

Polysense iView Function Specification

Sep 15, 2017

Document Number: FS-XXXX

Revision 0.1

Table of Contents

1. OVERVIEW	8
2. IVIEW ARCHITECTURE	9
2.1. ARCHITECTURE REQUIREMENTS	11
2.1.1. OVERALL REQUIREMENTS	11
2.1.2. SYSTEM DISCOVERY	11
2.1.3. STATUS MAINTENANCE	13
2.1.3.1. SYSTEM STATUS	13
2.1.3.2. GATEWAY STATUS	13
2.1.3.3. MOTE STATUS	13
2.1.4. SENSING TYPE MANAGEMENT	13
2.1.5. OPEN INTERFACE	15
2.1.6. PROTECTION SWITCH	15
2.2. DATA STRUCTURE	15
3. CLI	错误！未定义书签。
4. WEB	16
4.1. OVERVIEW	16
4.2. TOPOLOGY	错误！未定义书签。
4.2.1.1. VIEW	错误！未定义书签。
4.3. DATA	20
4.3.1. DATA MANAGEMENT	错误！未定义书签。
4.3.2. QUERY CONDITION	错误！未定义书签。
4.3.2.1. QUERY ACTION	错误！未定义书签。
4.3.2.2. QUERY RESULT	错误！未定义书签。
4.4. ALARM	26
4.4.1. ALARM GENERATION	错误！未定义书签。
4.4.1.1. CROSS-THRESHOLD ALARM	错误！未定义书签。
4.4.1.2. TREND ALARM	错误！未定义书签。
4.4.1.3. UNREACHABLE EXTERNAL STORAGE	错误！未定义书签。
4.4.1.4. FIBER CUT-OFF ALARM	错误！未定义书签。
4.4.1.5. FIBER PLUG-OUT ALARM	错误！未定义书签。
4.4.1.6. FBG OUT-OF-ORDER ALARM	错误！未定义书签。
4.4.1.7. DEVICE ALARM	错误！未定义书签。
4.4.2. QUERY CONDITION	28
4.4.3. QUERY ACTION	29
4.4.4. QUERY RESULT	30
4.5. SETTINGS	30
4.5.1. CONFIGURATION MANAGEMENT	31
4.5.1.1. SYSTEM/CARD/PORT/GATEWAY	错误！未定义书签。
4.5.1.2. FIBER	错误！未定义书签。
4.5.1.2.1. ADD FIBER	错误！未定义书签。
4.5.1.2.2. EDIT FIBER	错误！未定义书签。
4.5.1.2.3. DELETE FIBER	错误！未定义书签。
4.5.1.2.4. DEPLOY FIBER	错误！未定义书签。
4.5.1.3. POINT	错误！未定义书签。
4.5.1.4. PROVIDER	错误！未定义书签。

4.5.1.5.	MOTE.....	35
4.5.2.	VIEW SETTING.....	38
4.5.3.	MAP.....	42
4.5.3.1.	ADD MAP.....	43
4.5.3.2.	EDIT MAP.....	45
4.5.3.3.	DELETE MAP.....	46
4.5.4.	ZONE.....	47
4.5.4.1.	ADD ZONE.....	47
4.5.4.2.	EDIT ZONE.....	49
4.5.4.3.	DELETE ZONE.....	51
4.5.5.	OFFICE.....	错误! 未定义书签。
4.5.5.1.	ADD OFFICE.....	错误! 未定义书签。
4.5.5.2.	EDIT OFFICE.....	错误! 未定义书签。
4.5.5.3.	DELETE OFFICE.....	错误! 未定义书签。
4.5.6.	MANUFACTURER.....	错误! 未定义书签。
4.5.6.1.	ADD MANUFACTURER.....	错误! 未定义书签。
4.5.6.2.	DELETE MANUFACTURER.....	错误! 未定义书签。
4.5.7.	DATA MANAGEMENT.....	错误! 未定义书签。
4.5.7.1.1.	QUERY CONDITION.....	错误! 未定义书签。
4.5.7.1.2.	QUERY ACTION.....	错误! 未定义书签。
4.5.7.1.3.	QUERY RESULT.....	错误! 未定义书签。
4.5.8.	DATA TYPE.....	52
4.5.9.	DATA PROFILE.....	53
4.5.10.	DATA MIGRATION.....	错误! 未定义书签。
4.5.10.1.	OVERVIEW.....	错误! 未定义书签。
4.5.10.2.	CONFIGURATION ON GUI.....	错误! 未定义书签。
4.5.11.	ALARM MANAGEMENT.....	56
4.5.11.1.	QUERY CONDITION.....	57
4.5.11.2.	QUERY ACTION.....	58
4.5.11.3.	QUERY RESULT.....	59
4.5.12.	ALARM PROFILE.....	错误! 未定义书签。
4.5.13.	USER MANAGEMENT.....	错误! 未定义书签。
4.5.13.1.	LOGIN.....	错误! 未定义书签。
4.5.13.2.	EDIT/ADD/DELETE.....	错误! 未定义书签。
4.5.13.3.	NOTIFICATION CASES.....	错误! 未定义书签。
4.5.14.	LOG MANAGEMENT.....	错误! 未定义书签。
4.5.15.	SOFTWARE MANAGEMENT.....	60
4.5.15.1.	ABOUT SOFTWARE IMAGE.....	60
4.5.15.2.	MANAGE SOFTWARE ON WEB.....	61
4.5.16.	REBOOT.....	66
5.	OUTSTANDING FEATURES.....	错误! 未定义书签。
6.	REFERENCES.....	错误! 未定义书签。

Revision History

Revision	Owner	Date	History
0.1	Thomas Teng	12/16/2014	Initial draft
0.2	Thomas Teng	12/23/2014	<ol style="list-style-type: none"> 1. Replaces TIMESTAMP with DATETIME and changed the length from 4 octets to 8 octets 2. Added IPv6 address/mask into Card table 3. Changed external key to foreign key 4. Changed the integer type to unsigned integer type 5. Changed OTDR base line data, calibration data and M-data from INT to DOUBLE
0.3	Thomas Teng	12/27/2014	<ol style="list-style-type: none"> 1. Added "update_timestamp" into fiber table with "ON UPDATE CURRENT_TIMESTAMP" property 2. Changed "creation_timestamp" in fiber base table to "update_timestamp" with "ON UPDATE CURRENT_TIMESTAMP" property 3. Changed "response_time" from SMALLINT UNSIGNED to INT UNSIGNED in Fiber and Fiber base tables (changed its unit from millisecond to nanosecond) 4. Changed Fiber base data table: <ul style="list-style-type: none"> - "wavelength" -> "wavelength_id" - Added "point_id", "temperature", "shift", "noise"
0.4	Thomas Teng	12/30/2014	<ol style="list-style-type: none"> 1. Added "Absence" as one value of card status attribute 2. Added "User view restoration failure" as the new type of log 3. Finished "Fiber" section and "Data" section
0.5	Thomas Teng	12/31/2014	<ol style="list-style-type: none"> 1. Added attributes "Sample Timestamp", "Data", "Color" and "Color profile ID" into "Point" table 2. Added "Color profile ID" attribute into "Color" table 3. Added the user management section (partially available)
0.6	Thomas Teng	01/03/2015	<ol style="list-style-type: none"> 1. Removed "ColorScope", "CardId", "PortId", "FiberId", "DeploymentId" and "Distance" from Color table 2. Created "ColorProfileId", "MDataType" and "Color" as primary key of color table 3. Added "Color profile name" and "Color profile clause" attributes into color table 4. Replaced "SQLStatement_" with "Clause1_", "Clause2_", "Clause3_", "Clause4_" in UserView_table 5. Added "UserPrivilege_" table to save the definitions of user privileges 6. Deleted "LogControl_" table, deleted

			<p>"SoftwareModule_" and "Priority_" attributes from log table, deleted "Software debugging" log type</p> <ol style="list-style-type: none"> 7. Changed log types to 'Login/logout', 'Fiber', 'Point', 'Map', 'Zone', 'Data', 'Alarm', 'Administration' 8. Removed the sub-map zone concept and added sub-map concept into the map table, added the sub-map id and coordinates into point table 9. Changed system table structure to add more default configurations, including map, temperature color profile, strain color profile 10. Changed color table to put all color thresholds into one entry 11. Added "Type" attribute into fiber base data table, and merged "Temperature", "Noise" and "Shift" into one attribute "User data"
0.7	Thomas Teng	01/05/2015	<ol style="list-style-type: none"> 1. Added Alarm ID attribute into Alarm table and Point table to improve the performance when updating the alarm table 2. Finished the 3.4.2 System section, 3.4.3.1 View section, 3.4.6.1 User management section 3. Updated 3.4.2.2 Fiber section, 3.4.4 Data section 4. Updated the diagram with the latest design 5. Changed "Notification case" definition in user table 6. Added all the main web pages
0.8	Thomas Teng	01/06/2015	<ol style="list-style-type: none"> 1. Updated the [Topology -> View] window to support multiple active alarms per point 2. Added Vibration default color profile related attributes into system table 3. Finished 3.4.5.1.1 Cross-threshold alarm
0.9	Thomas Teng	01/08/2015	<ol style="list-style-type: none"> 1. Added the trend alarm profile default configuration related attributes into system table 2. Added trend alarm state attributes into point table 3. Changed Color table name to alarm profile, and added trend alarm profile related attributes into alarm profile table 4. Removed the "Color" attribute, and added "Cross Alarm Severity", "Alarm Top Severity" and "Active Alarm Count" attributes into Point table 5. Finished 3.4.5.1.2 Trend Alarm and whole 3.4.5 Alarm
1.0	Thomas Teng	01/15/2015	<ol style="list-style-type: none"> 1. Removed `Operation_`, added `SystemOperation_`, `TopologyOperation_`, `DataOperation_`, `AlarmOperation_`, `AdministrationOperation_` into User role table

