.

Passwords

Each command submitted via the HTTP interface specifies a password as the second field of the command. For some commands the password is specified as `OperPwd`, for other commands it is specified as `AdminPwd`. This indicates the minimum level of password required with the command.

If passwords are disabled, the password field can be left empty. If `OperPwd` is specified and the operator password is enabled in the RTU, either the operator password or the administrator password must be supplied in this field. If `AdminPwd` is specified and the administrator password is enabled in the RTU, then the administrator password must be supplied in this field.

Passwords are sent to the RTU in encrypted form. An encrypted password only has a short time during which it is valid. Once that time has passed, using the same encrypted value will fail.

There are different techniques that can be used to encrypt and use passwords. These techniques are *not* recorded in this document but are available to authorised personnel only via your distributor.

Retaining Values

Many RTU commands have several fields that must be supplied with the command. The arguments you supply in these fields allow you to customise the RTU to your needs.

All fields must be entered, even if you are only making an adjustment to one or two values. However there is a convenient shortcut for fields where the values are not being changed.

If you enter a pipe (vertical bar) (“|”) character as the value for a field, then the setting associated with that field will not be changed.

Commands

Note that the following documents the command formats for the HTTP interface. If you are entering commands via the SNMP interface, omit the password field and its tilde (“~”) field separator.

Analog Port Settings (ANA)

Use this command to change settings for an analog port.

The command format is

```
ANA ~ AdminPwd ~ PortNum ~ Name ~ Position ~ Group ~  
Enabled ~ LowAlmEnabled ~ LowDCEnabled ~ LowTrigger ~  
LowRelease ~ HighAlmEnabled ~ HighDCEnabled ~  
HighTrigger ~ HighRelease ~ Units ~ Priority ~
```

ZoomBottom ~ ZoomTop ~ ELogEnabled ~ TLogEnabled ~
RptAlm ~ GoIntoHistoric ~

where

- `ANA` is the command acronym.
- `AdminPwd` is the encrypted password.
- `PortNum` is the number of the port, from 1 to the number of analog ports in your RTU.
- `Name` is the main text label for the port. Max 20, alphanumerics and spaces.
- `Position` is the second text label for the port. Max 20, alphanumerics and spaces.
- `Group` is the third text label for the port. Max 20, alphanumerics and spaces.
- `Enabled` is a single digit, "1" to enable the port, or "0" to disable it.
- `LowAlmEnabled` is a single digit, "1" to enable the low alarm for the port, or "0" to disable it.
- `LowDCEnabled` is a single digit, "1" to enable the low duty cycle for the port, or "0" to disable it.
- `LowTrigger` is the value below which the alarm / duty cycle is triggered, if enabled.
- `LowRelease` is the value above which an active low alarm / duty cycle is stopped.
- `HighAlmEnabled` is a single digit, "1" to enable the high alarm for the port, or "0" to disable it.

- `HighDCEnabled` is a single digit, "1" to enable the high duty cycle for the port, or "0" to disable it.
- `HighTrigger` is the value above which the alarm / duty cycle is triggered, if enabled.
- `HighRelease` is the value below which an active high alarm / duty cycle is stopped.
- `Units` is a text label stating the units for the port values, eg "volts", "kPa" etc. Max 6, alphanumeric and spaces.
- `Priority` is a single digit, "1" is the most urgent priority, "9" is the least urgent. For dialup systems, the RTU will only initiate a connection to raise an alarm for ports with priorities in the range 1 to 3.
- `ZoomBottom` is used for scaling diagrams. It is a number showing the lowest practical value that you are interested in.
- `ZoomTop` is used for scaling purposes. It is a number showing the highest practical value that you are interested in.
- `ELogEnabled` is a single digit, "1" to enable event logging for the port, or "0" to disable it.
- `TLogEnabled` is a single digit, "1" to enable timed logging for the port, or "0" to disable it.
- `RptAlm` is a single digit, "1" to enable alarms to be raised for the port, or "0" to disable the reporting of alarms.
- `GoIntoHistoric` is a single digit, "1" so the port status changes to Historic when an alarm condition clears, or "0" to make the port return to Normal status when the alarm condition clears.

Activate Output Ports (AOP)

Use this command to activate or de-activate digital (I/O, relay, or latched) or virtual output ports.

You can activate (or de-activate) several output ports using one command, and you can mix digital and virtual ports.

The command format is

```
AOP ~ OperPwd ~ ActiveState ~ PortDesignators ~
```

where

- `AOP` is the command acronym.
- `OperPwd` is the encrypted password.
- `ActiveState` is a single digit, "1" to activate the outputs, or "0" to de-activate them.
- `PortDesignators` is a list of ports. Each port is designated by a letter for the port type ("D" for a digital port, "V" for a virtual port) followed by exactly 3 digits giving the port number from 1 to the number of ports of that type in your RTU.

Activate Pass Thru (APT)

Use this command to activate or de-activate the Pass Thru feature. The Pass Thru feature must be available and it must be enabled for this command to have an effect. Even though the Pass Thru feature may be available and enabled you need to activate Pass Thru before you can connect to it. If the connection is closed or lost, the RTU automatically de-activates Pass Thru and it must be re-activated before it can be used again.

The command format is

```
APT ~ OperPwd ~ ActiveState ~
```

where

- `APT` is the command acronym.
- `OperPwd` is the encrypted password.
- `ActiveState` is a single digit, "1" to activate Pass Thru, or "0" to de-activate it.

Acknowledge Alarms (ARA)

Use this command to acknowledge existing alarms. When all alarms are acknowledged, the RTU will stop flashing red (it will go to solid red instead) and stop beeping.

You can acknowledge all alarms at once or you can acknowledge an alarm on an individual port.

The command format is

```
ARA ~ OperPwd ~ PortType ~ PortNum ~
```

where

- `ARA` is the command acronym.
- `OperPwd` is the encrypted password.
- `PortType` can be left empty to acknowledge all alarms. Otherwise it can be a single character ("A" for analog, "D" for digital, "T" for temperature, "V" for virtual) indicating the type of port to be acknowledged.
- `PortNum` is ignored if `PortType` is left empty, otherwise it must be the number of the port to be acknowledged from 1 to the number of ports of that type in your RTU.

Examples:

The following will acknowledge all alarms on an RTU.

```
ARA~~~~
```

The following will acknowledge the alarm on port D003 of an RTU.

```
ARA~~D~3~
```

Calibrate Analog Port (CAP)

Use this command to calibrate an analog port. You must take sensor readings before you use this command meaningfully.

The command format is

```
CAP ~ AdminPwd ~ PortType ~ PortNum ~ SensorValue1 ~  
UserValue1 ~ SensorValue2 ~ UserValue2 ~
```

where

- `CAP` is the command acronym.
- `AdminPwd` is the encrypted password.
- `PortType` must be the "A" character.
- `PortNum` is the number of the analog port being calibrated, from 1 to the number of analog ports in your RTU.
- `SensorValue1` is a number from 0 to 4096. It is the reading taken by the sensor at a known state, eg at a specific temperature or voltage.
- `UserValue1` is a number showing the known state, eg the specific temperature or voltage, that corresponds to the sensor reading entered in the previous field.
- `SensorValue2` is a number from 0 to 4096. It is the reading taken by the sensor at a second known state.

