Willabay Design EDMS System Provisioning and Installation User Guide

EDMS Equipment and EDA Software Installation Instructions

Version 4.2,   3/6/2018

Introduction

This provisioning document assumes that the reader has read the Environmental Data Monitoring System (EDMS) Product Description and understands the key terms involved in this product. The overall engineering and installation of a specific EDMS customer site is the "project" as defined in this document.

These steps cover the overall EDMS product installation from the first network engineering steps to final activation of the full network. In this document, each EDMS Network Host site consists of the Tibbo device that is serving as the Environmental Data Agent (EDA) and its associated Embedded Data Systems (EDS) Meshnet controller (MN-CTRL). For the remainder of this document, the EDMS Network Host will be referred to simply as the host.

EDS MN Repeaters can also be used in an EDMS network. The instructions for setting up repeaters can be found in the EDS documentation and will not be repeated here other than to point out some device count constraints. EDS combined Temperature and Humidity Sensors (TH types in the text) and long range combined Temperature and Humidity Sensors (THX types in the text) are also now supported, subject as well to some rules as described below.

This version of this document now includes the revised steps that a customer must take to set up their remote portal on the Willabay Design server. The EDMS system allows large customers to have their own MySQL database that they can administer themselves. In most cases; however, Willabay Design will support this database function by internally assigning MySQL databases as necessary.

Advance Planning and Engineering

For many of the types of systems related to multi-site environmental monitoring, the actual engineering and installation would be handled by a service firm that normally handles such things as large business networks or security device engineering and installation. Typically, an alarm system contractor or a residential network installation contractor would be the type of vendor that supports a residential customer premises portion of this product. However, in the case of this EDMS system, there is nothing that would prevent an individual user, such as a property manager, from doing this step themselves if they have prior experience in such areas as home networks.

If a given customer application is limited to one host site with a number of sensors distributed around that site, the engineering aspect of the EDMS system is fairly simple. The customer simply needs to install the host equipment and the sensors and make sure that each sensor is within range of its host

MN-CTRL Controller. The remainder of this section is intended for larger customer networks made up of multiple systems with several host sites in each system.

Using a map of the service area, the person or group of persons planning the project should develop a preliminary plan for assigning hosts (each host is one EDA and one EDS MN-CTRL Controller) to specific locations on the customer's premises. Based on the number of wireless sensors that are to be assigned at each host site, and the distance between each planned host and its sensors, a preliminary location assignment can be made which will determine the number of hosts that are required. The total number of sensors is based on the total number of host sites and the number of sensors at each site. A sample map of a proposed project with three Hosts and 8 separate sensors spread over 7 separate small ski condos is shown in the diagram below. The condos are arranged into 3 buildings (10,11, and 12).
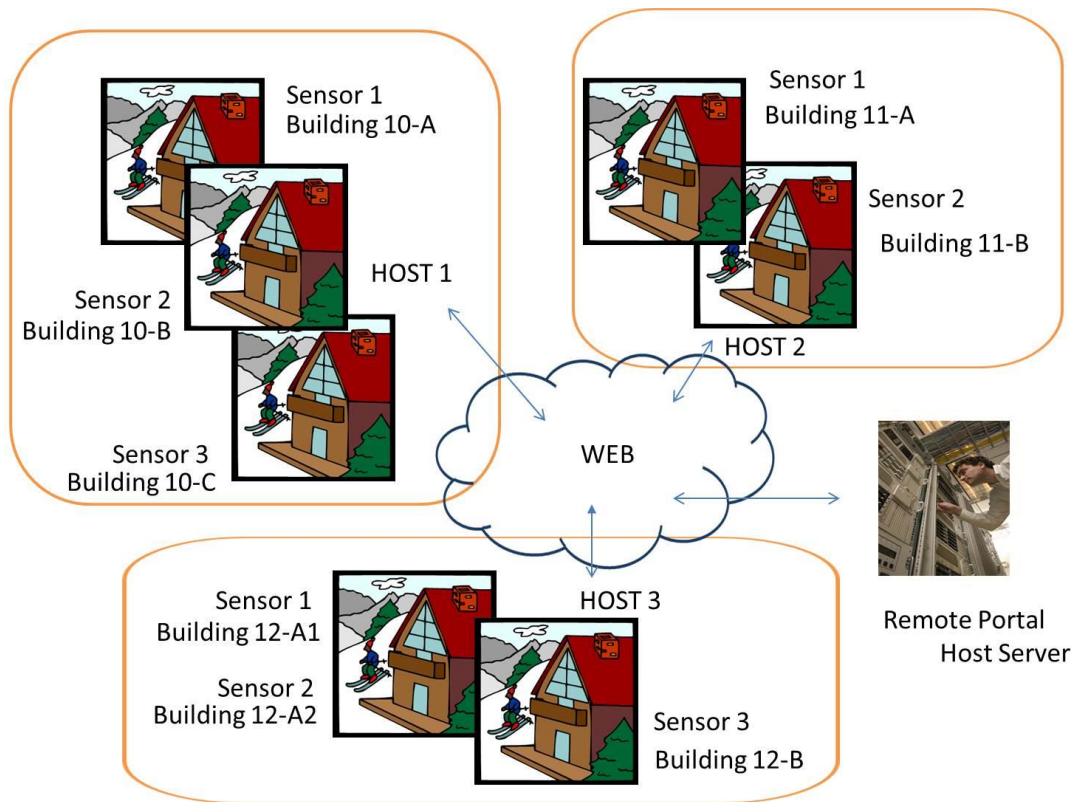
In the plan above, note that Building 12 has two sensors in one condo but only one in the other. The provisioning forms allow for many such naming arrangements for the actual building and unit names. The actual host equipment is only needed in one building per host. Note that with the advent of the new EDS Long Range THX sensor, Host assignments in one building can easily reach THX sensors that are assigned in nearby buildings. As such, some buildings may have sensors in them but not be considered Host Sites.

