SITEWATCH™

Micro RTU

A guide for setting to work on a Sitewatch System

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1   INTRODUCTION

Sitewatch is Lee-Dickens Ltd's remote control and monitoring solution. It is a high integrity software package designed for use in mission critical applications across all sectors of industry.

The Sitewatch Micro RTU is a small low powered 'Remote Terminal Unit' (RTU) that can read analogue and digital values and communicate status and alarms via 'Mobile Data' (GPRS) and/or SMS.

This document is a guide aimed at customers who wish to configure a Micro RTU to report in to a Sitewatch System via a 'Mobile Data' connection.

Readers of this document should already be familiar with:
- Sitewatch Operator's Guide
- RCMS Configurer's Guide
- Micro RTU Handbook

1.1   NETWORKING

The Micro RTU will be configured to communicate to the Sitewatch Server using a 'Mobile Data' connection.

1.1.1   Access Point Name

The RTU will need to establish a connection to the internet via the APN (Access Point Name) provided by the cellular SIM provider. You will need to find out the following details from the provider:
- APN   (for example Vodafone UK APN is simply 'internet')
- Username   (for example Vodafone UK APN Username is 'web')
- Password   (for example Vodafone UK APN Password is 'web')

1.1.2   Server Port

Once the RTU has a working internet connection, it will need to establish a 'socket connection' to a TCP/IP port listening on your server. A typical arrangement is as follows:

> The Sitewatch Server will be installed on a private LAN with an IP address such as 192.168.1.100

> A Firewall will sit between the LAN and the internet. The firewall must be accessible from the internet via a public FIXED IP address such as 81.123.123.99 – this must be organised via you internet (broadband) provider.

> A TCP/IP port number must be selected for the Micro RTU to connect with. The Firewall must be configured to forward that selected port from the internet (WAN) to the Sitewatch Server on the LAN.

> So for example the Micro will try to connect to '81.123.123.99 port 8100' over the internet. The Sitewatch Server will be configured to expect the connection on 192.168.1.100 port 8100.

> In practice, if the system is to accommodate numerous Micro RTUs, it is usual to set up one forwarding rule on the firewall that forwards a contiguous pool of ports from the WAN to the Sitewatch Server.

2 CREATING TAGS IN SITEWATCH

This section will show how an example Micro should be set up if it is required to communicate to a Sitewatch Server.

2.1 CREATE A NEW TCP TAG:

- **Name**: Such as 'Micro_Loc1' (Loc1 being your location / site descriptor)
- **Area**: Such as 'Loc1'
- **Description**: Such as 'Connection to Loc1'
- **Address**: Leave blank in order to make this operate as a server port.
- **Port Number**: Your IT Department need to assign a port number that is forwarded by the firewall from the internet to your Sitewatch server on your internal LAN.
- **Time Limit**: Typically 30 seconds
- **Disconnect Delay**: Typically 30 seconds

2.2 CREATE A NEW 'MICRO RTU POINT':

- **Name**: Such as 'Micro_Loc1_RTU'
- **Area:** Such as 'Loc1'
- **Description**: Such as 'Micro RTU at Loc1':
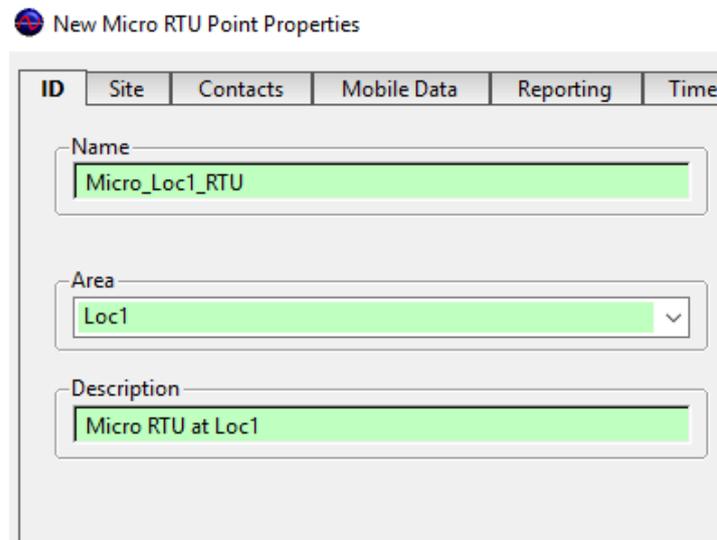
2.2.1 Site tab