			<ol style="list-style-type: none"> 2. Changed `Type_` to `Category_` in `Log_` table 3. Changed 3.2.1 and 3.2.2 to redefine the system default configuration and related procedure 4. Finished 3.4.3.2 view setting, 3.4.3.3 map, 3.4.3.4 zone, 3.4.3.5 office
1.1	Thomas Teng	01/19/2015	<ol style="list-style-type: none"> 1. Removed the "Export data" from "User" role privilege list 2. Replaced "Variation" with "Vibration" 3. Removed the default map, default system alarm profile for temperature, strain and vibration attributes from system table 4. Changed the design to support fiber being constructed from fiber segments <ul style="list-style-type: none"> - Added `FiberToBase_` table to save the mappings between fiber and fiber base - Added `Type_` attribute into `FiberBase_` table - Added 3 new ENUMs to `AdminState_` attribute of `Point_` table, i.e. 'In building', 'Building done', 'Building failed'
1.2	Thomas Teng	01/20/2015	<ol style="list-style-type: none"> 1. Changed the webserver procedure for adding a new DGS fiber as below: <ul style="list-style-type: none"> - Add the fiber entry into fiber table with admin state set as "Disabled" - Add the new fiber segments into fiber-to-base table - Update fiber entry admin state to "In building" in fiber table
1.3	Thomas Teng	04/01/2015	<ol style="list-style-type: none"> 1. Added Section 4.4.6.3 Data Migration 2. Updated System table definition to add the new attributes for data migration configuration 3. Updated Section 5.4.3.1 View to add the support of [Point Interval] checkbox 4. Added "Data migration failure" alarm 5. Updated System table definition to add the MIN and MAX values of temperature, strain and vibration for scale setting purpose on Data diagram page 6. Updated System table definition to add the fields for data migration 7. Added 3.4.6.3 – data migration 8. Updated section 3.4.4
1.4	Thomas Teng	04/09/2015	<ol style="list-style-type: none"> 1. Added the right-key-clicked popup menu in the [View] window to open the realtime sensing data or alarm monitoring window from the [View] window
1.5	Thomas Teng	05/01/2015	<ol style="list-style-type: none"> 1. Added the CLI section

1.6	Thomas Teng	05/14/2015	<ol style="list-style-type: none"> 2. Added `FpgaVersion_` attribute into card table 3. Updated the IP address related definitions in card table 4. Changed `SlotId_` and `CardType_` from NOT NULL to NULL in card table 5. Changed `MacAddress_` from BIGINT UNSIGNED to CHAR(18) in card table 6. Moved CLI section into a separate document: FS – CLI.docx 7. Updated the Add Fiber and Deploy Fiber sections
1.7	Thomas Teng	05/25/2015	<ol style="list-style-type: none"> 1. Updated 3.4.2.2.4 (Deploy fiber) section
1.8	Thomas Teng	07/13/2015	<ol style="list-style-type: none"> 1. Updated the data exporting in 3.4.4.3 (Query Result) section 2. Updated 3.4.4.3 to support automatic adjustment for the scale of vertical axis according to the M-Data MAX and MIN in the [Data Diagram] tab pane 3. Removed the MAX and MIN scale attributes of the vertical axis in the [Data Diagram] tab pane
1.9	Thomas Teng	12/04/2015	<ol style="list-style-type: none"> 1. Changed User.Password_ attribute type from CHAR(16) to CHAR(64) 2. Removed Status_ attribute and added WebStatus_, CliStatus_ attribute in User_ table 3. Updated user management section to add in the usage of WebStatus_ and CliStatus_ attributes 4. Updated the description on how to clear one alarm manually 5. Updated the ENUM value of Alarm_.Status_ to distinguish if the alarm is cleared manually or non-manually 6. Added [Data Diagram (Distance)] tab pane into data page, the old [Data Diagram] was changed [Data Diagram (Time)] 7. Updated section 3.4.1 and 3.4.6.1.1
2.0	Thomas Teng	05/03/2016	<ol style="list-style-type: none"> 1. Added 3.4.6.4 Software Image Management 2. Update 3.4.3.2 - View Setting section 3. Added "DB version" attribute into System_ table

1. Overview

This document defines Polysense iView platform architecture and function specifications

The principle to define the function specification (or feature list which is an exchangeable terminology) is more from the software module's user perspective, i.e. the software module will be treated as a black box, the document tries to identify what are the functionalities and behaviors it should look like in its user "eye" (from external). The user here may not be a real person, but could be another software module who will use the "services" (invoke API, take output as own input, etc.) that current module offers, e.g. data processing module will take the output of data collection module as its input, then data processing module is the user of data collection.

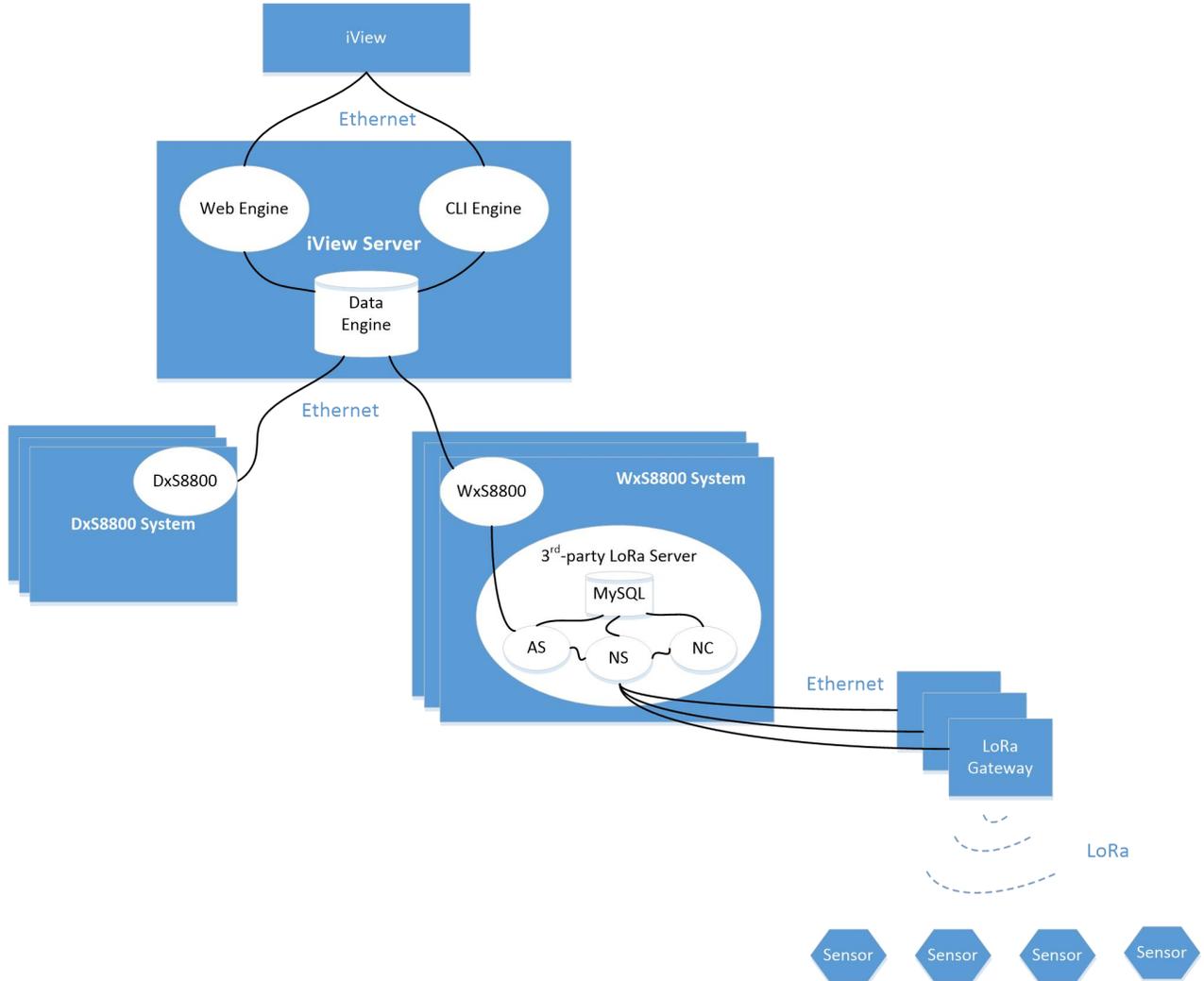
The software design must make sure all the functionalities defined in this specification can be supported in a doable way, even the functionalities may be not supported immediately (in the near software release). This document doesn't define the functionalities delivery timeframe, there will be a separate document (release plan) to take care of it.