 In general, each Host building will need its own internet access, a router or equivalent to manage IP addresses, a Tibbo controller that serves as the EDA, and an EDS Meshnet controller. If one EDA is not sufficient for the number of sensors required, additional EDA and Meshnet controllers can be connected

to the same router. If the distance between a given host and a desired sensor location is too far (say another building or floor), EDS MN Repeaters or THX sensors may be used.

While any given host is limited with respect to how many devices the MN-CTRL can support based on its required radio coverage , a typical engineering scenario may result in an average of about 6 to 16 sensors per host. Some hosts may end up with less than 6 sensors, depending on the specific topology for a given project. The current release of this product will only support a maximum of 16 remote devices (sensors or repeaters) on one host because of limitations in the current EDA software. In addition, the use of a Tibbo Generation 1 device such as a DS1101 or TPP2L (G1) as the EDA will now limit the EDA to 8 devices.

In some cases, the planned layout may require the provisioning of one or two EDS Meshnet repeaters in some buildings. These repeaters are also remote devices from the Meshnet controller's perspective thus count as sensors when mixed in with T, TH, or THX sensors.

Please refer to the EDS Meshnet System documentation in the EDS manuals that may be found on the EDS website (http://www.embeddeddatasystems.com)   for specific information relating to the installation of an EDS network. The EDS sensors and repeaters can be placed anywhere within radio range feet of their assigned host controller. The sensors will work as long as they can reach the controller or repeater. The EDS Meshnet wireless system was specifically chosen because of its considerable sensor range.

In most cases, all of the wireless sensors assigned to a given host will be in the same building but in some cases, a specific sensor location may be closer to a planned host location in another building. In any case, a map of the proposed layout should be drawn up and all host locations designated on the map along with their proposed sensors. Once the proposed layout is determined, a preliminary proposal can be given to the customer.

The remaining portions of this document assume that an EDS MN-CTRL controller is configured with the EDS Version 2.02 Firmware or later and any EDS Meshnet sensors are Version 1.18 sensors or later. This document also assumes that the customer has purchased the V4.2.03 (or later) release of the Willabay Design EDA product.

Customer or Third Party Service Provider Database Access Setup

Before any of the on-site equipment is installed at the customer's site, the customer's EDMS database and its support files have to be assigned on Willabay Design's server. The actual database is a standard MySQL database and can be hosted by a third party if necessary. The supporting package of HTML forms and PHP scripts are now on Willabay Design's website. This creates what can be referred to as a private remote portal. If a customer wishes to support their own MqSQL database, the EDMS design can easily support that option.

Several special PHP scripts (referred to as the database access forms) are available to any Willabay Design customers who have purchased an EDA license. Two of these access forms are used to (1) obtain

a Customer Account Number and define the specific internal database elements that the customer will need to administer their remote portal. A second form (2) can be used to assign an additional EDMS System to an existing Customer Code. This remote portal access is free of charge to those users who do not require a large database of their own. They can simply use database setup forms to get their internal tables set up on Willabay Design's shared EDMS database. There is another planned option (1ALT) for very large customers to actually construct their own database entirely using a toolset from a hosting service of their choice. This third option is not yet available.

The specific instructions for the Customer Account (Assign_CustNumber_Form3) and System Setup (Creat_Table_CForm_SYS2) forms can be found on the Remote Portal Setup Page on our website. Once this database access mechanism is set up, the specific steps the installer must complete at this time are described below.

## Tibbo Controller and EDS Equipment Engineering

Preliminary Setup

If the proposed network is intended to serve a large area, such as a residential complex or a large storage facility, it will probably be necessary for the installer to test the wireless radio reception between certain specific host locations and some of the locations that are planned for its sensors. This can easily be done by placing a "Test" Host data collector (the EDS MN-CTRL controller) at a planned host location and sensors in some of the planned sensor locations. They can then observe the received signal strength from these sensors on the EDS controller. This capability (Controller RSSI) is built into the existing EDS Meshnet products and utilizes the individual sensor display pages on the MN-CTRL. From our experience, an average received signal strength of more than -65dBm is sufficient for reliable operation. After the installer validates all of the assigned sensor locations, the final product order can be completed and all of the necessary system components can be delivered to the customer or system installer.

The User Manual for the EDS MN-CTRL can be found at https://eds.zendesk.com/hc/en-us/categories/201742683-MeshNet-Wireless-Sensor-System . This manual describes how to access the sensor data using a web page on the MN-CTRL as well as other controller operations that will be required later in this process.

In order to access both the EDS MN-CTRL controller and the Tibbo controller in a subsequent part of this provisioning process, the installer must have access to a laptop or tablet that supports a web browser that can be used for accessing web pages on these controllers. The EDMS system configuration does not readily support browser access on a smartphone because of the detail that needs to be displayed on the screen. This device can be Wi-Fi based using a wireless router or can be directly connected to the router in each installed location. This access computer is only needed for this provisioning function. After installation, a similar device may be needed for occasional on-site support, but the customer does not have to buy any specific test equipment to maintain this product.