- `UserValue2` is the number showing the second known state that corresponds to the sensor reading entered in the previous field.

Device Settings (DEV)

Use this command to enter overall settings for the RTU.

The command format is

```
DEV ~ AdminPwd ~ Name ~ CommsMethod ~ TestMode ~  
AdminPwdEnabled ~ OperPwdEnabled ~ PanelLockEnabled ~  
FlashPanelOnAlm ~ AudioEnabled ~ AlmSoundNum ~  
ARATimeoutMins ~ TempIsCelsius ~ LowPowerMode ~  
TLogIntervalSecs ~ ConfigPageURL ~ NotifResendMethod ~  
NotifResendSecs ~ NotifMaxResends ~
```

where

- `DEV` is the command acronym.
- `AdminPwd` is the encrypted password.
- `Name` is the text label for the RTU. Max 20, alphanumeric and spaces.
- `CommsMethod` is a number that specifies the communication method used by the RTU. Valid values are "1" for ethernet only; "2" for ethernet with serial failover; "3" for serial only; "4" for ethernet and SMS; "5" for serial and SMS; "6" for SMS only; "7" for ethernet with SMS failover; "8" for ethernet with serial and SMS failover.
- `TestMode` is a single digit, "1" to place the RTU in test mode, or "0" for normal production operation. Note that when the RTU is in test mode, it does not issue any external alarms or traps.

- `AdminPwdEnabled` is a single digit, "1" to enable the administrator password, or "0" to disable it.
- `OperPwdEnabled` is a single digit, "1" to enable the operator password, or "0" to disable it.
- `PanelLockEnabled` is a single digit, "1" to lock the front panel, or "0" to unlock it.
- `FlashPanelOnAlm` is a single digit, "1" to cause the RTU to flash when an alarm condition is detected, or "0" to disable the flashing.
- `AudioEnabled` is a single digit, "1" to enable the audible alarm on the RTU, or "0" to disable it.
- `AlmSoundNum` must be a single digit from "1" to "5" (default is "2") to select the alarm sound made by the RTU when an alarm is detected. This field is ignored if `AudioEnabled` is disabled.
- `ARATimeoutMins` is a number from 0 to 9999. If this value is zero (default), once an alarm condition is placed into ARA it will remain in the ARA state indefinitely (until the alarm condition is cleared). Otherwise this value gives the number of minutes the alarm condition can remain in ARA before the RTU takes it out of ARA and re-instates the alarm condition.
- `TempIsCelsius` is a single digit, "1" to show the temperature in degrees Celsius, or "0" to show it in Fahrenheit.
- `LowPowerMode` is a single digit, "1" to enable low power mode, or "0" to disable it. In low power mode the RTU reduces the time the LEDs and LCD backlight are used.

- `TLogIntervalSecs` is the number of seconds to wait before updating the timed logs with the status and values of ports that have been enabled for timed logging. Note that at present a practical lower limit for this value is 2 to 3 seconds.
- `ConfigPageURL` is a URL on your intranet from where the Macromedia Flash configuration page can be accessed. This can be left empty if this feature is not being used.
- `NotifResendMethod` is a single digit. A value of "0" disables resends of notifications; a value of "1" implements simple resending, where notifications are resent until either the maximum number of re-sends is reached or the trigger event is no longer active; a value of "2" is similar to a value of "1" except that if an acknowledgement is received for the notification then the RTU will not re-send the notification again.
- `NotifResendSecs` is a number from 0 to 9999. This setting gives the number of seconds the RTU will wait before attempting to re-send a notification. Note that the re-send feature works best if this number is kept small, e.g. in the range of 5 to 120 seconds.
- `NotifMaxResends` is a number from 0 to 9. This value is the maximum number of times the RTU will attempt to re-send a notification.

Digital Port Settings (DIG)

Use this command to change settings for a digital port.

The command format is

```
DIG ~ AdminPwd ~ PortNum ~ Name ~ Position ~ Group ~  
Enabled ~ Input ~ ActiveWhenOpen ~ ActiveSecs ~ Priority
```

```
~ ELogEnabled ~ TLogEnabled ~ AlmEnabled ~ DCEnabled ~  
RptAlm ~ GoIntoHistoric ~
```

where

- `DIG` is the command acronym.
- `AdminPwd` is the encrypted password.
- `PortNum` is the number of the port, from 1 to the number of digital (including relay and latched) ports in your RTU.
- `Name` is the main text label for the port. Max 20, alphanumerics and spaces.
- `Position` is the second text label for the port. Max 20, alphanumerics and spaces.
- `Group` is the third text label for the port. Max 20, alphanumerics and spaces.
- `Enabled` is a single digit, "1" to enable the port, or "0" to disable it.
- `Input` is a single digit, "1" to set the port for input, or "0" to set it for output. Note that relay and latched ports cannot be set for input.
- `ActiveWhenOpen` is a single digit, "1" to set the port active when open ("normally closed"), or "0" to set it active when closed ("normally open").
- `ActiveSecs` is a number from 0 to 99999.9. If the value is zero, an output port will remain active indefinitely; an input port will go into alarm immediately. Otherwise the output port will automatically de-activate after the specified number of seconds;

the input port will only go into alarm once the alarm condition has been present for the specified number of seconds.

- `Priority` is a single digit, "1" is the most urgent priority, "9" is the least urgent. For dialup systems, the RTU will only initiate a connection to raise an alarm for ports with priorities in the range 1 to 3.
- `ELogEnabled` is a single digit, "1" to enable event logging for the port, or "0" to disable it.
- `TLogEnabled` is a single digit, "1" to enable timed logging for the port, or "0" to disable it.
- `AlmEnabled` is a single digit, "1" to enable the alarm for the port, or "0" to disable it.
- `DCEnabled` is a single digit, "1" to enable the duty cycle for the port, or "0" to disable it.
- `RptAlm` is a single digit, "1" to enable alarms to be raised for the port, or "0" to disable the reporting of alarms.
- `GoIntoHistoric` is a single digit, "1" so the port status changes to Historic when an alarm condition clears, or "0" to make the port return to Normal status when the alarm condition clears.

Ethernet Settings (ETH)

Use this command to change the RTU's ethernet settings. Note that these changes are acted upon immediately, so you will lose contact with the RTU if you change its IP address. You could also lose contact with the RTU, temporarily or permanently, if you change its communication method.

The command format is

```
ETH ~ AdminPwd ~ IPAddr ~ IPSubmask ~ GatewayEnabled ~  
IPGateway ~ HTTPEnabled ~ SNMPEnabled ~ SMTPEnabled ~  
NTPEnabled ~
```

where

- **ETH** is the command acronym.
- **AdminPwd** is the encrypted password.
- **IPAddr** is the IP address of the RTU.
- **IPSubmask** is the IP subnet address of the RTU.
- **GatewayEnabled** is a single digit, "1" to enable a gateway address, or "0" to specify no gateway.
- **IPGateway** is the IP address of the gateway.
- **HTTPEnabled** must be set to "1".
- **SNMPEnabled** must be set to "1".
- **SMTPEnabled** is a single digit, "1" to specify that SMTP is to be used, or "0" to disable SMTP.
- **NTPEnabled** is a single digit, "1" to specify that NTP is to be used, or "0" to disable NTP.