The application software function specification defined in this document is just based on our current understanding of the DxS 8800 system and the features it should offer, which is more like a prototype instead of commercial product, so the document is subject to be on-going changed based on many kinds of input (especially input from real customer) till it can meet real deployment requirements.

For the reader attention (especially the designer), the important contents are highlighted in yellow color.

2. iView Architecture

Polysense iView is an IoT-oriented universal sensing platform integrated with big-data processing engine, it can handle almost all kinds of sensing data in real-time which is sampled from point sensors and/or linear sensors (fiber sensors). Figure 2-1 shows the iView platform architecture.



For system architecture perspective, iView platform consists of below components:

iView server, as a logical concept, it can be running on an independent machine, or co-locate on the same machine with WxS8800 system, or even can be running on DxS8800 box. It provides the core functionalities of the iView platform, including data processing, data analysis, data storage, data migration, data visualization, etc.

DxS8800 system, a very cost efficient distributed fiber sensing system, which can support DTS, DGS, DAS and DDS modes. The system supports to collect data from fiber, do data pre-processing, then send data to iView platform via Ethernet network. There may be multiple DxS8800 instances running on the DxS8800 system to enable fast and high throughput data sampling and transmission. DxS8800 can also

work as an independent system for small business application, in this case, iView platform will be running on DxS8800 internal processor though they are separate animals logically.

WxS8800 system, this is a LoRa (Long Range) technology based point sensing system, the point sensors (one point sensor consists of LoRa mote + one or multiple types of sensors, for convenience purpose, mote will be used in the description of the rest document, which is equivalent to point sensor) communicate with the gateway (s) through LoRa protocol defined in LoRaWAN specification over the air, gateways communicate with LoRa server via Ethernet network, gateways don't parse the messages, but just relay them between the motes and the LoRa server. One mote can only communicate with one specific LoRa server, but may go through one or multiple gateways to exchange message with the server.

So one WxS8800 system consists of one LoRa server with a specific pair of IP address + UDP port opened to the gateways, multiple gateways listening on the server IP address + UDP port, and lots of motes pointing to the LoRa server with the same known server EUI.

From service perspective, iView platform supports below basic functions: raw data sampling, data processing (raw data processing to translate into readable sensing data, like temperature, humidity, etc.), data transportation via Ethernet network or LoRa network, data analysis (data correlation and abstraction to identify alarm or potential alarm), knowledge discovery, and data visualization etc.

In below chapters, we will mainly describe the iView platform, WxS8800 system, as well as how DxS8800 system is integrated into the iView platform. As to the DxS8800 system details, please refer to FS - DxS8800 system.

2.1. Architecture Requirements

2.1.1. Overall Requirements

1. The iView platform can manage one or multiple DxS8800 systems, and/or one or multiple WxS8800 systems at the same time
2. iView platform can be physically running on a separate Linux machine, or running on DxS8800 internal processor
3. WxS8800 system can be physically running on a separate Linux machine, or running on the same Linux machine with iView platform
4. Support up to 10 users to access to the system via CLI or Web simultaneously. Both CLI or Webserver should provide mechanism to support the concurrent access to system and ensure the data integration and consistence in database, including:
 - a. To lock the entry or table when initiating deletion, update operations in database to prevent the deletion, update operations to the same entry or table from other users or other software modules, but basically still allow the query operation to the same entry or table (unless it is really necessary to prevent the query operation)
5. One user can only start one connection section (either a CLI section or a web section) to access to the system

2.1.2. System Discovery

Each system has a local configuration file in flash saving the information for system discovery, including:

1. iView platform IP address
2. iView platform TCP port
3. System Serial No.

Once system is up and running, it should follow below procedure to finish the system discovery:

1. Read out the information from local configuration file
2. Try to connect to MySQL at the IP address + TCP port given in the configuration file
3. If MySQL connection is setup successfully, then try to find out if the system entry has existed in System table or not according to system serial no.:
 - a. If exist, then change Status attribute to "Connected" and HeartbeatTimestamp to its latest local datetime
 - b. Otherwise, insert a new entry into System table by setting the entry Status attribute to "Connected" and HeartbeatTimestamp attribute to its latest local datetime
 - c. Save the returned system ID in RAM, as the unique ID to identify the system, all the rest access to database will be based on the system ID
 - d. Create the default provider entry in provider table if the DefaultAppKey of the system isn't NULL and the default provider entry doesn't exist in provider table. The AppEUI of the default provider entry MUST be zero

4. If MySQL connection fails to setup, then try to connect for another 2 times, if all fail, then give up
5. Start to discover other management objects, including Card, Port, Fiber, Point for DxS8800 system, or Provider, Gateway, Mote for WxS8800 system
 - a. If this is new system to iView, then automatically add new Card entry and Port entries into the related tables for DxS8800 system, or add new Gateway entries for WxS8800 system if the gateways have been discovered by the system locally
 - b. For WxS8800 system, to further discover motes, user must add providers manually via iView GUI at first according to deployment plan (and MUST specify the DefaultAppKey if AutoMoteDiscovery is on, and other properties associated with the provider, e.g. AppEui). The motes discovery can also be performed later after the new system discovery. The key point is, the motes can only be discovered or added manually after their parents – providers are added. There are 2 ways to discover motes:
 - If the AutoMoteDiscovery attribute of the new provider is on (and the DefaultAppKey is also configured), then the motes can be discovered automatically via the LoRa OTA procedure even they aren't pre-provisioned in iView database. Such motes should be programmed with the same DefaultAppKey in local can be discovered and added into iView database automatically
 - Besides the AppKey, the motes should also be programmed with the right application EUI which points to the provider entry
 - Even the AutoMoteDiscovery is on, the manual mote discovery procedure can still be proceeded in parallel, i.e. if the motes have been pre-provisioned in iView Mote table in advance, motes can go with LoRa OTA or Personalization way to be discovered
 - If the AutoMoteDiscovery attribute of the new provider is off, then all the mote entries should be pre-provisioned in iView Mote table manually in advance according to the deployment plan, and should be configured with the same properties as shown below, which is programmed in motes local during manufacture stage:
 - If the mote JoinType is OTA (Over The Air), the mote should be assigned with the application EUI, application key and mote EUI

(NOTE: the application key can be set as unique to each mote or same as DefaultAppKey)
 - If the mote JoinType is Personalization, the mote should be assigned with the device address, application session key and network session key

(NOTE: same as device address, application session key and network session key should be configured as unique to each mote)
 - c. Otherwise, synch up the corresponding Card, Port and Fiber information between database and real system for DxS8800. For WxS8800 system, synch up the corresponding Gateway entries and Mote entries (as there may be Gateways/Motes added or deleted during system down time), and system Gateway and Mote information with database

2.1.3. Status Maintenance

2.1.3.1. System Status

As mentioned above, WxS8800 and DxS8800 should keep the HeartbeatTimestamp field of the corresponding system entry in MySQL updated every 30 seconds (i.e. update the HeartbeatTimestamp to current datetime every 30 seconds), and change the Status field to "Connected" if it is NOT "Connected".

A timer procedure (SystemStatusDetection) in MySQL will keep polling all system entries every 2 minutes, to compare HeartbeatTimestamp of each entry against current datetime, if the gap exceeds 5 minutes, then the procedure will change the entry Status field to "Disconnected".

2.1.3.2. Gateway Status

WxS8800 should keep monitoring the message from individual gateway, if there is message received from the gateway, then WxS8800 should update the HeartbeatTimestamp field of the gateway entry in MySQL to current datetime, and change the Status field to "Connected" if it is NOT "Connected".

A timer procedure (GatewayStatusDetection) in MySQL will keep polling all gateway entries every 60 minutes, to compare HeartbeatTimestamp of each entry against current datetime, if the gap exceeds 120 minutes, then the procedure will change the entry Status field to "Disconnected".

2.1.3.3. Mote Status

WxS8800 should keep monitoring the message from individual mote, if there is message received from the mote, then WxS8800 should change the Status field of the mote entry to "Connected" if it is NOT "Connected".

A timer procedure (MoteStatusDetection) in MySQL will keep polling all entries in MoteData table every 12 hours, to compare SampleTimestamp of each entry against current datetime, if the gap exceeds 24 hours, then the procedure will change the entry Status field to "Disconnected".