A diagram of the related equipment that will sit at each host site is shown below with a DS1101 serving as the EDA. This diagram does not indicate any necessary modems provided by the customer's internet service provider. The router does not have to be a wireless router and in fact, turning Wi-Fi off may be necessary if the router does in fact support this capability. A Wi-Fi router may interfere with the Meshnet system's radio signal if it is too close to the MN-CTRL. We have used very powerful routers a few feet away from a MN-CTRL with no problems.

The documentation below assumes that a network router is used for this application but there are other ways that the system can be set up. One such example is by means of an internet access modem that internally can support the DHCP function. In such a case, an IP switch would be needed to connect the modem to the two controllers (Tibbo based EDA and the MN-CTRL). The Tibbo device that serves as the EDA can typically be placed next to the router to minimize cable length.
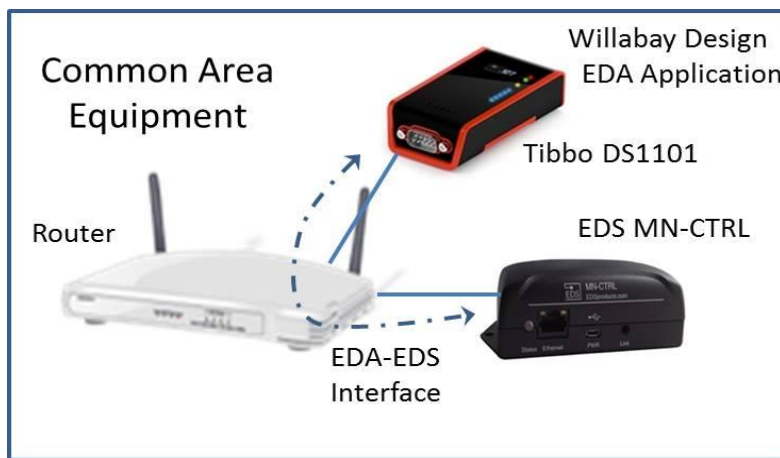
Required Common Area Equipment at a Customer Site

In the above diagram, the solid blue lines are the connecting Ethernet cables and the dashed lines show the path of the access HTTP messages that are used between the Tibbo device and the EDS MN-CTRL controller.

EDS Meshnet Controller Setup

For every planned EDS MN-CTRL controller location that is determined by the above engineering process, the system installer has to determine a suitable location where the Internet Access Equipment (IAE), the network router, and the Tibbo controller (assumed to be a DS1101 in this document) will be located. This step is determined by the location of the appropriate Internet equipment terminations in the building and whether it is possible to place the router and DS1101 (EDA) at that location and physically connect the EDS MN-CTRL controller to the router when the MN-CTRL is centrally located. As an example, there may be a utility room where existing phone lines are terminated and where AC power is available to power the IAE equipment, a router, and the DS1101. It is then necessary to connect the router to the EDS MN-CTRL controller which may be at a different physical location in the same building. The EDS controller is best placed in the center of its field of associated sensors. This setup may require a

long Internet cable to reach the MN-CTRL controller. This controller also requires AC power access for its 5 volt supply. The MN-CTRL controller should not be placed near any metal object which would limit its wireless range.

The specific type of router that is used is not an important factor in this system; however, a combined modem and router may simplify the support aspects of this EDMS system. If it is more convenient for the installer to utilize cable modem technology or other wireless technology to support this internet access, these would also be viable alternatives. Prior to any work on the MN-CTRL, the installer should insure that the router is set up to properly assign a range of DHCP based IP addresses to devices that are connected to it.

When the EDS controller is first powered up and connected to a router, the router will assign an available IP address to the controller using DHCP. EDS also supports a software tool called EDSScanner which can be used to discover an EDS controller on a network and identify the appropriate DHCP generated IP address for use in the next step. The EDS website has an excellent set of manuals covering the MN-CTRL, a MN-RPT repeater, or any of the MN-ENV sensors.

> NOTE: The current EDA software release now supports a handy LCD display of all of the appropriate IP addresses if the user has opted to use the TPP2L for the EDA. Once the TPP2L is loaded with the EDA application, the EDA and MN Controller IP addresses are available using the second and third keys respectively on the TPP2L keypad (below the LCD). If the installer has already loaded the TPP2L device with the EDA software, this device can be used to determine the MN-CTRL IP address using the third key. (See Section 1.1 in the Tibbo Device Setup section)

System Configuration – Meshnet Controller

After the EDS MN-CTRL controller is initialized and assigned an IP address in the router's DHCP range, the installer can access the controller's web page and easily set up the MN-CTRL for this application. All of the necessary controller setup links are found under the System Configuration tab on the MN-CTRL controller's home page. The default User Name and Password for the MN-CTRL is "admin" and "eds". After following the EDS instructions and getting into the MN-CTRL, the following EDMS specific parameters have to be assigned.

System Configuration – Network

1. On the Network Page that is reached from the System Configuration tab, the Device Name on the setup form is used as a means to identify this controller. For this EDA application this name must be assigned as "MNCTRL_HCxx" where the xx is a number that is assigned as the host number for this EDA. Hosts are numbered 1 to N for every customer deployment on the same system.
2. The installer needs to assign a username and password for this device so that others cannot easily access the equipment. It is recommended that all hosts for a given customer use the same id (admin) and password for simplification.