Pass Thru Settings (IPT)

Use this command to change the RTU's IP Pass Thru settings.

The command format is

```
IPT ~ AdminPwd ~ BaudRate ~ DataBits ~ StopBits ~ Parity  
~ PortNum ~ PTEEnabled ~
```

where

- **IPT** is the command acronym.

- `AdminPwd` is the encrypted password.
- `BaudRate` is the speed with which to communicate to the attached serial devices. The supported values are 300, 600, 1200, 2400, 4800, 9600, 19200, and 38400 baud.
- `DataBits` is the number of data bits. The supported values are 7 and 8.
- `StopBits` is the number of stop bits. The supported values are 1 and 2.
- `Parity` is the parity to use when transmitting. The supported values are "0" for no parity; "1" for odd parity; and "2" for even parity.
- `PortNum` is an IP port number to use when establishing a socket for the Pass Thru mechanism to use. The supported values are in the range 1 to 4096.
- `PTEnabled` is a single digit, "1" to specify that Pass Thru is to be used, or "0" to disable Pass Thru.

Log Clear (LCR)

Use this command to clear an RTU's log records.

The command format is

```
LCR ~ OperPwd ~ LogType ~ MaxRecNum ~
```

where

- `LCR` is the command acronym.
- `OperPwd` is the encrypted password.
- `LogType` is a single character ("A" for audit, "E" for events, "T" for timed) indicating the type of log to be cleared.

- `MaxRecNum` can be left empty to clear the entire log, otherwise it is a number giving the highest log record number to be deleted. This is a number in the range 1 to 999,999.

NTP Settings (NTP)

Use this command to change the RTU's NTP settings.

The command format is

```
NTP ~ AdminPwd ~ ResyncTimeSinceMidnight ~  
NTPServerIPAddress ~
```

where

- `NTP` is the command acronym.
- `AdminPwd` is the encrypted password.
- `ResyncTimeSinceMidnight` is a number from 0 to 86,400 that gives the number of seconds after midnight that you wish the RTU to synchronise its time against the NTP server.
- `NTPServerIPAddress` is the IP address of the NTP server.

PPP Settings (PPP)

Use this command to change the RTU's PPP settings.

The command format is

```
PPP ~ AdminPwd ~ DialNum ~ IPAddress ~ LoginMethod ~  
LoginName ~ LoginPassword ~ RemoteIPAddr ~ MinRedialMins  
~ HTTPEnabled ~ SNMPEntabled ~ SMTPEnabled ~ NTPEnabled ~
```

where

- `PPP` is the command acronym.
- `AdminPwd` is the encrypted password.

- `DialNum` is the number to dial to connect to the PPP server, if dialup is being used to establish PPP connections.
- `IPAddress` is the IP address of the RTU when connected to the network using PPP.
- `LoginMethod` is a single digit that sets the method used to connect to the PPP server. Values are "0" for none; "1" for direct connection when the RTU dials in; "2" for server callback; "3" for an RTU-specific method named dial-back.
- `LoginName` is the name to use when logging in to the PPP server. This value must be encrypted according to the password encryption rules. Max 20 alphanumeric characters and spaces before encryption.
- `LoginPassword` is the password to use when logging in to the PPP server. This value must be encrypted according to the password encryption rules. Max 20 alphanumeric characters and spaces before encryption.
- `RemoteIPAddr` is the IP address to be used by the PPP server for the PPP session.
- `MinRedialMins` is a number from 0 to 9999 used to minimise incessant dialling by an RTU, especially with intermittent alarms. The number indicates the number of minutes an RTU must wait, after it has connected to the PPP server, before it can attempt to connect again.
- `HTTPEnabled` must be set to "1".
- `SNMPEnabled` must be set to "1".

- `SMTPEnabled` is a single digit, "1" to specify that SMTP is to be used, or "0" to disable SMTP.
- `NTPEnabled` is a single digit, "1" to specify that NTP is to be used, or "0" to disable NTP.

Reboot (RBT)

Use this command to force an RTU to reboot and restart its processors as if it were power cycled.

The command format is

```
LCR ~ OperPwd ~ WhichProcessor ~
```

where

- `LCR` is the command acronym.
- `OperPwd` is the encrypted password.
- `WhichProcessor` can be empty or a single digit. If it is empty, or has a value of "0" or "1", the RTU is rebooted similar to a power cycle. A value of "2" causes the I/O processor only to be reset; a value of "3" causes the Network processor only to be reset.

Reset Duty (RSD)

Use this command to reset the duty cycle information for an RTU or an individual port.

The command format is

```
RSD ~ OperPwd ~ PortType ~ PortNum ~
```

where

- `RSD` is the command acronym.
- `OperPwd` is the encrypted password.

- `PortType` can be empty if all duty cycle information is to be cleared or a single character ("A" for analog, "D" for digital, "T" for temperature, "V" for virtual) indicating the type of port to have its duty cycle reset. If the field is empty, all ports will have their duty cycles reset.
- `PortNum` is ignored if all ports are to have their duty cycles reset. Otherwise this field is a number from 1 to the number of ports of that type in the RTU, indicating which port is to have its duty cycle reset

Rules Segment (RSE)

Use this command to enter rules script into the RTU.

The command format is

```
RSE ~ AdminPwd ~ Enabled ~ FromByteIdx ~ ToByteIdx ~  
ProgramSize ~ Tokens ~
```

where

- `RSE` is the command acronym.
- `AdminPwd` is the encrypted password.
- `Enabled` is a single digit, "1" if the rules script is enabled, or "0" if it is disabled.
- `FromByteIdx` gives the 0-based location in the script of the first byte in the `Tokens` field.
- `ToByteIdx` gives the 0-based location in the script of the last byte in the `Tokens` field.

- `ProgramSize` gives the size, specified as the number of tokens, of the complete rules script (i.e. not just the segment passed to the RTU in this command).
- `Tokens` contains the script tokens (code) that make up the segment defined by the `FromByteIdx` and `ToByteIdx` fields.

To clear the rules script, specify 0 for each of `FromByteIdx`, `ToByteIdx` and `ProgramSize`. You should not pass more than 128 tokens in any one segment command; use multiple segments to load an entire script.

Reset History (RSH)

Use this command to clear the historic status for an RTU or an individual port.

The command format is

```
RSH ~ OperPwd ~ PortType ~ PortNum ~
```

where

- `RSH` is the command acronym.
- `OperPwd` is the encrypted password.
- `PortType` can be empty if all historics are to be cleared or a single character ("A" for analog, "D" for digital, "T" for temperature, "V" for virtual) indicating the type of port to have its historic status cleared.
- `PortNum` is ignored if all historics are to be cleared. Otherwise this field is a number from 1 to the number of ports of that type in the RTU, indicating which port is to have its historic status cleared

Set Administrator Password (SAP)

Use this command to change the administrator password in the RTU.