2.1.4. Sensing Type Management

1. The sensing data is stored in database (Data table) with below format:

|<DataTypeId>=<Value>

- a. "|" and "=" are the key characters, means all the other characters after "|" and before "=" are always interpreted as data type ID, while the characters after "=" and before next "|" (or the end of the data payload) are always interpreted as value of the data type
- b. DataTypeId and Value MUST be in decimal, the Value MUST be readable and can be displayed on UI directly without further translation, i.e. the precision of the decimal value should be determined by WxS8800
- c. On record of Data table refers as one time sampling for a specific mote, there is a timestamp attribute to identify the sampling datetime. One record may consist of multiple data type ID + value pairs, but the data type IDs MUST be different
- d. Not support combined/complex sensing types, like motion, which consists of x, y, z coordinates, such combined/complex sensing types can be replaced by simple sensing types, like motion mentioned above, it can be replaced by motion_x, motion_y and motion_z simple sensing types

2. The sensing types of the mote are user-configurable via the profile, user can add a new sensing type or delete an existing sensing type on iView UI
 - a. DataTypeId from 1 to 100 are reserved as known data types to iView platform. Currently only below 3 types are defined for reserved data types, the purpose is to recognize the position data from mote reported message, and use them to update mote position information in mote table (so that user doesn't need to input such information manually)
 - Longitude
 - Latitude
 - Altitude
3. One mote can support one or multiple sensing types, this is also user-configurable
 - a. According to the capabilities one mote or mote group can support in real deployment, user need bind the right profile (which consists of one or multiple sensing types from existing sensing type list) to it on iView UI. In some special cases, e.g. just after Mote auto-discovery but before their profile is specified by user manually, there may be data being reported from the Mote to WxS8800, in this case, the WxS8800 should still insert the data into Data and MoteData table regardless the profile. As there is NO profile bundled with the mote, so WxS8800 can't generate alarm according to the mote data
 - b. For a specific sensing type bundled with a mote or mote group, user can set it administration state to enabled or disabled:
 - "Enabled" refers that the mote(s) bundled with this data profile can report valid data for this kind of data type
 - "Disabled" refers that mote(s) will still report data for this data type, and WxS8800 will also insert such data into Data and MoteData table, but shouldn't generate alarm corresponding to such data type anymore, and iView should filter out such data when displaying the mote data on GUI
4. The alarm types associated with one specific sensing type of a mote is also user-configurable via the profile
 - a. Each sensing type can be bundled with two kinds of alarms, cross-threshold alarm and trend alarm
 - b. User can change the alarm thresholds, enable/disable one kind of specific alarm by changing the profile bundled with a mote or a group of motes on iView UI
5. The sensing data type and corresponding alarm type are bundled to the motes via the profile (including Profile and ProfileDataType tables)
 - a. There is an iView default profile (only has one entry in Profile table, but no entry in ProfileDataType table, i.e. no DataType and AlarmType defined in the profile by default), every mote should be bundled with the default profile after mote discovery.
 - b. User can edit the default profile, e.g. add or delete data types, but can't remove the default profile
 - c. User can also add new profile and apply to motes to replace the default profile

- d. It is possible that the data types included in the profile don't match the data types in the data report from specific motes (e.g. the data report includes the data type ID that not included in the profile0, in this case, software should try the best to recognize the data and present on UI (for the unrecognized data, software should also present it on the UI to remind user to enhance the profile)

2.1.5. Open Interface

Support open interface to integrate/interoperate with 3rd-party LoRa server and motes easily
Refer to Polysense iView APIs.docx for the interface definitions

2.1.6. Protection Switch

1. Support 1+1 and 1:1 protection switch between 2 DxS8800 systems which have identical fiber settings

2.2. Data Structure

Refer to iview_db_reset.sql

3. iView/Web

3.1. Overview

The Webserver provides the key GUI for end user to manage and monitor the system, below shows the overall requirements of the Webserver:

1. The Webserver can be accessed from the popular Web browsers, including IE, Chrome, Opera, Firefox, Mozilla, Safari, etc.
2. The Webserver can be accessed from external Web browser based on the Card IP address and the well-known TCP port (443 for HTTPS).
3. Support HTTPS to access Webserver from Web browser
4. Support language independence, and the language is user configurable when user logins the system, the default language should be Simple Chinese
5. After user login the system via web, if there is NO fiber exists, then the [System]->[System] page should be opened by default (for user to create fiber at first), else if there is NO view setting information in DB, then the [Topology]->[View Setting] page should be opened by default (for user to define the view), else, the [Topology] -> [View] page should be opened by default, and the fiber and point information should be shown on the map according to the view settings saved in DB.
6. When user refreshes web browser, the web browser should stay on the same page (instead of requesting user to re-login) or navigate to [System] or [View setting] page if the conditions described in #5 above are true
7. Common button behavior definitions
 - a. [Apply] just apply the new changes (and won't close the window if the [Apply] button is on a dialog window). The apply operation will trigger the validation check for the new changes, then **commit the new changes into database ONLY if the validation check of the entire changes passes**
 - b. [OK] same as [Apply] plus to close the dialog window afterwards
 - c. [Cancel] give up the new changes and close the dialog window afterwards
 - d. [Start] show the first page data in the data list/diagram (to-first-page operation)
 - e. [End] show the last page data in the data list/diagram (to-last-page operation)
 - f. [<<] show the previous page data in the data list/diagram (page-up operation)
 - g. [>>] show the next page data in the data list/diagram (page-down operation)

3.2. View

Figure 4.2-1 shows the [View] page.

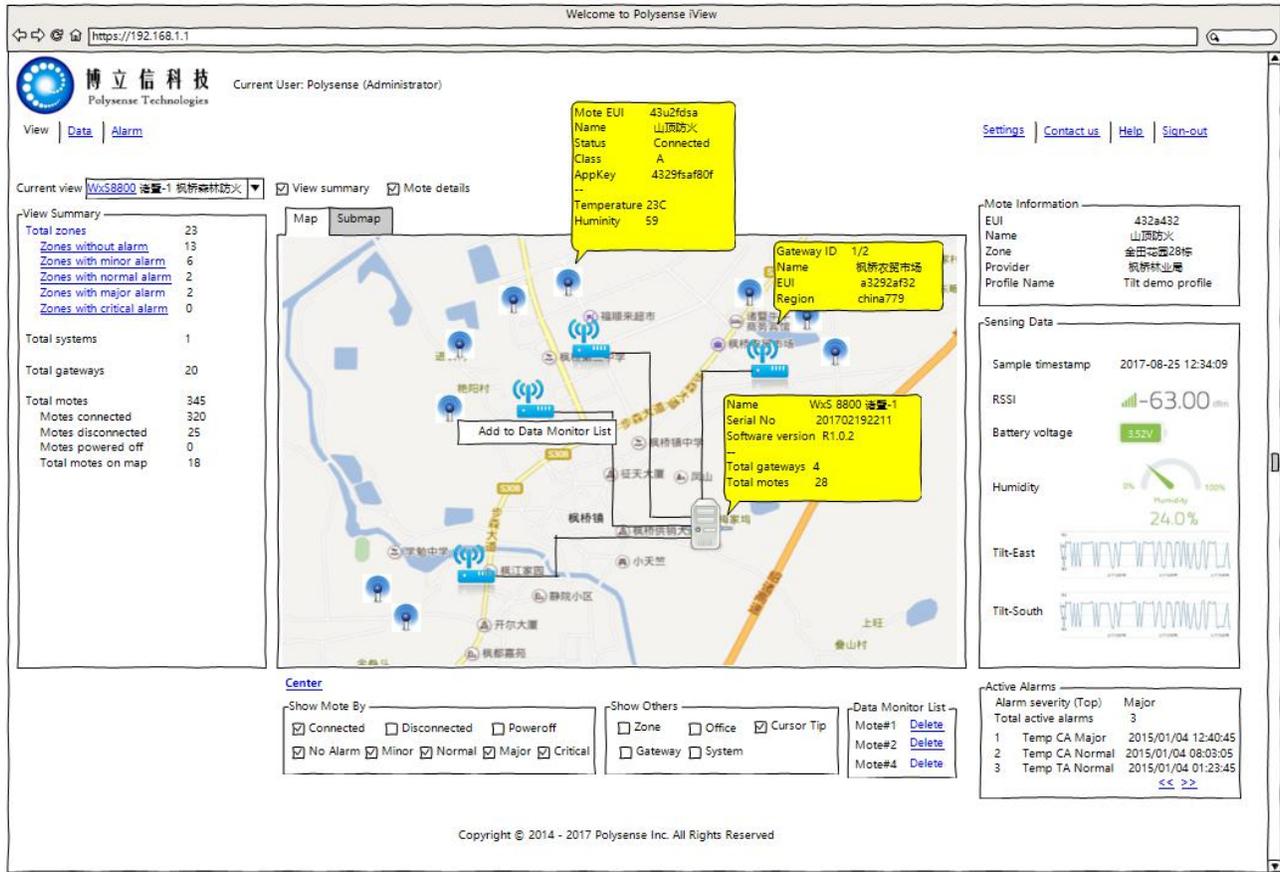


Figure 4.2-1 [View] page

View page is always the first page once after user login iView. View is also the key page for operator to monitor the sensor network, data and alarm in real-time. Administrator user (including provide administrator) can define one or multiple views for a specific user in [View Setting] page.