3. The "Host Name" under the same Network tab has to be assigned a name ending in "MNCTRLxx" where the xx is the number of this assigned host in the system. It must be the xx in the Device Name above. In general, one system should be limited to at most 10 to 12 hosts. The overall host name can be a maximum of 10 characters.
4. The Enable DHCP button should be unchecked and a specific static IP address assigned to this MN-CTRL host controller. This IP address must be outside of the routers expected DHCP range. The last IP segment for this static IP address will be used later in the EDA setup procedure. As an example, if the IP address for the gateway router is 192.168.1.1, then the first three segments will be 192.168.1. The Network page on the MN-CTRL should be used to assign the EDS controller a static IP address such as 192.168.1.220 (the standard EDA default). In reality, any last segment number can be used as long as the EDA and MN-CTRL are consistent. While the system will work with IP addresses assigned by DHCP, it is far easier to work with internally assigned in-network static IP addresses.
5. The Gateway field must be set to the router's IP address (the above 192.168.1.1) and the Subnet Mask must be assigned as 255.255.255.0.
6. The primary DNS address would normally be the ISP modem or router IP address but any valid set of DNS server IP addresses can be used for a primary and secondary DNS address.
7. The HTTP Port must be changed from the default of 80 to 64500. This is a fixed port assignment that the EDA will use and must be used for any manual access to the MN-CTRL after the controller is rebooted.

   After the above steps are completed, the data can be saved and the EDS controller will be restarted on this newly assigned static IP address. Browser access to this controller using the previous IP address example will now be 192.168.1.220:64500.

System Configuration - Wireless

1. The original Network Key should not be changed but the Channel Hop counter must be set to a high enough value to avoid excessive battery use. EDS documentation describes this in more detail but a safe value would be 672 hours to cover 4 weeks. A specific recommended value for this counter will be available after Willabay Design gains more experience with this product.
2. In the event that multiple EDS controllers and their sensors will be operating within radio range of each other, the PAN ID of each controller must be unique. This is extremely important for systems that have multiple hosts in the same area. The PAN ID must be set before any sensors are assigned to the MN-CTRL. This identifier is typically assigned by EDS in a random fashion and you should not run into matching codes in the field.

System Configuration – Devices

1. This capability is not used for the EDMS at this time and should not be used unless you are well versed in working with EDS controllers. This feature allows users to move sensors and repeaters between different controllers in the same neighborhood. It can be handy if you want to home a

given sensor on a MN-CTRL that is associated with a different host. We have verified that this feature works very well on T or TH sensors that are at version 1.18 or higher or any THX sensor.

System Configuration – Post Client

1. This capability is not used for the EDMS at this time. Both the Enable Client and Enable Proxy boxes must be unchecked. In this application, the EDS controller is not sending POST messages on a scheduled basis.

System Configuration – Lock Order, Telnet, and SNMP

1. The functions on these pages are not used at this time.

System Configuration – SNTP Client

1. This setting determines the remote website that the MN-CTRL will query to obtain the correct Internet Time (UTC). The offset should be changed to get the right time for a specific time zone.

   This list indicates home many hours to use for each time zone.

   EST : -5, CST: - 6, MST: -7, PST: -8

   This SNTP based time is read by the EDA and used on the EDA's display page. As a result, the displayed time on the EDA Display Page and the Remote Portal displays will always reflect the last time the EDA accessed the MN-CTRL Controller for a new set of measurement data.

Once the EDS MN-CTRL controller is powered up and operating, each of its planned sensors or repeaters must be linked to that controller using the provided EDS linking cable. This step, which has to be executed on each sensor one at a time, is necessary with every sensor that is planned to be used with that host MN-CTRL controller. This linking process is described in detail in the EDS manual. After all the sensors are electronically "connected" to the controller, the EDS equipment will be fully operational but not yet accessible to the Tibbo DS1101. Note that the process for which EDS uses to link its sensors to the MN-CTRL is very simple but requires the sensor battery to be installed while the sensor is physically linked to the controller. This is very important.

On recent releases of the MN-CTRL, this sensor linking process can actually be done using the Devices tab described above. Just follow the instructions on that screen.

The process for linking a Meshnet Repeater (MN-RPT) to a controller is very similar and fully documented in the EDS Repeater manual that can be found online.

EDS Sensor Setup

Following the EDS controller setup, and after linking all of the planned sensors to the MN-CTRL, each of the assigned sensors have to be assigned a name for this application. If the sensor was properly "linked" to the controller, the EDS controller will have a "details" file assigned which is accessible on the

controller's home page under the Advanced tab. This "details" file will have an assigned section for every sensor that the MN-CTRL detects. This brings up the complete set of information for all of the assigned sensors. The following sensor fields must be updated at this point for every assigned sensor in the system.

UserName – For temperature sensors (MN-ENV-T) This field must be set to "WD T-y" where "y" is the assigned sensor number from 1-20. As stated above, this number must be limited to 10 on the current release of this product. These sensor names (called a UserName) are completely independent of a given sensor's relative location in the set of details files. It would be a good idea to physically label each of the actual temperature sensors with its assigned name. Combined temperature/humidity sensors (TH or THX) must be named "WD TH-y". The sensor numbers (the y's) MUST be assigned in sequence starting with 1.

There are a few special name code assignments that can be used for sensors that need to be treated differently. One such code is the use of "WS" instead of "WD" on a sensor name. Sensors with this prefix on their names will trip a low temperature alert only when the measured temperature is 20 degrees lower than the low temperature threshold that is currently configured for the EDA. Another code using "WX" instead of "WD" essentially ignores sensors that are above 5 degrees. These settings are handy for monitoring outside unheated rooms adjacent to a heated area.