- o **Micro IMEI Number:** This can be found inside the RTU on the GSM module (omit all dashes and spaces!):
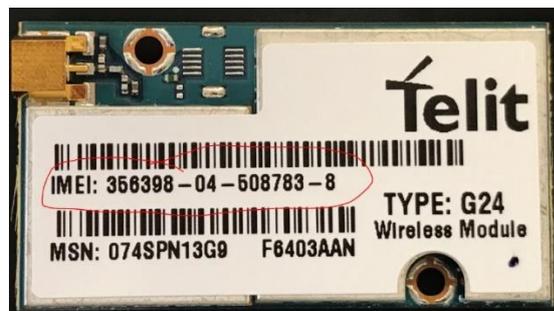
- ○ **Micro SMS/Phone number**: Enter the phone number of the RTU's SIM

2.2.2 Contacts tab

- ○ For Micro RTUs that are reporting to a Sitewatch Server via GPRS, the contacts are typically left blank, although (as indicated in the handbook) it is a good idea eventually to secure the unit by adding a valid SMS number for the administrator's phone.

2.2.3 Mobile Data tab

- ○ **Server listening TCP Port**: Select the Micro_Loc1
- ○ **APN + username + Password**: These are the access point name details available from your SIM/cellular provider
- ○ **Micro Remote Server IP address**: This is the public IP used to access your Sitewatch server
- ○ **Micro Remote Server**: This is the unique port number that allows this RTU to connect to the its parent TCP tag (typically requires port forwarding configured in you firewall to route the incoming connection to the server port)

IMPORTANT: These details must be stored in the RTU before the RTU will be able to establish a connection to the server. However, since initially the RTU will not know these details it will be unable to talk to the server – and therefore the server will not be able to send these details to the RTU! Therefore, in the first instance these details will need to be sent to the RTU using SMS. This will be detailed later.

2.2.4 Reporting Tab

- ○ **Reporting Interval**: Typically set to 15 minutes, but depends on the application. This sets the interval for status reports via GPRS and SMS (if required).
- ○ **Status SMS-Format File**: This is used if, as well as reporting via GPRS, the RTU is required to send SMS status reports. This field allows the 'StatForm' template report to be defined, either by entering the template text directly, or by specifying a file containing the template text (Template files should be stored under the customer application folder (but NOT in the Data sub-folder!)). See Micro handbook regarding the StatForm settings but a good starting place would be (note that a new line is specified by a '\n' entry):

    Update: <V1Name>=<V1><V1U>
    (<V1State>)\n<D1Name>=<D1>\n<D2Name>=<D2>\nRead at <CLOCK>\nNext at:
   *<nrt>\nBatt:<B1State>(<B1>%)*

- ○ **Alarm SMS-Format File**: Similar to Status SMS-Format File except this template is used whenever a configured alarm condition arises. Eg: *ALARM!! <V1Name>=<V1><V1U> (<V1State>)\n<D1Name>=<D1>\n<D2Name>=<D2>\nRead at <CLOCK>\nNext at: <nrt>\nBatt:<B1State>(<B1>%)*

2.2.5 Time Tab

In most applications it is preferable to allow the mobile network to provide the RTU with the time updates. The RTUs should be set to use UTC/GMT rather than local time wherever possible.

- ○ **Update RTU Clock** : leave this 'unchecked' in which case the Sitewatch Server will NOT set the RTU clock
- ○ **GMT Time Offset**: leave this blank.