The requirements of the [View] window are:

1. Display the map selected in the [View Setting] window in the map area of the [View] window
2. Display the zone submap if user clicks the zone icon on map
3. Display all the motes and mote parents (gateway + system) selected from [View Setting] window with the right icons on the map by default
 - a. Mote may navigate from one gateway to another dynamically, if one gateway has no motes (which are selected from the view setting) attached, then the gateway icon should be removed from the map automatically. Or if one mote navigates to a new gateway, then the gateway icon should be displayed on the map automatically
 - b. User can show/hide some motes by selecting/deselecting the mote status and mote active alarm top severity checkboxes
4. Display all the motes belonging to the zone with the right icons on the submap once it is opened

5. Support to change the mote icon color in realtime according to the mote status and its top active alarm severity, i.e.

```
If mote status != connected then
    Mote icon color = grey
Else if mote top active alarm severity = minor then
    Mote icon color = yellow
Else if mote top active alarm severity = normal then
    Mote icon color = orange
Else if mote top active alarm severity = major then
    Mote icon color = red
Else if mote top active alarm severity = critical then
    Mote icon color = purple
Else
    Mote icon color = green
End if
```

6. Support to show the brief information in a small tip window on the map or zone submap when the cursor is moved over the icon of mote, gateway, system or office

- a. The cursor tip window should be closed automatically when the cursor is moved away
- b. By default, this feature is enabled, it can be disabled or enable through unselecting/selecting the [Cursor Tip] checkbox
- c. Information in mote tip window
 - Name
 - Mote EUI
 - RSSI
 - The data type 1 name + latest data value
 - ...
 - The data type n name + latest data value
 - Report timestamp
- d. Information in gateway tip window
 - Name
 - Gateway EUI
 - Region
- e. Information in gateway tip window
 - Name
 - Serial No
 - Software version

- f. Information in office tip window
7. Support to pick up a mote on the map or zone submap when the mote icon is left-key-clicked, then
- a. Show the mote brief in the mote information area
 - b. Show the mote latest sensing data in sensing data area
 - The sensing data should keep updated if there is new data reported
 - If the sensing data is presented in curve chart, then the last 10-minute data should be displayed after user left-key-clicks the mote icon, then the curve will keep growing when there is new data reported
 - c. Show mote active alarms in alarm area, including
 - Top active alarm severity
 - All active alarms
8. Support to popup a menu when the point icon is right-key-clicked, user can select the menu item to add current mote into the data monitor list:



- a. The data monitor list includes the motes user has interest to monitor them in the [Data] window
 - b. Only up to 5 motes can be added into the data monitor list, if the list is full, then software should deny the user operation through greyed out the [Add to Data Monitor List] menu item
 - c. The [Data Monitor List] is shown in the bottom of the map area, once the selected point is added successfully, it will be displayed in the list
 - d. User can delete the selected point from the list via clicking the [Delete] button in the [Data Monitor List]
 - e. The data monitor list should be kept even user navigate among different windows, i.e. when user navigate back to the [View] window, the select points of the fiber should be displayed in the [Data Monitor List]
9. Support to move the last left-key-clicked mote to the center of the map when user clicks the [Center] radio button, if NO mote is left-key-clicked, then software can randomly select one mote to the center of the map
10. Support the basic map operations, including zoom in/out, drag, satellite view, etc.

- 11. Support to show/hide the mote icons on map and zone submap according to the “ANDed” result of mote status and mote active alarm top severity selected by user under the map area
 - a. By default, only “connected” mote status and all mote active alarm top severities should be selected
- 12. Support to show/hide zone, office, gateway and system icons on map according to user selection
 - a. The zone icon color can be updated in realtime according to the top active alarm severity of the motes belonging to the zone
 - b. When user selects the Zone checkbox underneath the map, only the zones whose motes is being displayed on the map currently will show up on map, and all the motes should be hidden as the result
- 13. In map area, when user moves the cursor while pressing the right mouse key, there will be a dashed rectangle showing up on the map to track the start and current position of the cursor, once user releases the mouse key, then the dashed rectangle along with the map region in the dashed rectangle will be zoomed in automatically till equaling to the map view
- 14. The left area of the view page is the view summary, which consists of the different zone category statistics, system statistics, gateway statistics and mote statistics
 - a. The zone related items are hyperlink, i.e. user can click it, then all zones belonging to current zone category will show up as below

Community	Name	Age	Total floors	Contruction	Rating	Alarm status	Data
光华一村	6号	80	6	砖混	C级	正常	Data
光华一村	7号	80	6	砖混	C级	正常	Data
光华一村	8号	80	6	砖混	C级	正常	Data

- b. User can click the data hyperlink at the end of each zone to open the mote data list dialog. By default, all data types the motes of the zone have should show up in the list, if the data type is inapplicable to the mote, then its value should be displayed as “-“

Mote EUI	Mote name	Tilt-east	Tilt-south	Tilt-west	Tilt-north	Crack(mm)	Alarm status
432a431	楼顶东南角	1.09‰	0.92‰	-	-	-	正常
432a432	楼顶东北角	1.21‰	-	1.10‰	-	-	正常
432a433	楼顶西南角	-	-	2.1‰	0.91‰	-	正常
432a434	楼顶西北角	-	0.09‰	3.2‰	-	-	正常
432a435	5楼东外立面	-	-	-	-	2.2	正常

- 15. Support to keep the view last state while user navigates among different pages, i.e. when user navigates back to the view page, everything on the view page should be restored to its last state
 - a. The view last state should be kept till the user logout current session

3.3. Data

Figure 4.3-1a and 4.3-1b show the 2 kinds of the [Data] page. [Data] page can show the data of the selected motes + specified time interval in form of data diagram or data list.

1. The normal procedure to display data (data display procedure) is:
 - Query motes in [Mote Selection] area -> edit the selected motes in most list -> select Data type in data type list -> click the time interval option hyperlink
2. Same as [View] page, the [Data] page should also be kept with the last state while user navigates among different pages, i.e. when the user navigates back to the [Data] page, everything on the page should be restored to its last state, even the data in [Data List] and [Data Diagram]. The last state should be kept till user logout.