Any equipped EDS MN Repeaters must also be assigned a UserName and it has to be "WD R-X" for each repeater with the actual letter "X" . They will be assigned internal "sensor" numbers when the EDA first starts accessing the EDS MN-CTRL. The EDA will then assign and use repeater numbers that continue the number range used by any assigned sensors. As an example; if there are 3 environmental (T or TH) sensors, then the first repeater will be internally assigned the name "WD R-4".

Input Send – this field has to be set to 1 for any sensor that will have its Input1 external sensor assigned as a monitored parameter. This is an optional feature for this application. It will only be used on EDS sensors that are also used for access to an external device such as a water sensor. This external sensor access is available in the current release of the EDA product. It will be important that any customers who plans to utilize this feature have compatible sensors; all on or beyond firmware release 1.18.

SensorReadPeriod – this field determines the frequency for which the sensor actually wakes up and makes a data measurement. The field is described in detail in the EDS sensor manual but the recommended setting for this field is 6 for a read once a minute if the server reporting interval is expected to be 5 and 10 minutes. Each count on this setting represents 10 seconds. A ten minute server reporting interval may allow this SensorReadPeriod parameter to go higher.

This SensorReadPeriod value is very important because it has a direct relationship to how long the sensor battery will last.

When all of the host's assigned sensors are named and characterized using the above process, the EDS portion of the provisioning is complete. The actual sensors can be placed in their planned locations at this time. In the event that a given sensor will not be used on this host because of an issue with signal

reception (or any of several other reasons), the sensor must be powered down (battery removed) or disconnected from any host that it may have been linked to. This is where the MN-CTRL Devices Page comes into play. Note that the installer may then have to change a sensor name for another sensor to keep the sensor numbers in sequence.

If an EDS Meshnet Repeater will be used in some locations in the network, the sensors that will be homed in on the repeater must also be joined to the MN-CTRL controller. The EDS documentation completely covers this bit of equipment engineering and configuration.

As the various EDS controllers are assigned to the customer's network, the installer must make note of the IP address assigned for each controller. In most cases, where there is only one MN-CTRL at any given host location (one host per router), this IP address may be the same for every host in the system. Every router in the network may have the same in-network IP addressing and in fact the same Gateway IP address. This actually simplifies the provisioning considerably. Using the above IP address example, every EDS MN-CTRL is assigned the same 192.168.1.220 IP address. Each Gateway (router) is assigned a 192.168.1.1 address.

In the event that more than one MN-CTRL is used in the same location and connected to the same router, the Host Number assignments described above must be different in each MN-CTRL. These numbers also have to match the Host Number assignment on the Network Page of the EDA that is described below.

EDA Engineering for the Tibbo Device

Tibbo Device Firmware and Application Installation

Before a given Tibbo device can be used for this application, it must first be loaded with the correct firmware and EDA application using Tibbo's Device Explorer (DE) tool. This step is usually done by the party that purchases the Tibbo devices in bulk and handles the project's hardware installation. Since the Tibbo toolset is available from Tibbo's website free of charge to anyone who has purchased Tibbo hardware, there is no extra expense involved in this device firmware and application installation. The actual time that it takes to complete this firmware and application install is less than 5 minutes.

When first shipped, any given Tibbo device is preloaded with a particular version of the device firmware. The device may also be shipped with a demo application. However, the firmware version on the device may not be the version of the firmware that is compatible with the release of the EDA application that the customer has purchased from Willabay Design. In any case, Tibbo's Device Explorer can be used to load the appropriate firmware and application.

When the EDA application is purchased, the customer receives the EDA application p-code (object code) file and an 8 character activation code that is used as a license for this product. This code must be retained for use when the EDA is configured as described below.

After the EDA application is loaded onto the Tibbo device (DS1101 as an example), the device should be locked using Tibbo's password protection feature. This is done using the Set Password tab on the Device Explorer screen. This password is very important since it prevents anyone from loading software into the device without knowing this password. Security features such as these are what makes the Tibbo product line very competitive. This password must be kept in a secure place since the device will not be able to be updated without the password. Actually, there is a way to do this on site but the reader is referred to the Tibbo manuals for further details.

Tibbo Device – EDA Setup

Once the EDS MN-CTRL controller is assigned for a given host location, the Tibbo device that will serve as the EDA for that host must be set up according to the following steps. At this point, it is assumed that the supplier of the Tibbo devices, the customer, or a designated installer has loaded the EDA application on every Tibbo device (the DS1101 Controller in this case) that will be used in the system. As stated above, every Tibbo device used for the EDA application should be assigned a password known only to the customer and installer. This password does not have to be unique across the customer's network but is a requirement if the system is to be protected against in-field application updates by an unapproved user.

Tibbo's Device Explorer tool that is used to upload the device's firmware or application code and assign a password is provided free of charge from Tibbo and available to download for use with any Tibbo device. Anyone can use this tool to download a device but devices that are protected by Tibbo passwords will not be changed if the correct protection password is not employed.

The necessary EDA provisioning steps are very simple and are broken into 7 simple steps as documented below. The device is assumed to be a DS1101 Controller. Since some special capabilities are now available on TPP2L versions of the EDA product. These capabilities are noted separately.

Step 1 - Initial Startup and Base Configuration

1. The Tibbo DS1101 controller is connected to the router via a wired Ethernet cable and powered up. At this point, it is assigned an IP address from the router according to the router's DHCP address range. It will be in the same subnet as the previously assigned EDS controller. The DS1101 will display its assigned IP address on its small LCD screen.