2.3 CREATE A NEW 'SITEWATCH RTU' TAG:
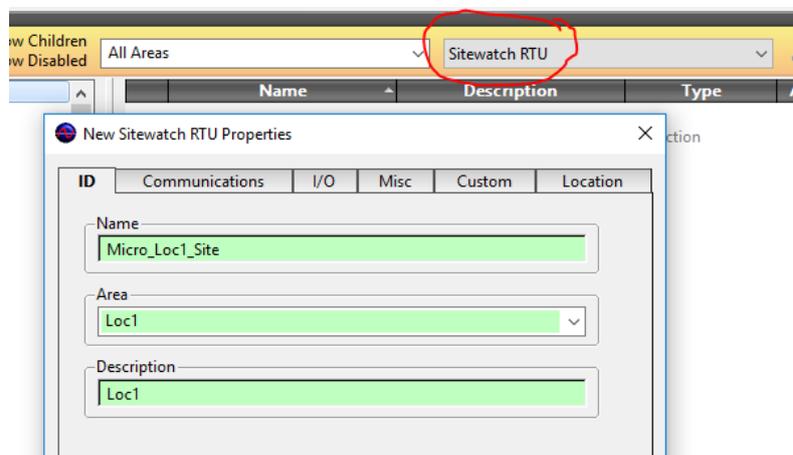
2.3.1 Communications tab

- ○ Comms Driver: Select your Micro RTU point 'Micro_Loc1_RTU
- ○ Timeout: We suggest you check 'Constant' and enter **3600** which will cause the site to be declared stale after 1 hour of silence.
- ○ Commission Site: This should initially be left unchecked
- ○ Alarm Inhibit: This should initially be left unchecked
- ○ Comms Fail and Comms Normal Alarm Priorities: Typically set to 2 and 3 respectively.
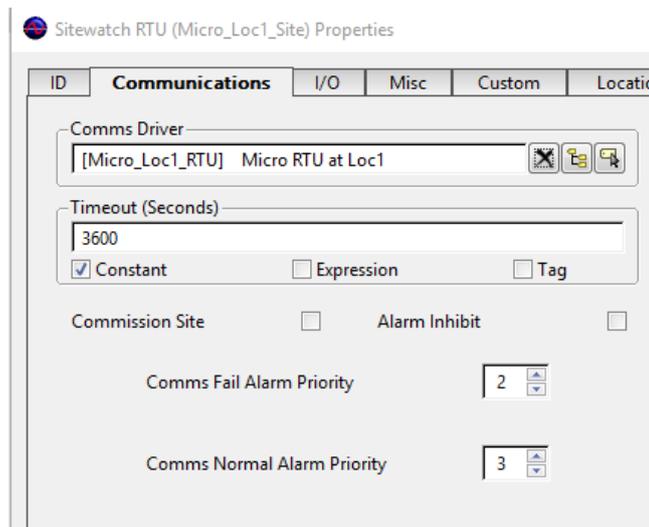
2.3.2 REMAINING tabs

All remaining parameters should be left blank - we'll come back to these later.

2.4 CREATE A NEW 'SITEWATCH ANALOGUE INPUT' TAG

The following analogue input tags are available:

B1	RTU Battery voltage	We would advise that this should be implemented
C1	RTU '12V' Power Supply	This should typically be monitored
V1	The 4-20mA signal	Monitoring depending on the application
V2	Expansion 2.3v input	Monitoring depending on the application
T1	RTU ambient Temperature	This should typically be monitored
Sig	RTU GSM signal strength	This should typically be monitored
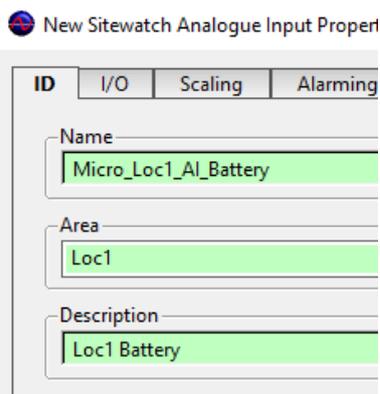
2.4.1 I/O Tab:

- ○ I/O Device: Select the SW RTU Object (not the Micro RTU object!)
- ○ Address: e.g. B1
- ○ Scan Rate: Has no meaning on this RTU; we suggest all channels set to 0 seconds.
- ○ Data Quality Point: Typically left blank.

2.4.2   Scaling Tab:

Depends on the channel being configured.