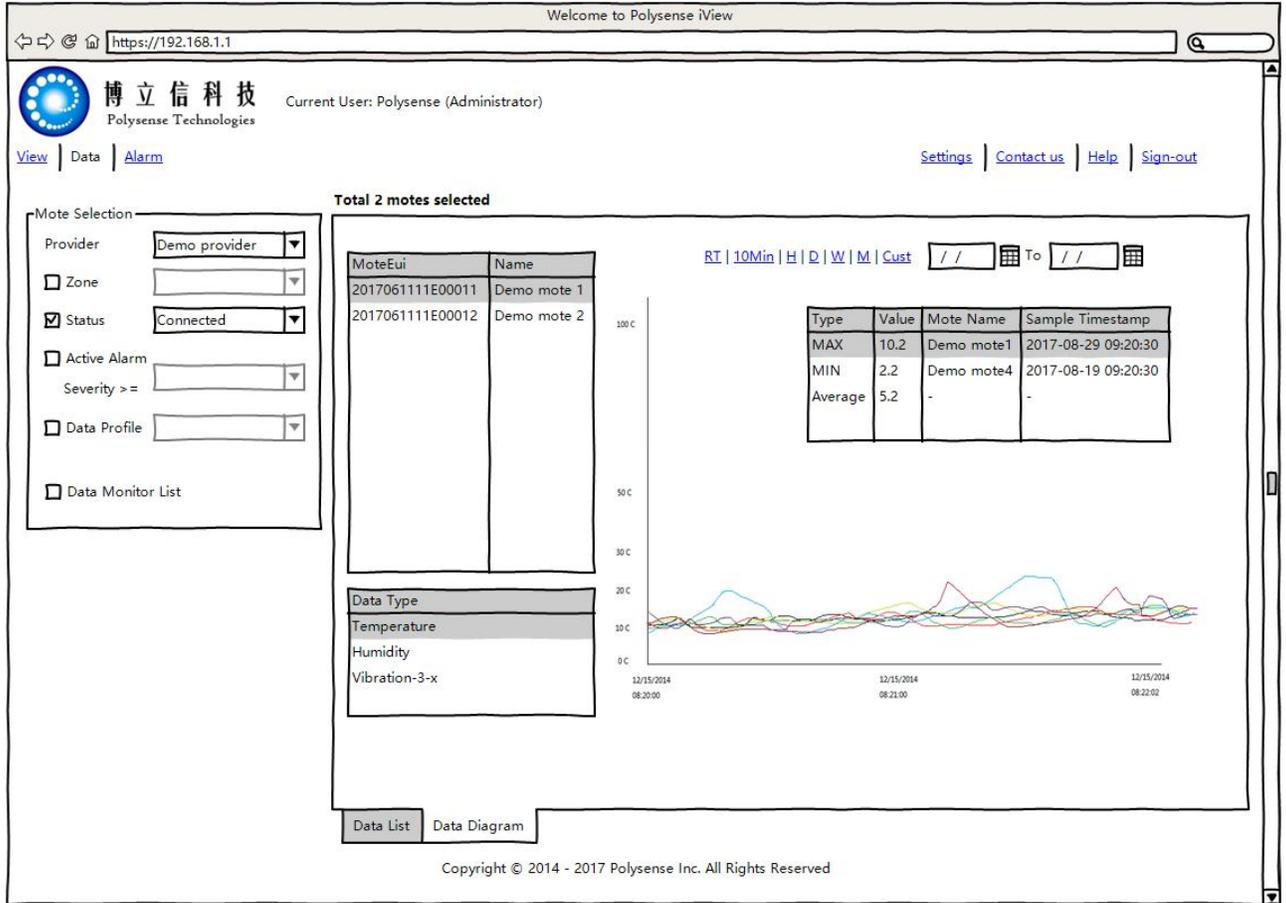


Figure 4.3-1a [Data] page – Data Diagram

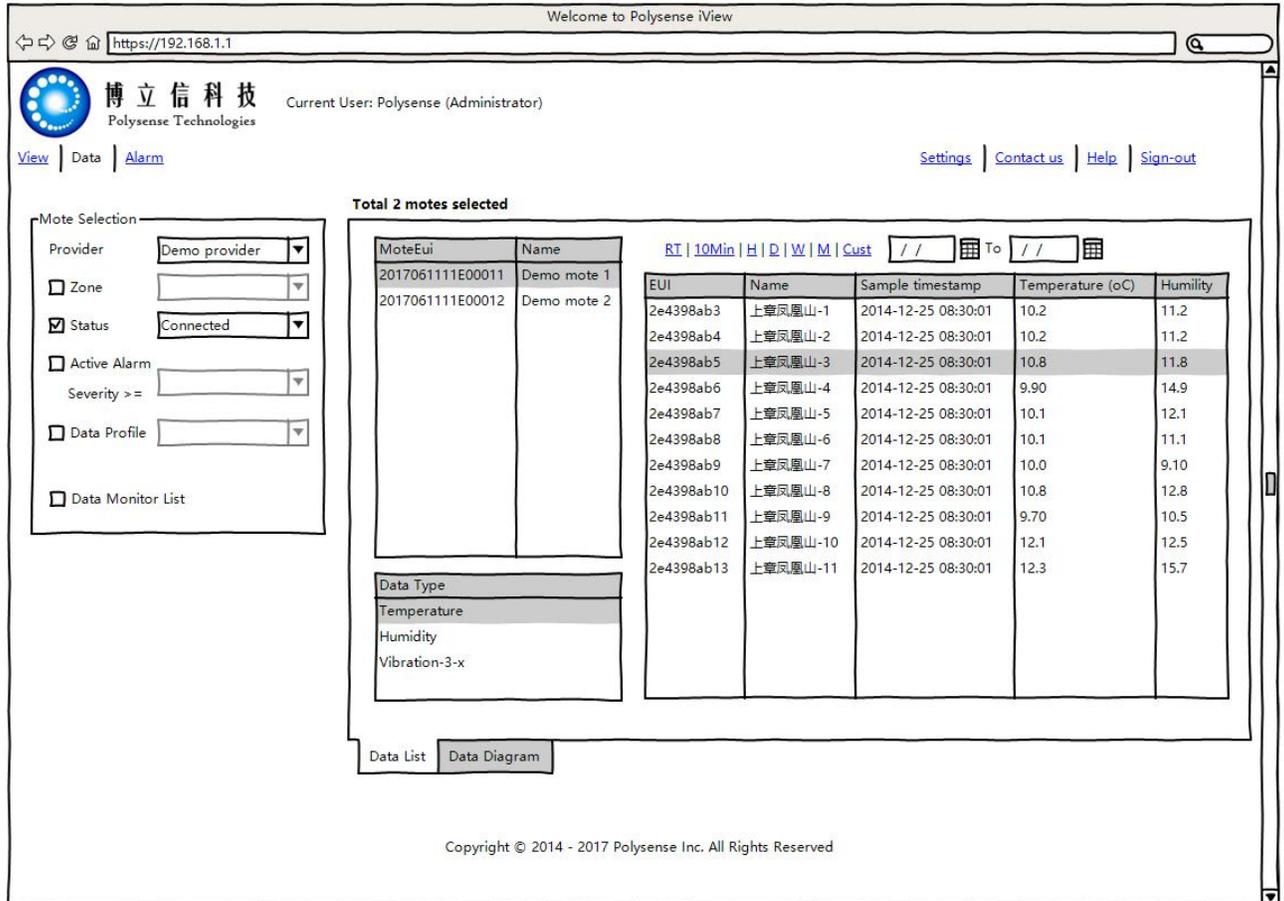


Figure 4.3-1b [Data] page – Data List

The [Data] page allows user to view the sensing data for the selected motes in form of data list or data diagram, user can use the [Data] page to query the history data according to the specified time interval, or monitor the data in real-time.

3.3.1. Mote Selection

At first user must query the motes in the [Mote Selection] area. There are 2 ways to query motes, one is to directly use the motes in data monitor list (the data monitor list is selected in [View] page) via selecting the [Data Monitor List] checkbox, the other way is to use below combined conditions to query motes via unselecting the [Data Monitor List] checkbox:

Condition	Mandatory	Multiple Selection	Default Value	Note
Provider	Yes	Yes	The provider the user belongs to or empty if the user doesn't belong to any provider	User must select one or multiple providers in the dropdownlist as the condition to select motes
Zone	No	Yes	Unselected and greyed out	

Status	No	Yes	Selected with Connected status	
Active Alarm Severity	No	No	Unselected and greyed out	
Data Profile	No	Yes	Unselected and greyed out	

If the [Data Monitor List] checkbox is selected, then all above combined conditions should be greyed out (means such conditions won't be valid anymore), but their checkbox states and values should be kept. If the [Data Monitor List] checkbox is unselected, then the combined conditions should be changed to normal, and their checkbox states and values are turned out to be valid.

3.3.2. Mote List

After selecting the query conditions, user can click [Query] button to initiate the query action, and the queried motes should be filled into the mote list in the [Data Diagram] or [Data List] tab. The mote list allows user to only show the data for the subset of the query motes.

1. The total queried mote number should show up on the top of the [Data Diagram] or [Data List] tab
2. By default, all motes in the mote list should be selected
3. User can de-select the motes in the mote list to only show the data of subset of motes
4. The mote EUI and name should be displayed with different colors in the most list
5. If there is data being displayed in [Data List] and [Data Diagram] (e.g. user has gone through the data display procedure described above), selecting or de-selecting the motes in mote list will cause the data in [Data List] and [Data Diagram] updated automatically, i.e. add the data display for the newly selected motes, remove the data display for the newly de-selected motes

3.3.3. Data Type List

The [Data Type] list allows user to select the data types to be displayed in data diagram and data list

1. [Data Type] list holds all the data types supported by the selected motes in mote list, so it should be updated automatically if user selects or de-selects motes in most list
2. [Data Type] list in [Data Diagram] tab is a single-selection list, while it is a multi-selection list in [Data List] tab
3. By default, NO entry should be selected in the [Data Type] list
4. If there is data being displayed in data list and data diagram and user changes the selections in [Data Type] list, then the data in data list and data diagram should be updated accordingly, i.e.
 - a. In data diagram, the data curve of the selected data type should be displayed in the data diagram, and the data curve of previous selected data type should be removed
 - b. In data list, add the data of the selected data types as the new columns into the data list, and remove the data columns of de-selected data types

3.3.4. Time Interval Options

Time interval option hyperlinks allows user to specify the time interval when querying history data, or initiate data monitoring in real-time. In addition, clicking the time interval option hyperlink will trigger the data query operation for the selected notes in the specified time interval, the returned result (data of all the data types of each selected note) will show up in the data list and data diagram according to the selected data types.