    If the Tibbo device is the TPP2L, the larger display on the TPP2L will show the IP address of both the TPP2L itself and the MN-CTRL controller that it is associated with. This association is now automatic in that the EDA can poll all Meshnet controllers in the network and find the right one to use after the correct host number is assigned on step 2-6 below.

    The TPP2L's IP   addresses will also be displayed if the user hits the second keypad key on the lower part of the LCD panel.

2. The DS1101 controller will initialize using all of its internal default data assignments and the assigned IP address will be displayed on the device's LCD screen at startup. If the display goes

blank, pressing the button on the top of the DS1101 will reactivate the display. If the EDA is a TPP2L device, the any key on the front panel does the same thing. If a DS1101 without an LCD display is used, the installer will have to determine the assigned IP address by way of the router's list of connected addresses or by the use of Tibbo's Device Explorer.

3. The installer can then access the EDA's internal home page by entering the correct IP address on a browser. For additional security, the system requires a specific access port to be included. This port is 64400 and cannot be changed. The default on most systems is 80 but that will not work on this system. All you need to do is enter 192.168.1.100:64400 (using your own IP address fields instead of the 1.100) to get into the system. Remember that the EDS port has to be 64500 so keep them straight.

   On the initial access of the system, the installer will have to enter the products default login password (1234) to gain access. After that point, an installer can use the various Settings web pages on the EDA to configure the DS1101 or TPP2L.

4. The very first time that the EDA application initializes after the login prompt, the display will be limited to a special version of the home page called the Startup Page. This page is used to assign a given EDA license code to the device. The system will not leave this startup mode until the license code is validated. After the validation step, the EDA application will move from the startup mode to its normal mode of operation. An installer cannot access EDA web pages other than the Network or Configuration Pages until this validation process is complete. The license code that is used must be a new code and not previously assigned to another EDA.

Step 2 – EDA Configuration Using the Configuration Page

1. The setup information such as the system name and a password for this EDA application are assigned using the Configuration Settings page. The System Name, Customer Number, System Password, and the number of assigned sensors on the EDS controller for this host have to be set up on this page. The Customer Number is a number that is obtained when the customer used the Assign_CustNumber_Form3 form to set up their database environment. The System Password is the password that is needed to access the internal web pages on the EDA and, if changed, it will replace the default of 1234.

   The System Name is the means for which the EDA can identify what customer "system" it is part of. As an example, a set of greenhouse buildings may require a number of host locations with an EDA at each location. The set of buildings in the complex can be treated as one system. It is quite possible that more than 10 Host Sites are planned for the same system. In such a situation, then multiple system device names (and by reference, multiple system numbers) will have to be assigned over the full set of EDAs that are employed. The same Customer Code can be used to obtain these additional system numbers. Valid system names will always end in " WDn", with the "n" the system number. The maximum length of a system name is 10 characters.

2. The Allow Updates control must be set to 1 after the network settings are complete. The update frequency in minutes and seconds can be assigned at any time. This is the service rate for which the EDA will access the Meshnet controller and then transmit its data to a target server. Update times of from 3 to 15 minutes can be assigned at the present time. All assigned service rates for a given customer on the same system must be the same. The actual target server is assigned later using the Network Settings web page.

   Very fast server access rates should be avoided if there are a large number of sensors assigned to a given host. Rates in the area of 5 to 10 minutes work well.

3. The Configuration web page is also used to set up a threshold temperature for low and high temperature (or humidity) reporting and any necessary telnet access information. There are separate default low/high thresholds for all of the base sensors in the actual EDS sensor case and the full set extended 1-wire probes that are available on an EDS THX sensor.

   The low or high temperature (or humidity) threshold setting defaults for the base sensors are indicated on the table below.

	LOW	HIGH
Default Temperature Threshold (T, TH, and THX)	45 degrees F	120 degrees F
Default Humidity Threshold (TH and THX)	20 percent	90 percent

   The low or high temperature (or humidity) threshold setting defaults for the 1-wire extended sensor probes are indicated on the table below.

	LOW	HIGH
Default Temperature Threshold (THX)	45 degrees F	150 degrees F
Default Humidity Threshold (NA)	NA	NA

4. A new form entry was assigned to the Configuration Page on the V4.2.03 Release. This entry is called the Extended Sensor Operating Mode. This entry is only applicable to configurations that include the Long Range THX sensor and Extended Sensor probes are actually used in the customer's sensor setup. This only applies to an EDA that is based on Tibbo's TPP2L(G2) platform since the expanded sensor capability cannot be supported on other platforms at this time.

The default assignment for this mode field is "ST". This would be the case where the customer uses THX sensors but has no extended 1-wire temperature probes assigned. As soon as the system detects a valid probe, the mode internally changes to "EX". In this mode, the system will generate an alert, and subsequently send an alert email, if either the Base Sensor (in the sensor case) or any probe's reading is out of range. Out of range readings result when a Low or High Temperature (or Humidity in the case of the THX's Base Sensor) threshold is exceeded.

A special "No Base" or "NB" code is reserved for those cases where a customer does not want to be bothered with low or high temperature or humidity reports from the Base Sensor itself. This currently impacts the temperature and humidity variance on a THX sensor. An example of this "NB" usage would be a set of EDS THX sensors used for remote reading of the temperature in a number of freezers. The customer does not care about the temperature where the Base Sensor is sitting; only the probe temperatures.

Step 3 - Network Setup and Target Server Assignment

It is recommended that this network portion of the EDA be completely set up as soon as possible after the EDA has been powered up.