- B1:
  - Raw scale   3200 to 4300 (mV)
  - Engineering scale   0 to 100
  - Units   %
- C1:
  - Raw Scale   0 to 16.56
  - Engineering scale   0 to 16.56
  - Units   V
- Sig:
  - Raw Scale   0 to 30
  - Engineering scale   0 to 100
  - Units   %
- T1:
  - Raw Scale   - 30 to 70
  - Engineering scale   -30 to 70;
  - Units   DegC
- V1: assume that Z is the engineering value represented by 4mA, and F is the 20mA value. So, for example if the transducer is 0 (4mA) to 50 Kg (20mA), then Z is 0 and F is 50
  - Raw Scale   Z to F
  - Engineering scale   Z to F
- V2: assume that Z is the engineering value represented by 0v, and F is the 2.3V value. So, for example if the transducer is 0 (0V) to 50 Kg (2.3V), then Z is 0 and F is 50
  - Raw Scale   Z to F
  - Engineering scale   Z to F

2.4.3   Alarming Tab:

Note that the Micro does not recognise the Invalid Low and Invalid High limits, so these are best set to the zero-scale and full-scale figures respectively. The other limits can be configured as required.

- Limits: For most channels the assignment is quite arbitrary and application dependant. However, the RTU operates with fixed limits on the B1 channel since these are critical to the RTU's reliable continued operation. The B1 limits that should be used (in order to 'shadow' those assigned by the RTU) are:
  - Invalid Low: 0
  - Low Low   36.36
  - Low   54.54
  - High   100
  - High High   100
  - Invalid High   100
- AlarmDeadband: The deadband can be used to reduce the number of alarm reports that might occur if the signal is noisy or slightly erratic.

2.4.4   Misc Tab:

- Owning Summary Point: Can be selected as required; either a valid owner tag or possibly the SW RTU (Site) tag
- Data Logging Rate: The RTU does not perform logging. Logs are made at the server at the specified Data Logging Rate.
- Log Deadband: This field is normally left blank. Logs are made at the server if the value changes by more than the specified Log Deadband amount.

2.5 CREATE A NEW 'SITEWATCH DIGITAL INPUT' TAG

The following digital input tags are available:

D1	Configure if in use
D2	Configure if in use
D3	Configure if in use

2.5.1 I/O Tab:

- I/O Device: select the SW RTU Object (not the Micro RTU object!)
- Address: e.g. D1
- Number of States: set to 2 (micro only supports two-state tags).
- Scan Rate: Has no meaning on this RTU; we suggest all channels are set to 0 seconds.
- Data Quality Point: typically left blank.

2.5.2 Misc Tab:

- Owning Summary Point can be selected as required; either a valid owner tag or possibly the SW RTU (Site) tag
- Data Logging Rate: The RTU does not perform logging. Logs are made at the server at the specified Data Logging Rate.

2.6 UPDATING THE SITEWATCH RTU POINT

Edit the Micro RTU point.

2.6.1 I/O Tab:

- Mains Status Point - leave this blank
- Battery Status Monitoring: select the point monitoring the B1 value
- Temperature Monitoring: select the point monitoring the T1 value


2.6.2 Communications Tab

- Commission Site: Check/tick this. This will cause all the settings to be sent to the RTU when it eventually talks to the server.

3   ESTABLISHING FIRST COMMUNICATION

3.1   APN SETTINGS

Send the APN settings to the RTU using an SMS message, e.g.

<div align="center">
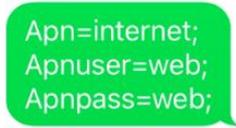
Apn=internet;
Apnuser=web;
Apnpass=web;

</div>

The RTU should send a reply SMS confirming the settings.

3.2   SERVER SETTINGS

Send the Server settings to the RTU using an SMS, e.g.

<div align="center">

SERVERIP=81.123.123.99
SERVERPORT=8100;

</div>

The RTU should send a reply SMS confirming the settings.

3.3   ATTEMPT TO COMMUNICATE

Once the APN and server settings have been sent, the RTU can be instructed to make a connection attempt to the Server by sending a Report SMS:

<div align="center">

Report

</div>

The RTU will not send a reply SMS.

If a connection was correctly established to the server then communications should take place and the server will commission the RTU. To verify the process, monitor the control Panel of the server's SW-RTU point – it will indicate the time of the last successful communication and display RTU Battery and Temperature values:

<div align="center">

Last Update: 2017/11/22 16:15:04
Comms Healthy
Site Status

Battery: 95.0 % (Normal)
Temperature: 22.0 C (Normal)

</div>