The command format is

```
SAP ~ AdminPwd ~ NewAdminPwd ~
```

where

- `SAP` is the command acronym.
- `AdminPwd` is the encrypted password.
- `NewAdminPwd` is the new administrator password to be set. This value must be encrypted according to the password encryption rules. Max 8 alphanumeric and spaces before encryption.

Serial Settings (SER)

Use this command to set the characteristics of the RTU's serial port and attached equipment.

The command format is

```
SER ~ AdminPwd ~ EquipmentType ~ BaudRate ~ FlowControl  
~ ModemType ~ GSMPIN ~ ModemInitStr ~ ModemDialPrefix ~  
ModemStr1 ~ ModemStr2 ~ ModemStr3 ~
```

where

- `SER` is the command acronym.
- `AdminPwd` is the encrypted password.
- `EquipmentType` is a number indicating what equipment is attached to the serial port. Valid values are: "0" for none; "1" for leased line; "2" for PSTN modem; "3" for GSM modem; "4" for CDMA modem (not yet implemented); "5" for radio modem (not yet implemented).

- `BaudRate` is a number giving the speed of the attached equipment.
- `FlowControl` is a single digit, "1" if flow control is enabled, or "0" if it is not used.
- `ModemType` must be "0".
- `GSMPIN` must be entered if a GSM modem is being used. This is the four digit PIN associated with the SIM card in the GSM modem.
- `ModemInitStr` is the initialisation string to send to the modem to reset it. If a value is entered, the RTU will send out an "AT" followed by the value, followed by a carriage return character. If this field is blank, the RTU will send "ATE0V1" followed by a carriage return.
- `ModemDialPrefix` is the dial prefix used when dialling out. Whatever value is found in this field will be sandwiched between the "ATD" modem dial command and the number being dialled.
- `ModemStr1` is a modem customisation string. Must be empty.
- `ModemStr2` is a modem customisation string. Must be empty.
- `ModemStr3` is a modem customisation string. Must be empty.

SMS Settings (SMS)

Use this command to change the RTU's SMS settings.

The command format is

```
SMS ~ AdminPwd ~ MinRedialMins ~ AEnabled ~ ANumber ~  
BEnabled ~ BNumber ~
```

where

- `SMS` is the command acronym.
- `AdminPwd` is the encrypted password.
- `MinRedialMins` is a number from 0 to 9999 used to minimise incessant dialling by an RTU, especially with intermittent alarms. The number indicates the number of minutes an RTU must wait, after it has sent an SMS message, before it can attempt to send another SMS message.
- `AEnabled` is a single digit, "1" to enable sending SMS messages to the first SMS destination number, "0" to disable sending messages to this number.
- `ANumber` is the first destination number to which SMS messages will be sent.
- `BEnabled` is a single digit, "1" to enable sending SMS messages to the second SMS destination number, "0" to disable sending messages to this number.
- `BNumber` is the second destination number to which SMS messages will be sent.

SMTP Settings (SMT)

Use this command to change the RTU's SMTP (email) settings.

The command format is

```
SMT ~ AdminPwd ~ From ~ AEnabled ~ ATo ~ BEnabled ~BTo ~  
Server ~
```

where

- `SMT` is the command acronym.
- `AdminPwd` is the encrypted password.

- `From` is the email address allocated to the RTU, from which email messages will be sent. Max 40 characters.
- `AEnabled` is a single digit, "1" to enable sending email messages to the first SMTP destination address, "0" to disable sending messages to this address.
- `ATo` is the first destination email address to which SMTP messages will be sent.
- `BEnabled` is a single digit, "1" to enable sending email messages to the second SMTP destination address, "0" to disable sending messages to this address.
- `BTo` is the second destination email address to which SMTP messages will be sent.
- `Server` is the IP address of the outgoing mail server. Domain names are not yet implemented, nor are user names and passwords for logging into the server.

SNMP Settings (SNM)

Use this command to change the RTU's SNMP settings.

The command format is

```
SNM ~ AdminPwd ~ TrailingZero ~ AEnabled ~ AIPAddress ~  
BEnabled ~ BIPAddress ~ CEnabled ~ CIPAddress ~ DEnabled  
~ DIPAddress ~ EEnabled ~ EIPAddress ~ MgrPort ~  
TrapPort ~ ReadCommunity ~ WriteCommunity ~  
TrapCommunity ~
```

where

- `SMT` is the command acronym.
- `AdminPwd` is the encrypted password.

- `TrailingZero` is a single digit, "1" to enable a trailing zero on each SNMP OID, or "0" to suppress the additional zero. Some SNMP managers require a trailing zero on each (non table) OID. Note that if you change this setting while the RTU is running, you will need to restart the RTU for the setting to take effect.
- `AEnabled` is a single digit, "1" to enable sending SNMP messages to the first SNMP server IP address, "0" to disable sending messages to this address.
- `AIPAddress` is the IP address of the first SNMP server to which SNMP traps will be sent.
- `BEnabled` is a single digit, "1" to enable sending SNMP messages to the second SNMP server IP address, "0" to disable sending messages to this address.
- `BIPAddress` is the IP address of the second SNMP server to which SNMP traps will be sent.
- `CEnabled` is a single digit, "1" to enable sending SNMP messages to the third SNMP server IP address, "0" to disable sending messages to this address.
- `CIPAddress` is the IP address of the third SNMP server to which SNMP traps will be sent.
- `DEnabled` is a single digit, "1" to enable sending SNMP messages to the fourth SNMP server IP address, "0" to disable sending messages to this address.
- `DIPAddress` is the IP address of the fourth SNMP server to which SNMP traps will be sent.

- `EEnabled` is a single digit, "1" to enable sending SNMP messages to the fifth SNMP server IP address, "0" to disable sending messages to this address.
- `EIPAddress` is the IP address of the fifth SNMP server to which SNMP traps will be sent.
- `MgrPort` is the IP port on which the RTU will listen for SNMP messages from SNMP servers. The default port is 161.
- `TrapPort` is the IP port on SNMP servers to which traps from the RTU will be sent. The default port is 162.
- `ReadCommunity` is the read community string for the RTU's SNMP agent.
- `WriteCommunity` is the write community string for the RTU's SNMP agent.
- `TrapCommunity` is the trap community string for the RTU's SNMP agent.

Set Operator Password (SRP)

Use this command to change the operator password in the RTU.

The command format is

```
SRP ~ AdminPwd ~ NewOperPwd ~
```

where

- `SRP` is the command acronym.
- `AdminPwd` is the encrypted password.
- `NewOperPwd` is the new operator password to be set. This value must be encrypted according to the password encryption rules. Max 8 alphanumeric and spaces before encryption.

Set Time (STM)

Use this command to change the time in the RTU.

The command format is

```
STM ~ AdminPwd ~ SecsSince1Jan1980 ~
```

where

- `SRP` is the command acronym.
- `AdminPwd` is the encrypted password.
- `SecsSince1Jan1980` is the number of seconds since 1 January 1980 in GMT / UTC. The RTU time functions will only work correctly if the RTU is set to GMT / UTC time.