1. Before the DS1101 (or any of the other supported Tibbo devices) can be used to access the EDS controller, its network configuration has to be set up using the Network Settings web page. When the page is first accessed, the DHCP setting will be 1 because DHCP was used on the initial startup. The device's current IP address is always displayed on the DS1101 or TPP2L LCD screen at startup.
2. The Network Settings form can be used to assign a permanent static IP address for the DS1101. In addition, the Gateway IP address and a Subnet Mask must be assigned that match the same information that was entered on the EDS controller. The Network Settings form should also be used to assign the correct static IP segment for the EDS MN-CTRL controller. This is the last 3 digit segment of the IP address; commonly called a subnet.

   Note that if the EDS MN-CTRL Meshnet controller's assigned IP address segment is other than the default "220", the Network Settings page must be used to assign this segment information on the EDA. Otherwise, the EDA will not be able to communicate with the MN-CTRL.

3. An appropriate DNS server address must be entered for the system to be able to use its internal DNS client to obtain an IP address for the various servers that it must access. The DNS client is used both for obtaining an IP address of the target server as well as the address for any required SMTP server that is used for Email. A typical router and modem setup would use the IP address of the modem or router for the DNS address.

4. In order to send reports to a remote server, the address of the remote portal's target server must be entered in URL form. This is the site that will receive reports from the EPA and may

ultimately be a third party service that was contracted to provide this monitoring service. For the immediate future, this should be left at its default setting.

5. The Host Number on this Network Page must be assigned correctly.

    Note that if the MN-CTRL controller is still using IP addresses assigned by DHCP or previously set to a different static IP address, the EDA is capable of collecting that address and assigning it internally. The Host Number field on this page is the means for which the EDA knows which host to look for. This Host Number must be assigned at startup.

    This host assignment step is very important, especially if there is more than one EDS MN-CTRL controller connected to the same router in a large network. All of the hosts must have unique host numbers and the EDA and MN-CTRL host numbers must match.

    Users should not attempt to load two or more different devices on the same EDMS system with the same host number or they will be locked out of the target server.

Step 4 - Email Configuration

1. The actual assignment of email parameters for the system is supported by another web page called the Update SMTP and EMAIL Settings Page.

2. The various settings for the Email Page are the usual assignments of an Outgoing SMTP server name (in URL form), the customer's SMTP mail server login id and password, an email address to be used as the "FROM" address, up to 3 separate "TO" email addresses in a string separated by semi-colons, and the outgoing SMTP port that will be used for all email communication. Only port 587, or in some cases port 25 or 26, will work at this time.

    There is a built in limit on the total number of characters that the string of "TO" email addresses may have. This limit is now 128 characters. As of this writing, the system is only able to assign 3 addresses but a future update may increase this limit.

Step 5 – Host Activation Using the Configuration Page

The last required installation step for every new host location is the activation of the server interface to the new EDA. When the Allow Updates control on the Configuration Page is set to 1, the system will begin to send live measurement data to the target server at a reporting frequency set up on the same page. Once this control is set, the next time the EDS controller is accessed, its data will be reported to the customer's target server location.

The actual environmental data updates on the target server are driven by the information reported over this HTTP interface from the EDA to the server at the time of the report. As an example, assume that Host 1 was assigned three sensors as shown in our plan and the table below. Within several reporting cycles of this Allow Update activation, the customer's internal database table will be completely built for

this EDA host. The same thing will hold for Host 2 with two more sensors . The Host and Sensor Key is made up of the host number and sensor number as shown. The table at this point will look like the example below with all new table entries having Building and Unit names of "NEW". Note that the database now reflects "live" environmental data as reported by the EDS MN-CTRL controller.

The specific table example shown below does not show a Humidity column but the actual humidity will be shown in the table if the sensor for that row is a combined Temperature/Humidity sensor.

Index	Host and Sensor Key	BUILDING	UNIT	STATUS	TEMPERATURE	EXTERNAL SENSOR ALERT	BATTERY STATE ALERT
1	MN_1_1	NEW	NEW	OK	72	NO	NO
2	MN_1_2	NEW	NEW	OK	75	NO	NO
3	MN_1_3	NEW	NEW	OK	68	NO	NO
4	MN_2_1	NEW	NEW	OK	70	NO	NO
5	MN_2_2	NEW	NEW	OK	75	NO	NO

Post-Installation Database Table for the first two Hosts

Step 6 – Host Location Name Assignment

In most of the currently available products on the market that compete with this Willabay Design product, the customer is responsible for assigning appropriate location names (such as the building name and unit name) on a special web portal provided by the equipment vendor. Access to such a portal may be part of a service for which there is a monthly fee.

In this EDMS system, the database location information is assigned at the EDA during installation. This allows the installer to "move" sensors around as necessary when the network is first built; assuming of course that they are "joined" to the appropriate EDS controller in each case. Sensor location names can be changed at any time but they must be changed using the EDA's Location Assignment Page at this time.

This step consists of populating the various name fields for each assigned sensor. A web page on the EDA (the Assign Sensor Location Page) is provided for this physical Location Assignment function. As the appropriate names are assigned for each of the sensors on the host, the target server's database is automatically updated with the correct location information. Sensor numbers and location names may be entered either one at a time or a range of sensors (up to 4 at the present time) may be named at the same time.

As an example of how this works, consider the database table example described above. The default Building information was building "NEW" and the Unit Information was "NEW" before the Location Information Web Page is used to assign real names to these default fields. If the sensor field in the form

for Host 1 is populated with 1-3, the "Building" field with 10, and the "Unit" field with A-C, then the three sensors will be named and populated in the server automatically when the next scheduled server access time is reached. This may take some time since the access frequency is determined by the update time as specified on the Configuration Page. The sensor locations will be updated to Building 10, with units A through C. The Assign Sensor Location Page can then be used again on host number 2 to assign names to the last two sensors that were recently assigned to the host according to our original sample plan.