1. RT – query the history data of the selected notes for last 10 minutes and fill into data list and data diagram, then start the data monitoring for the selected notes in real-time.
 - a. While the real-time data monitoring is ongoing, clicking the [RT] hyperlink will stop current real-time data monitoring
 - b. After the real-time data monitoring is stopped, clicking the [RT] hyperlink again will cause:
 - Flush the existing data in both data list and data diagram
 - Reset the data summary table in data diagram
 - Query the history data of the selected notes for last 10 minutes and fill into data list and data diagram, then start the data monitoring for the selected notes in real-time
2. 10MIN – query the history data of the selected note data for last 10 minutes
3. H – query the history data of the selected notes for last one hour
4. D – query the history data of the selected notes for last 24 hours
5. W – query the history data of the selected notes for last one week
6. M – query the history data of the selected notes for last one month
7. Cust – query the history data of the selected notes according to the time interval in [From] [To] edit boxes
 - a. The [From] [To] edit box format should be “YYYY/MM/DD HH:MM:SS”, and by default, the edit boxes should be filled with the delimiters “ / / : : ” to divide the edit box into year placeholder, month placeholder, day placeholder, hour placeholder, minute placeholder and second placeholder
 - b. User can input the time interval into [From] [To] edit boxes manually, user can continuously type in the date time (e.g. type in 20170809102030) without manually moving the input cursor to skip the delimiter, for example, after user types in “2017”, the input cursor should skip the first “/” to move to the month placeholder automatically
 - c. User can also select the [From] and [To] date time via clicking the calendar icon 
 - d. When user clicks the [Now] hyperlink, the [To] edit box should be filled with current date time

3.3.5. Data Diagram

By default, [Data Diagram] tab is always the opened tab, [Data Diagram] tab shows data of the selected notes in form of curve.

1. Each mote curve has different color which is same as the mote entry text color in the mote list (so that user knows each curve owner)
2. The horizontal axis represents the date time, it should show the entire time interval user specifies for history data query, or it should show the time interval of at least last 10 readings for real-time data monitoring
3. The vertical axis represents the data of the selected data type, the scale of vertical axis can be adjusted automatically according to the MAX and MIN data value for the selected data type in data diagram
4. Support the data summary table in data diagram, it includes the maximum, minimum data and average data information among all the data queried (for history data query) or reported up to now (for real-time data monitoring)

3.3.6. Data List

[Data List] tab shows data of the selected motes in form of list

1. By default (when [Data List] is opened at the first time), as there is NO entry selected in the [Data List], so there is NO data column shown in the data list, but only mote EUI, mote name and sampletimestamp
2. When user selects or de-selects one entry in data type list, then the data type column should be added/removed in/from the data list, if a new data type is selected, then the corresponding data should be displayed as well if the motes have data for such data type

3.4. Alarm

Welcome to Polysense iView

Polysense Technologies | Current User: Polysense (Administrator) | [Contact us](#) | [Help](#) | [Sign-out](#)

System | Topology | Data | Alarm | Administration

Alarm Management | Alarm Profile

Polysense iView (浙江省诸暨市)

- System#1 (DxS8800-诸暨-1)
- System#2 (WxS8800-诸暨-1)
- System#3 (DxS8800-诸暨-3)
 - Card#1 (枫桥-秦南)
 - Card#2 (枫桥-上章)
 - Port#1 (1组)
 - Port#2 (2组)
 - Port#3 (3组)
 - Port#4 (4组)
 - Fiber#2 (2弄)
 - Provider#1 (枫桥林业局)
 - Provider#2 (店口林业局)

Show History Fibers

Select Points

Zone: 上章区段

Distance From: [] m To: [] m

Priority: []

Alarm Type: []

Alarm Severity: []

Alarm Status: []

Alarm Raise Timestamp

Realtime

Last 1 hour

Last 1 day

[] / [] / [] To [] / [] / []

[Search](#)

System#3.Card#1.Port#4.Fiber#1 - Alarm List Sort by: Raise Timestamp Ascending

ID	Distance (m)	Type	Severity	Status	Raise Timestamp
1	300	Temperature	Critical	Active without handling	2014/12/20 12:30:10

Point Information

- System ID: 3
- Card ID: 1
- Port ID: 4
- Fiber ID: 1
- Deployment ID: 1
- Distance: 300m
- Type: Temperature
- Name: 农民甲-1
- Description: 上章村11弄1号监控点1
- Priority: P8
- Creation timestamp: 2014/12/19 08:45:20
- Zone ID: 4
- Admin state: Enabled
- Cross threshold alarm state: Enabled
- Trend alarm state: Enabled
- Alarm profile: System temp profile
- Current temperature: 9.9C
- Change from previous reading: -0.9C
- Previous point (200m): 10.8C
- Next point (400m): 10.1C

Alarm Description
<Display the description of the selected alarm in Alarms list above when the Alarm Description checkbox is selected>

[Clear Alarm](#) [Delete Alarms](#) [Start](#) << >> [End](#)

Copyright © 2014 - 2017 Polysense Inc. All Rights Reserved

Figure 3.4.5-4a [Alarm] window – DxS8800 System

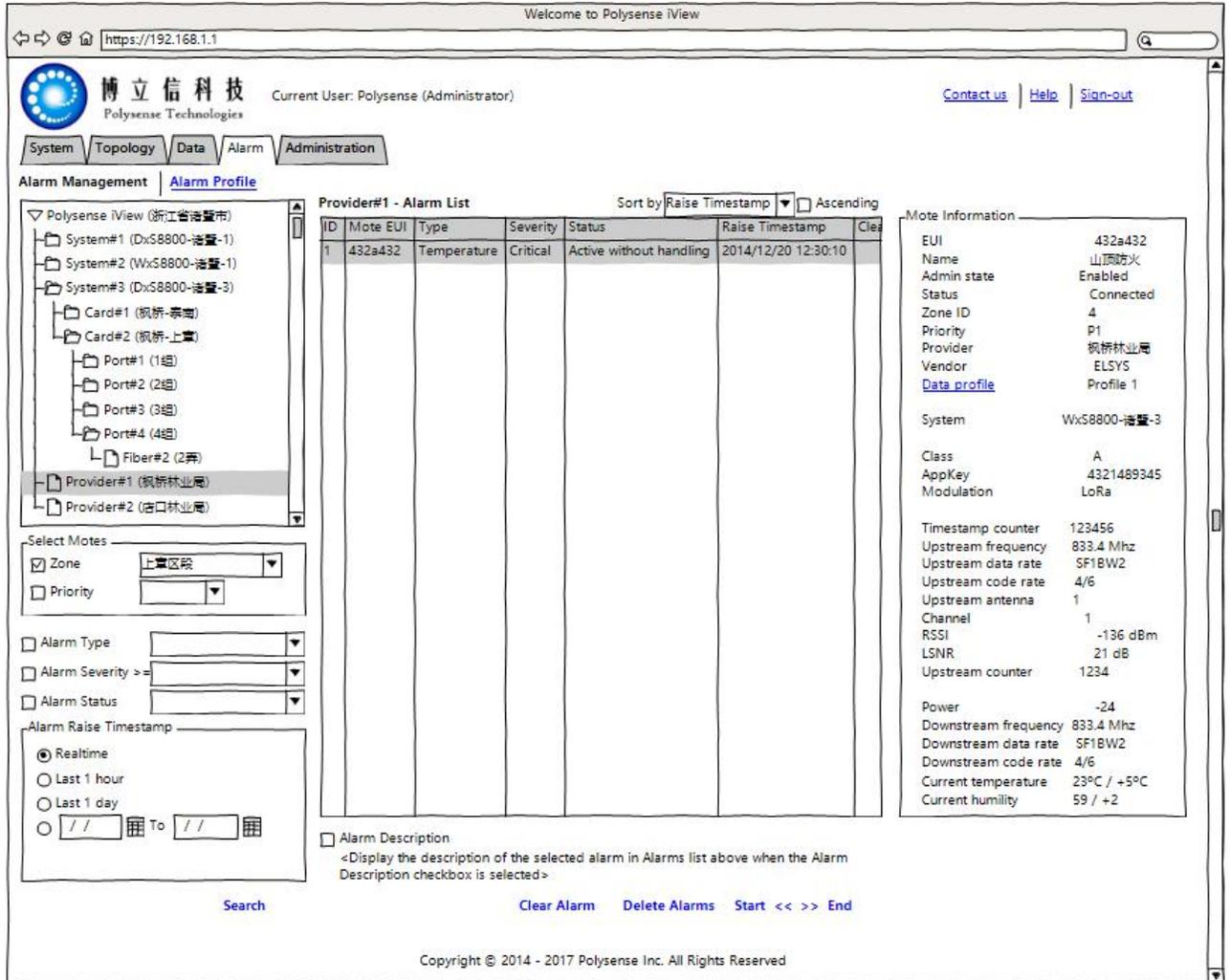


Figure 3.4.5-4b [Alarm] window – WxS8800 System

Figure 3.4.5-4 shows the [Alarm] window, which is the key page to manage the entire alarms of the system.