Temperature Port Settings (TEM)

Use this command to change settings for an analog port.

The command format is

```
TEM ~ AdminPwd ~ PortNum ~ Name ~ Enabled ~  
LowAlmEnabled ~ LowDCEnabled ~ LowTrigger ~ LowRelease ~  
HighAlmEnabled ~ HighDCEnabled ~ HighTrigger ~  
HighRelease ~ Priority ~ ZoomBottom ~ ZoomTop ~  
ELogEnabled ~ TLogEnabled ~ RptAlm ~ GoIntoHistoric ~  
CalibrationOffset ~
```

where

- `TEM` is the command acronym.
- `AdminPwd` is the encrypted password.
- `PortNum` is the number of the port, from 1 to the number of temperature ports in your RTU.

- `Name` is the main text label for the port. Max 20, alphanumerics and spaces.
- `Enabled` is a single digit, "1" to enable the port, or "0" to disable it.
- `LowAlmEnabled` is a single digit, "1" to enable the low alarm for the port, or "0" to disable it.
- `LowDCEnabled` is a single digit, "1" to enable the low duty cycle for the port, or "0" to disable it.
- `LowTrigger` is the temperature below which the alarm / duty cycle is triggered, if enabled.
- `LowRelease` is the temperature above which an active low alarm / duty cycle is stopped.
- `HighAlmEnabled` is a single digit, "1" to enable the high alarm for the port, or "0" to disable it.
- `HighDCEnabled` is a single digit, "1" to enable the high duty cycle for the port, or "0" to disable it.
- `HighTrigger` is the temperature above which the alarm / duty cycle is triggered, if enabled.
- `HighRelease` is the temperature below which an active high alarm / duty cycle is stopped.
- `Priority` is a single digit, "1" is the most urgent priority, "9" is the least urgent. For dialup systems, the RTU will only initiate a connection to raise an alarm for ports with priorities in the range 1 to 3.
- `ZoomBottom` is used for scaling diagrams. It is a number showing the lowest practical value that you are interested in.

- `ZoomTop` is used for scaling purposes. It is a number showing the highest practical value that you are interested in.
- `ELogEnabled` is a single digit, "1" to enable event logging for the port, or "0" to disable it.
- `TLogEnabled` is a single digit, "1" to enable timed logging for the port, or "0" to disable it.
- `RptAlm` is a single digit, "1" to enable alarms to be raised for the port, or "0" to disable the reporting of alarms.
- `GoIntoHistoric` is a single digit, "1" so the port status changes to Historic when an alarm condition clears, or "0" to make the port return to Normal status when the alarm condition clears.
- `CalibrationOffset` is used to calibrate the external temperature port. Compare an actual temperature reading with the temperature reported by the RTU sensor, and set this field to the difference between the two readings.

Virtual Port Settings (VIR)

Use this command to change settings for a virtual port.

The command format is

```
VIR ~ AdminPwd ~ PortNum ~ Name ~ Enabled ~ Input ~  
ActiveSecs ~ Priority ~ ELogEnabled ~ TLogEnabled ~  
RptAlm ~ GoIntoHistoric ~
```

where

- `VIR` is the command acronym.
- `AdminPwd` is the encrypted password.

- `PortNum` is the number of the port, from 1 to the number of virtual ports in your RTU.
- `Name` is the main text label for the port. Max 20, alphanumerics and spaces.
- `Enabled` is a single digit, "1" to enable the port, or "0" to disable it.
- `Input` is a single digit, "1" to set the port for input, or "0" to set it for output.
- `ActiveSecs` is a number from 0 to 99999.9. If the value is zero, an output port will remain active indefinitely; an input port will go into alarm immediately. Otherwise the output port will automatically de-activate after the specified number of seconds; the input port will only go into alarm once the alarm condition has been present for the specified number of seconds.
- `Priority` is a single digit, "1" is the most urgent priority, "9" is the least urgent. For dialup systems, the RTU will only initiate a connection to raise an alarm for ports with priorities in the range 1 to 3.
- `ELogEnabled` is a single digit, "1" to enable event logging for the port, or "0" to disable it.
- `TLogEnabled` is a single digit, "1" to enable timed logging for the port, or "0" to disable it.
- `RptAlm` is a single digit, "1" to enable alarms to be raised for the port, or "0" to disable the reporting of alarms.

- `GoIntoHistoric` is a single digit, "1" so the port status changes to Historic when an alarm condition clears, or "0" to make the port return to Normal status when the alarm condition clears.

Command Response

HTTP Interface

When the RTU processes a command received over the HTTP interface, it responds with a short XML document. The XML document has the following structure:

```
<CMD RC="RetCode" MSG="RetMsg" />
```

where

- `RetCode` is a number, the return code. Values are: 0 for "ready"; 1 for "web busy"; 2 for "no command"; 3 for "no password"; 4 for "bad command"; 5 for "bad password"; 6 for "timeout"; 7 for "no data"; 8 for "unauthorized access". Note that even though a "ready" value is returned, it is still possible that the command may have failed during processing.
- `RetMsg` is a short text return message. Allow for 10 characters.

SNMP Interface

If an error is encountered during the processing of a command entered via the SNMP `rtuWebCommand` variable, an SNMP "Bad value" error is returned. Reading the `rtuWebCommand` variable will return "OK" if the command was accepted or may have a short error message otherwise. Note that even though a command is accepted by the RTU, it is still possible that it may have failed during processing.

Retrieving RTU Settings

You retrieve an RTU's settings by issuing a GET request on the RTU.

The format of the GET request is:

```
rtu.xml
```

The RTU will respond with an XML document that contains the RTU's settings. The root tag is

```
RTU
```

The RTU tag contains many attributes, described below, and it also contains many other tags that contain their own attributes.

All settings are expressed in attributes contained in tags, as described in the following sections.

RTU Tag

The RTU tag contains the following attributes.

- MO gives the model of the RTU.
- CB gives the name of the RTU manufacturer.
- ST gives the overall RTU status as a number. Values are: 0 for normal; 1 for alarm; 2 for ARA; 3 for historic.
- NM is the name of the RTU.
- RB gives the version of the Network processor firmware.
- VR gives the version of the I/O processor firmware.
- CO gives the communications method of the RTU.
- MD is "T" if the RTU is in test mode, or "N" if it is in normal production mode.

- TU gives the temperature units, "C" for Celsius, or "F" for Fahrenheit.
- FL is "1" if the RTU is to flash on alarm, or "0" if it is go solid red.
- AU is "1" if the RTU is to make an audible sound on alarm, or "0" if it is to remain silent.
- AN is a number, the sound number generated by the RTU on alarm.
- AM is the ARA timeout time in minutes.
- PL is "1" if the front panel lock is enabled, or "0" if it is disabled.
- LP is "1" if low power mode is enabled, or "0" if it is disabled.
- TLI gives the number of seconds between recording values in the timed logs.
- CPURL gives the URL where a configuration page can be found on the local intranet.
- RM is the notification re-send method. The value is "0" if no re-sends are required; "1" if the RTU is to re-send notifications; or "2" if the RTU is to stop re-sending notifications if they are acknowledged.
- RS is the number of seconds to wait before re-sending a notification.
- RTC is the maximum number of times a notification is to be re-sent.
- DP gives a device PIN.