Index	Host and Sensor Key	BUILDING	UNIT	STATUS	TEMPERATURE	EXTERNAL SENSOR ALERT	BATTERY STATE ALERT
1	MN_1_1	10	A	OK	72	NO	NO
2	MN_1_2	10	B	OK	75	NO	NO
3	MN_1_3	10	C	OK	68	NO	NO
4	MN_2_1	11	A	OK	70	NO	NO
5	MN_2_2	11	B	OK	75	NO	NO
6	MN_3_1	NEW	NEW	UA	0.0	0	0

Post-Location Assignment Database Table for the first two Hosts

Note that one extra row is assigned for the first sensor on the third host. This may or may not have been intentional on the part of the installer but if it is left as in when Step 6 is executed, this extra row will be deleted. In this manner, the system can "clean-up" itself after a sequence of host installations is performed.

The initial version of this application will support a two-tier location structure for the sensor location names. This would cover arrangements such as a building with several separate units. It also covers a floor with separate units.

The introduction of the Long Range EDS THX sensors (also referred to as model 2040 sensors) required a re-arrangement of this Location Assignment Page when the TPP2(G2) platform is used for the EDA. There are separate fields on the form that are used for naming the actual probes on a THX sensor.

The naming convention used for these probes is of the form XX-Y where the XX comes from the Base Sub Unit field and the Y portion from each of the three Sub Unit fields. This will result in names for these probes at the server being S1-A, S1-B, S1-C if S1 was the Base Sub Unit Name and A, B, C is assigned as the Sub Unit names.

Step 7 – Final Host Activation

While the above steps, when executed for every new EDA assigned to the system, will populate the server database with entries for every sensor in the network, a special system completion step is

needed after all of the sensors on all of the EDAs in the system have been assigned. This Final Network Activation Page is used to inform the server that all of the hosts for a given system have now been assigned. This also activates an optional internal database audit function in the server that is capable of auditing and correcting errors in the database. This final step will get rid of any of any extra PDT table rows in the customer's database such as the last row in the table example above.

When the installer uses this Network Activation Page on the EDA to complete the hardware installation process only two items need to be specified on the form. The first is the final count of how many hosts were assigned on this system. This count may or may not have been the count that was originally planned. The system will use this count as a means of efficiently managing the database operations. To activate the network, a 1 must be entered in the Activate Final Network Setup field on this form.

Note that the system is designed such that new hosts cannot be grown into the system after this step is completed. If a reconfiguration of the system is necessary after this point, the system must first be restored to the "Growth" state using this same form. This is another internal feature that is intended to protect against unwanted equipment additions by an unofficial installer.

Additional Database Access Forms for System Administration and Searches

In addition to the Customer Account Number and Database Generation forms described above, the EDMS server package includes a set of access forms that a customer may use to perform a search of their database or update certain aspects of their network. These forms are fully documented on the Administrative Forms section of our website under the EDMS Server Products tab.

There are two versions of a search form for customer use. One is for a general search over an entire system (Search_Table_Form). This form would be of use by a property manager or owner who may want to search the entire database for instances where the temperature or humidity of a sensor in a unit is above or below a certain threshold. Another form (Display_Unit_Form)allows a given unit owner to quickly check the status of their specific unit.

> Note that in each of the search forms above, if a temperature or humidity sensitive search is requested, but a low battery or Input1 alert is present, that sensor is displayed regardless of the actual temperature or humidity.

Another administrative form called the Update_System_Form is used to update either the system password or server email assignments at any time. Certain server based function such as the optional internal audit may generate emails to alert an administrator that something is amiss. An example would be the failure of a given host to report its data to the server within a period of time determined by the system audit schedule.

Final System Password Assignment

In order to add additional security to the system at this point, a new internal server access password should be assigned to the entire system by means of the Update_System_Form which will always be

available to the system's owner and administrator. Distribution of this new password across the full set of hosts is automatic and any information exchanged is encrypted.

It should be noted that the only steps that need to be taken by the website administrator or other responsible party that oversees the server end of this system are the initial steps defined above that are done before any actual on-site installation is started and this final password update. A field installer does not have to worry about how the server side works. Neither do any of the end-users who use the system. As a result, end users do not even need an access account id or other means to get into the system. It is all handled by the administrator who presumably is the property manager, business owner, or equivalent.

Potential Future Customer Database Scripts

The customer may want to customize their EDMS by providing custom forms for the display of data in the database. They may also opt to hide access to the system behind a common access id and password. This is easily accomplished by means of the scripts that are available to the remote portal administrator but owned by Willabay Design. One such Script is the Display_Temps_PHP(N) script (N is the version number) which can be used to identify all sensor locations that are assigned to a given EDA host, all sensors for a given building, etc.

David G Yost

Willabay Design, LLC

Other Documentation

EDA Product Notes (supplied with the software)

EDMS/ EDA Release 4.2 Equipment and Software (available on our website)

EDMS Setup Guide (available on our website in the EDMS Support section)

EDMS Product Description (on our website)

EDMS Product Features and Capabilities(on our website)

EDA Technical Specifications Sheet (on our website)

EDMS FAQS –Typical Questions and Answers (on our website)

Willabay Design Website: http://www.willabaydesign.com