DEV Tag

The DEV tag contains the following attributes that describe device settings.

- DGTL gives the number of digital ports in the RTU.
- ANLG gives the number of analog ports in the RTU.
- TEMP gives the number of temperature ports in the RTU.
- VRTL gives the number of virtual ports in the RTU.
- PVAR gives the number of programming variables available to rules script.
- RMT gives the maximum number of tokens available to be stored in rules script.
- RST gives the number of tokens that can be transferred in a rules script segment.
- SMTP is "1" if SMTP (email send) facilities are available in the firmware, or "0" if this facility is not available.
- PF is "1" if power fail hardware is available in the RTU, or "0" if the hardware is not available.
- IPT is "1" if the Pass Thru feature is available, or "0" if it has not been configured.
- DOO is the number of digital output ports configured in the RTU.
- DIO is the number of digital general purpose I/O ports configured in the RTU.
- AI is the number of analog input ports configured in the RTU.
- SA is the serial address of the RTU.

- CC is the customisation code for the RTU firmware. Its format is 2 sets of 3 characters with a stroke ("/") character between them. The characters on the left give the customisation code of the Network processor, the characters on the right give the customisation code of the I/O processor.
- SV is the SNMP version installed in RTU's SNMP agent.
- MV is the MIB version support by the RTU's SNMP agent.

ETH Tag

The ETH tag contains the following attributes that describe the ethernet settings.

- IP gives the ethernet IP address of the RTU.
- SM gives the subnet mask for the RTU.
- GU is "1" if an IP gateway is being used, or "0" if it is not.
- GW is the IP address of the gateway, if one is being used.
- HTTP is "1" if HTTP services are being supported over the ethernet, or "0" if HTTP is not being supported.
- SNMP is "1" if SNMP services are being supported over the ethernet, or "0" if SNMP is not being supported.
- SMTP is "1" if SMTP services are being supported over the ethernet, or "0" if SMTP is not being supported.
- NTP is "1" if NTP services are being supported over the ethernet, or "0" if NTP is not being supported.

IPT Tag

The IPT tag contains the following attributes that describe the Pass Thru settings.

- BR gives the baud rate of the RTU's multi function port.
- DB gives the number of data bits used for serial communication via the RTU's multi function port.
- SB is the number of stop bits used during serial communication via the RTU's multi function port.
- PAR is the parity used during serial communication via the RTU's multi function port. Values are "0" for no parity, "1" for odd parity, and "2" for even parity.
- IPN is the IP port number used to create an IP socket for Pass Thru communications.
- EN is "1" if the Pass Thru feature is enabled, or "0" if it is not.

NTP Tag

The NTP tag contains the following attributes that describe the NTP settings.

- NA gives the number of seconds after midnight at which an NTP request is to be made to adjust the RTU's clock.
- NA gives the IP address of the NTP server.

PPP Tag

The PPP tag contains the following attributes that describe the PPP settings.

- DN is the number the RTU must dial to establish a serial connection to the PPP server.
- IP gives the IP address of the RTU when connected using PPP.
- LM gives the login method used by the RTU when connecting to the network.

- UN is the user name to use when establishing a PPP connection. This value is encrypted.
- UP is the password to use when establishing a PPP connection. This value is encrypted.
- RA is the IP address of the server for the PPP connection.
- RM is the number of minutes an RTU must wait, after it terminates a connection with the PPP server, before it can attempt to connect again.
- HTTP is "1" if HTTP services are being supported over PPP, or "0" if HTTP is not being supported.
- SNMP is "1" if SNMP services are being supported over PPP, or "0" if SNMP is not being supported.
- SMTP is "1" if SMTP services are being supported over PPP, or "0" if SMTP is not being supported.
- NTP is "1" if NTP services are being supported over PPP, or "0" if NTP is not being supported.

SEC Tag

The SEC tag contains the following attributes that describe the security settings.

- APE is "1" if the administrator password is enabled, or "0" if it is disabled.
- AP is the administrator password. This value is encrypted.
- RPE is "1" if the operator password is enabled, or "0" if it is disabled.
- RP is the operator password. This value is encrypted.

- PK is related to RTU security.
- PT is related to RTU security.

SER Tag

The SER tag contains the following attributes that describe the serial port settings.

- ET gives the type of equipment attached to the serial port.
- BR is the baud rate at which the serial port is to operate.
- FC is "1" if flow control is being used, or "0" if it is not.
- MT is the modem type variant.
- GPOK is "1" if the PIN associated with the SIM card in the GSM modem is valid, or "0" if it is not correct.
- GPIN gives the PIN associated with the SIM card in the GSM modem.
- IS is the initialisation string to use with the attached modem.
- DP is the dial prefix to use when initiating a call.
- M1 is the first modem customisation string.
- M2 is the second modem customisation string.
- M3 is the third modem customisation string.

SMS Tag

The SMS tag contains the following attributes that describe the SMS messaging settings.

- RM gives the number of minutes the RTU must wait, after it has sent an SMS message, before it can send another message.

- AU is "1" if the first SMS destination is to be used, or "0" if it is not to be used.
- AN is the number of the first destination to which SMS messages will be sent.
- BU is "1" if the second SMS destination is to be used, or "0" if it is not to be used.
- BN is the number of the second destination to which SMS messages will be sent.

SMTP Tag

The SMTP tag contains the following attributes that describe the SMTP email messaging settings.

- FM gives the identification of the RTU as stated in the "From" section of an email.
- AU is "1" if the first email destination address is being used, or "0" if it is not.
- AT is the first email destination address.
- BU is "1" if the second email destination address is being used, or "0" if it is not.
- BT is the second email destination address.
- SV is the IP address of the SMTP outgoing mail server.

SNMP Tag

The SNMP tag contains the following attributes that describe the SNMP settings.

- TZ is "1" if a trailing zero is to be used on OIDs, or "0" if no trailing zero is to be appended.

- AU is "1" if the first SNMP manager server is being used, or "0" if it is not.
- AS is the IP address of the first SNMP manager server.
- BU is "1" if the second SNMP manager server is being used, or "0" if it is not.
- BS is the IP address of the second SNMP manager server.
- CU is "1" if the third SNMP manager server is being used, or "0" if it is not.
- CS is the IP address of the third SNMP manager server.
- DU is "1" if the fourth SNMP manager server is being used, or "0" if it is not.
- DS is the IP address of the fourth SNMP manager server.
- EU is "1" if the fourth SNMP manager server is being used, or "0" if it is not.
- ES is the IP address of the fourth SNMP manager server.
- MP is the port on which the RTU's SNMP agent will listen for server messages.
- TP is the port on the SNMP management servers to which the RTU's SNMP agent will send trap messages.
- RS is the minimum number of seconds the RTU's SNMP agent must wait before re-sending a trap to the SNMP management servers.
- RTC is the maximum number of times a trap can be re-sent to the SNMP management servers.
- RC is the SNMP read community string.

- WC is the SNMP write community string.
- TC is the SNMP trap community string.

C Tag

The C tag contains attributes for a port. There is one C tag for every port in the RTU. The attributes for the C tag are different depending on the port type described by the tag.

Each port has the following common attributes:

- D gives the port's designation. Each port is identified by a letter ("A" for analog, "D" for digital, "T" for temperature, "V" for virtual) that identifies the port type, followed by 3 digits giving the port number for that type.
- NM gives the main (or only) text label for the port.
- PNT gives the port number for the port within that type of port.
- PNO gives the overall port number for the port within the RTU.
- EN is "1" if the port is enabled, or "0" if it is disabled.

Analog Port Attributes

In addition to the common attributes described earlier, an analog port has the following attributes:

- PS gives the position for the port, the second text label associated with the port.
- GC gives the group code for the port, the third text label associated with the port.
- UN specifies the units being measured by the port.
- LU is "1" if the port is enabled for low alarms, or "0" if it is not.

- LDC is "1" if the port is enabled for low duty cycle information, or "0" if it is not.
- LT is the value below which an alarm and / or duty cycle is triggered.
- LR is the value above which, if a low alarm and / or duty cycle is active, the low alarm and / or duty cycle is stopped.
- HU is "1" if the port is enabled for high alarms, or "0" if it is not.
- HDC is "1" if the port is enabled for high duty cycle information, or "0" if it is not.
- HT is the value above which an alarm and / or duty cycle is triggered.
- HR is the value below which, if a high alarm and / or duty cycle is active, the low alarm and / or duty cycle is stopped.
- PR gives the priority of the port.
- ZL is the lower value for scaling purposes.
- ZH is the higher value for scaling purposes.
- EL is "1" if port activity is being recorded in the events log, or "0" if it is not.
- TL is "1" if the port value and status are being recorded at regular intervals in the timed log, or "0" if it is not.
- RA is "1" if alarms for this port are to be reported, or "0" if they are not.
- EP is the number of elapsed seconds since duty cycle monitoring was last activated for this port.
- AP is the number of seconds recorded as active since duty cycle monitoring was last activated for this port.

- BPR is a back plane label, always blank in this version.
- GH is "1" if the port is to go into historic when an alarm condition is cleared, or "0" if the port is to go to normal state.

Digital Port Attributes

In addition to the common attributes described earlier, a digital port has the following attributes:

- PS gives the position for the port, the second text label associated with the port.
- GC gives the group code for the port, the third text label associated with the port.
- IN is "1" if the port is an input port, or "0" if it is an output port.
- OO is "1" if the port is an output only port, or "0" if the port can be configured for input.
- AU is "1" if the port is enabled for alarms, or "0" if it is not.
- DCU is "1" if the port is enabled for duty cycle information, or "0" if it is not.
- AWO is "1" if the port is active when open (normally closed), or "0" if it is active when closed (normally open).
- AS gives the number of active seconds for the port.
- PR gives the priority of the port.
- EL is "1" if port activity is being recorded in the events log, or "0" if it is not.
- TL is "1" if the port status is being recorded at regular intervals in the timed log, or "0" if it is not.

- RA is "1" if alarms for this port are to be reported, or "0" if they are not.
- EP is the number of elapsed seconds since duty cycle monitoring was last activated for this port.
- AP is the number of seconds recorded as active since duty cycle monitoring was last activated for this port.
- BPR is a back plane label, always blank in this version.
- GH is "1" if the port is to go into historic when an alarm condition is cleared, or "0" if the port is to go to normal state.

Temperature Port Attributes

In addition to the common attributes described earlier, a temperature port has the following attributes:

- LU is "1" if the port is enabled for low alarms, or "0" if it is not.
- LDC is "1" if the port is enabled for low duty cycle information, or "0" if it is not.
- LT is the value below which an alarm and / or duty cycle is triggered.
- LR is the value above which, if a low alarm and / or duty cycle is active, the low alarm and / or duty cycle is stopped.
- HU is "1" if the port is enabled for high alarms, or "0" if it is not.
- HDC is "1" if the port is enabled for high duty cycle information, or "0" if it is not.
- HT is the value above which an alarm and / or duty cycle is triggered.

- HR is the value below which, if a high alarm and / or duty cycle is active, the low alarm and / or duty cycle is stopped.
- PR gives the priority of the port.
- ZL is the lower value for scaling purposes.
- ZH is the higher value for scaling purposes.
- EL is "1" if port activity is being recorded in the events log, or "0" if it is not.
- TL is "1" if the port value and status are being recorded at regular intervals in the timed log, or "0" if it is not.
- RA is "1" if alarms for this port are to be reported, or "0" if they are not.
- EP is the number of elapsed seconds since duty cycle monitoring was last activated for this port.
- AP is the number of seconds recorded as active since duty cycle monitoring was last activated for this port.
- BPR is a back plane label, always blank in this version.
- GH is "1" if the port is to go into historic when an alarm condition is cleared, or "0" if the port is to go to normal state.
- CO is the calibration offset used to adjust the sensor's reading to a known value.

Virtual Port Attributes

In addition to the common attributes described earlier, a virtual port has the following attributes:

- IN is "1" if the port is an input port, or "0" if it is an output port.
- AS gives the number of active seconds for the port.

- PR gives the priority of the port.
- EL is "1" if port activity is being recorded in the events log, or "0" if it is not.
- TL is "1" if the port status is being recorded at regular intervals in the timed log, or "0" if it is not.
- RA is "1" if alarms for this port are to be reported, or "0" if they are not.
- EP is the number of elapsed seconds since duty cycle monitoring was last activated for this port.
- AP is the number of seconds recorded as active since duty cycle monitoring was last activated for this port.
- BPR is a back plane label, always blank in this version.
- GH is "1" if the port is to go into historic when an alarm condition is cleared, or "0" if the port is to go to normal state.

Retrieving RTU Status Information

You retrieve status information for an RTU and its ports by issuing a GET request on the RTU. The format of the GET request is:

```
rtustat.xml
```

The RTU will respond with an XML document that contains the RTU's status information. The root tag is

```
RTUSTAT
```

The RTUSTAT tag contains attributes, described below, and it also contains other tags that contain their own attributes.

All information is expressed in attributes contained in tags, as described in the following sections.

RTUSTAT Tag

The RTUSTAT tag contains the following attributes.

- ST gives the overall status of the RTU. Values are: "0" for normal; "1" for alarm; "2" for ARA; "3" for historic.
- TP gives the internal temperature of the RTU.
- MO gives the RTU model.
- RL is "1" if the rules script is valid, or "0" if it is not able to be executed.
- RM gives an error code for the rules script.
- RP gives the zero-based index of the token causing a problem with the rules script.
- TM gives the RTU time (that should be stored in GMT / UTC) as the number of seconds since 1 January 1980.
- TN is the last trap send number. Each time a trap is sent, this number is incremented.
- IPT is "1" if Pass Thru is currently active, or "0" if it is not currently active.

SEC Tag

The SEC tag contains attributes relating to RTU security.

- PK is related to RTU security.
- PT is related to RTU security.

CH Tag

The CH tag contains attributes that give the port status and values. There is a tag for each type of port in the RTU. The contents of each

tag differ depending on the port type. However each CH tag contains the following attributes:

- TP gives the port type to which the tag relates. Values are "A" for analog ports; "D" for digital ports; "T" for temperature ports; "V" for virtual ports.
- D gives the alarm status for the ports of the specified type. There is one character for each port. See the next section for an explanation of how to interpret a port's status.

Port Status

Each port is represented by a single character. The character displayed is always a hexadecimal character. To interpret the meaning of this character, convert it into binary form and look at each of the individual bits.

- The most significant (leftmost) bit is set to "1" if the port is in alarm, or "0" if it is not currently in alarm.
- The second most significant bit is set to "1" if the port is in ARA, or "0" if it is not currently in ARA.
- The third most significant bit is set to "1" if the port has a historic alarm, or "0" if there is no historic alarm for the port.
- The least significant bit is set to "1" if the port is currently active, or "0" if it is not active.

Examples:

- A digital input port that is in alarm must also be active. If the port is in alarm but not ARA, and has no historic alarm, then its status would be represented as:

$$ALM + 0 + 0 + ACT = 1001 = "9"$$

- If the same digital input port is also in ARA then its status would be shown as:

$$\text{ALM} + \text{ARA} + 0 + \text{ACT} = 1101 = \text{"D"}$$

- If the alarm condition goes away and the port goes into historic, then its port status is shown as:

$$0 + 0 + \text{HST} + 0 = 0010 = \text{"2"}$$

Analog Ports

In addition to the common attributes described earlier, analog ports have the following attribute:

- V contains a list of values for all the analog ports in the RTU. Each value is separated from the next by a tilde ("~") character and terminated by a tilde character.

Digital Ports

For digital ports there are no attributes in addition to the common attributes described earlier.

Temperature Ports

In addition to the common attributes described earlier, temperature ports have the following attribute:

- V contains a list of values for all the temperature ports in the RTU. Each value is separated from the next by a tilde ("~") character and terminated by a tilde character.

Virtual Ports

For virtual ports there are no attributes in addition to the common attributes described earlier.

Retrieving Logs Information

You retrieve log information for an RTU and its ports by issuing a GET request on the RTU. The format of the GET request is:

```
rtulog.xml ? data = LogType ~ DurationInSecs ~ StartSecs  
~ StartRecNum ~ MaxRecs ~ StartSeqNum ~
```

where

- There are no spaces in the command line, they are only included here to make it easier to read.
- “~” is the tilde character, used to separate arguments from each other.
- `LogType` is a single character defining which log is to be retrieved. Values are: “A” for audit; “E” for events; “T” for timed. This is the only parameter that is required; the rest can be left empty or omitted altogether, in which case all records in the log will be retrieved.
- `DurationInSecs` is only used if `StartSecs` is also specified (see next field). Log records are retrieved as long as they are within the specified time period.
- `StartSecs` gives the start time from which logs are to be retrieved. This time must be given in seconds from 1 January 1980 and must be in GMT / UTC.
- `StartRecNum` is an internal record number at which to start retrieving log records. This number is specified as a value from 0 to 999. It is usually used where more than one retrieval request is being used, as the returned XML gives this value to make the next retrieval as efficient as possible.

- `MaxRecs` is the maximum number of log records to retrieve. If not specified, all records are retrieved.
- `StartSeqNum` is the log sequence number at which to start retrieving records. This number is specified as a value from 0 to 999,999.

The RTU will respond with an XML document that contains the requested log records. The root tag is

LOG

The LOG tag contains attributes, described below, and it also contains other tags that contain their own attributes.

All information is expressed in attributes contained in tags, as described in the following sections.

LOG Tag

The LOG tag contains the following attributes.

- TP identifies which log is being retrieved. Values are: "A" for audit; "E" for events; "T" for timed.
- TS gives the time duration in seconds for which logs have been retrieved. A value of 0 indicates that this was not specified in the request.
- ST gives the starting time from which logs have been retrieved, the time is expressed in seconds from 1 January 1980. A value of 0 indicates that this was not specified in the request.
- SR gives the starting internal record number from which logs have been retrieved. A value of 0 indicates that this was not specified in the request.

- MR gives the maximum number of records requested. A value of 0 indicates that this was not specified in the request.

LI Tag

There is one LI tag for each log record retrieved. Each LI tag contains the following attributes.

- RN is an external record number, from 1 to 999,999. When this value reaches 999,999, it wraps around back to 1.
- TI is the time at which the logged event took place, recorded in GMT / UTC seconds since 1 January 1980.
- P specifies the port for which the information was logged. The value is specified as a single character ("A" for analog; "D" for digital; "T" for temperature; "V" for virtual) that identifies the port type followed by 3 digits identifying the port number.
- S gives the status of the port when the information was logged. This value is interpreted as specified in the "Port Status" subsection of the "Retrieving RTU Status Information" earlier.
- V gives the value of the port when the information was logged. Although this tag is always present it is only meaningful for analog and temperature ports.

CTL Tag

The last tag generated in the LOG XML document is the CTL tag. This tag contains the following attributes:

- MR is "1" if there are more log records in the log file after the ones that have been retrieved, or "0" if the retrieved records are the last ones in the file.

- SR is the internal record number of the next record to be retrieved after the last record returned in this XML document. This makes a subsequent retrieval more efficient.

Retrieving Rules Script

You retrieve rules script tokens from an RTU by issuing a GET request on the RTU. The format of the GET request is:

```
rules.xml ? data = StartTokenNum ~ MaxTokens ~
```

where

- There are no spaces in the command line, they are only included here to make it easier to read.
- “~” is the tilde character, used to separate arguments from each other.
- Both arguments are optional. If they are not specified, the whole rules script is retrieved.
- `StartTokenNum` specifies the number of the first token to retrieve. The first token in the script is token number 1. If not specified, tokens are retrieved from the first one onward.
- `MaxTokens` specifies the maximum number of tokens to retrieve. If not specified, all tokens are retrieved.

The RTU will respond with an XML document that contains the requested rules script tokens. The root tag is

```
RULE
```

The RULE tag contains attributes, described below, and it also contains other tags that contain their own attributes.

All information is expressed in attributes contained in tags, as described in the following sections.

RULE Tag

The RULE tag contains the following attributes.

- EN is "1" if the rules script is enabled, or "0" if the script is disabled.
- SR gives the starting script token requested for retrieval. A value of 0 indicates that this was not specified in the request.
- MR gives the maximum number of records requested. A value of 0 indicates that this was not specified in the request.

SCRIPT Tag

The XML document contains one or more SCRIPT tags that contain rules script tokens (the code). Each SCRIPT tag contains the following attributes.

- CD contains up to 64 script tokens. Rules script is made up of case sensitive alphanumeric characters.

CTL Tag

The last tag generated in the RULE XML document is the CTL tag. This tag contains the following attributes:

- MR is "1" if there are more tokens in the rules script after the ones that have been retrieved, or "0" if the retrieved tokens are the last ones in the rules script.
- SR is the number of the next token to be retrieved after the last token returned in this XML document. This means you don't

have to calculate the starting token number for the next retrieval, if one is required.