3.4.1. Query Condition

The M-data query conditions include:

1. Fiber
 - a. Fiber is mandatory condition
 - b. Only single fiber can be selected at one time
 - c. Both current fiber and history fiber - can be selected, by default only the current fiber shows up under the port node, when [Show history fiber data] checkbox is selected, then all the history fiber nodes as well as current fiber will show up under the port node
2. Zone

- a. Zone is optional condition
 - b. By default, software should select the [Zone] checkbox and fill in the dropdown list with the Zone that current user belongs to. If current user doesn't belong a valid zone (Zone ID of the user entry equals to NULL), then leave the checkbox unselected
3. Distance
 - a. Optional condition
 - b. Distance refers to the point distance range on the selected fiber
 4. Deployment
 - a. Optional condition
 - b. When user selects the deployment checkbox, then software should query all the deployments of the fiber and fill into the dropdown list
 5. Point priority
 - a. Optional condition
 6. Alarm type
 - a. Optional condition
 7. Alarm severity
 - a. Optional condition
 8. Alarm status
 - a. Optional condition
 9. Sample timestamp
 - a. Mandatory condition
 - b. Sample timestamp refers to the M-data sample timestamp
 - c. User can specify to monitor the alarm of the selected points in realtime (select the [Realtime] radio button), or just query the history alarms of the selected points according to the sample timestamp range, including:
 - Last 1 hour (from now to 1 hour ago)
 - Last 1 day (from now to 24 hours ago)
 - Specify a datetime range

All the selected conditions are ANDed together to construct the final condition.

3.4.2. Query Action

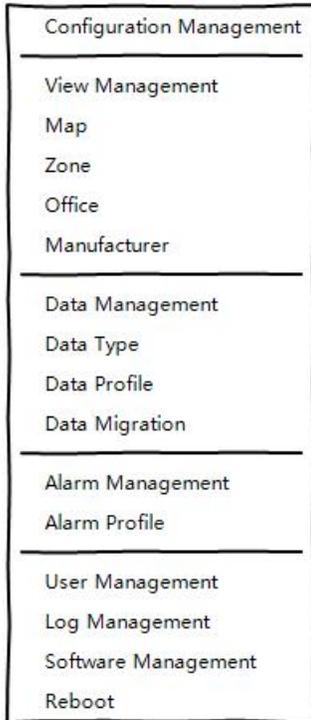
1. The query is triggered through clicking the [Search] button, as the consequent actions, the old alarm records in the [Alarm List] should be flushed, and filled in with the new queried alarm entries

3.4.3. Query Result

1. Support to show the queried alarms in form of list (in the [Alarm List] view of [Alarm] window)
 - a. In the alarm list, the alarms is displayed up in descending order of raise timestamp by default
 - b. User can change the ranking item and order by selecting the [Sort by] dropdown list and [Ascending] checkbox
 - c. User can select the [Alarm Description] checkbox, then the alarm description of the selected alarm entry in the alarm list will be displayed under the [Alarm Description] checkbox. If user selects another alarm entry, its alarm description will be updated accordingly
2. When [Realtime] radio button is selected, the alarm list should keep being updated with the latest alarms according to the query conditions
 - a. The behavior is, the latest M-data entry will always be inserted into the top place of the list (and other entries will be moved down accordingly), user still can do the page operations for the list
 - b. The ranking item and order settings are inapplicable to this case
 - c. If there are alarm entries in the alarm list queried from last time, then they all should be flushed before the realtime alarm entries are filled in
3. When user selects one alarm entry in the alarm list and the alarm is raised on one point, then the point information should be displayed in the [Point Information] view
4. Support to manually clear the selected alarm entry in the alarm list through clicking the [Clear Alarm] button
 - a. The status of the select alarm entry in the alarm list should be changed to “Cleared manually” after the clear operation (when DE clears the alarm, it should update the alarm status to “Cleared non-manually”
 - b. If the selected alarm entry has been cleared already either manually or non-manually, then software should just ignore the operation silently (should NOT touch the “ClearTimestamp_” in Alarm table)
 - c. Once the active alarm is cleared successfully, the “AlarmTopSeverity_” and “ActiveAlarmCount_” in Point table should be updated accordingly, i.e. “AlarmTopSeverity_” should be changed to next low alarm severity if there is such severity active alarm on the point, or “None” if there is no active alarm on the point. “ActiveAlarmCount_” should be minored with 1 till it is 0 (which means there is no active alarm on the point)
 - d. Once one active alarm is cleared manually, DE shouldn’t touch the alarm entry in alarm table, and the “AlarmTopSeverity_” and “ActiveAlarmCount_” in Point table anymore even there is alarm-clear event raised from DE after the manual-clear

3.5. Settings

Below is the setting menu items when user clicks [Settings] menu.



3.5.1. Configuration Management

Figure 3.4.2-1 shows the [System] window, as described in 3.2.2, the system entry (only 1 entry in system table) is created during manufacture phase, the card entries (1 or 2 entries in card table) and port entries are created during system initialization, so:

1. After software bootup, by default, the system entry, card entry and port entry should always be displayed in the tree view of the [System] window
2. If there are fiber entries having been created by user, then they should be displayed under the right port nodes when user clicks the port node
3. By default, only the active fiber (just one fiber entry whose admin state is enabled) shows up under one port node, when user selects the [Show History Fibers] checkbox, then all the historic fiber entries under the port node should show up under the port node, historic fiber entries refer to the fibers connected to the port before, but removed or replaced with a new fiber for some reason (e.g. the fiber is destroyed)
4. Software should support to detect the presence of a fiber on the port, then raise alarm (Fiber plug-out alarm) if the fiber was present before, but not present now, and change the fiber entry admin state to disabled)

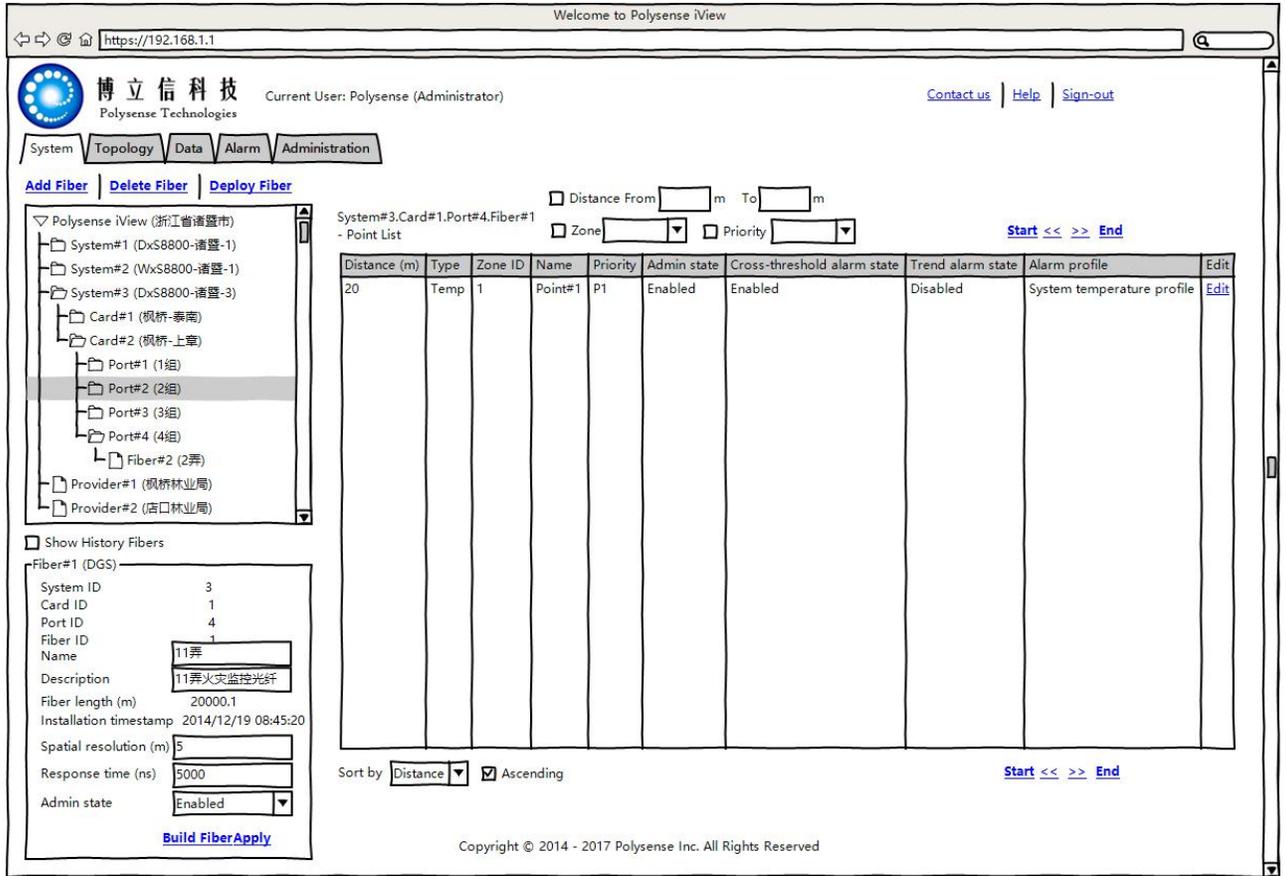


Figure 3.4.2-1a [System] window - DxS8800 System

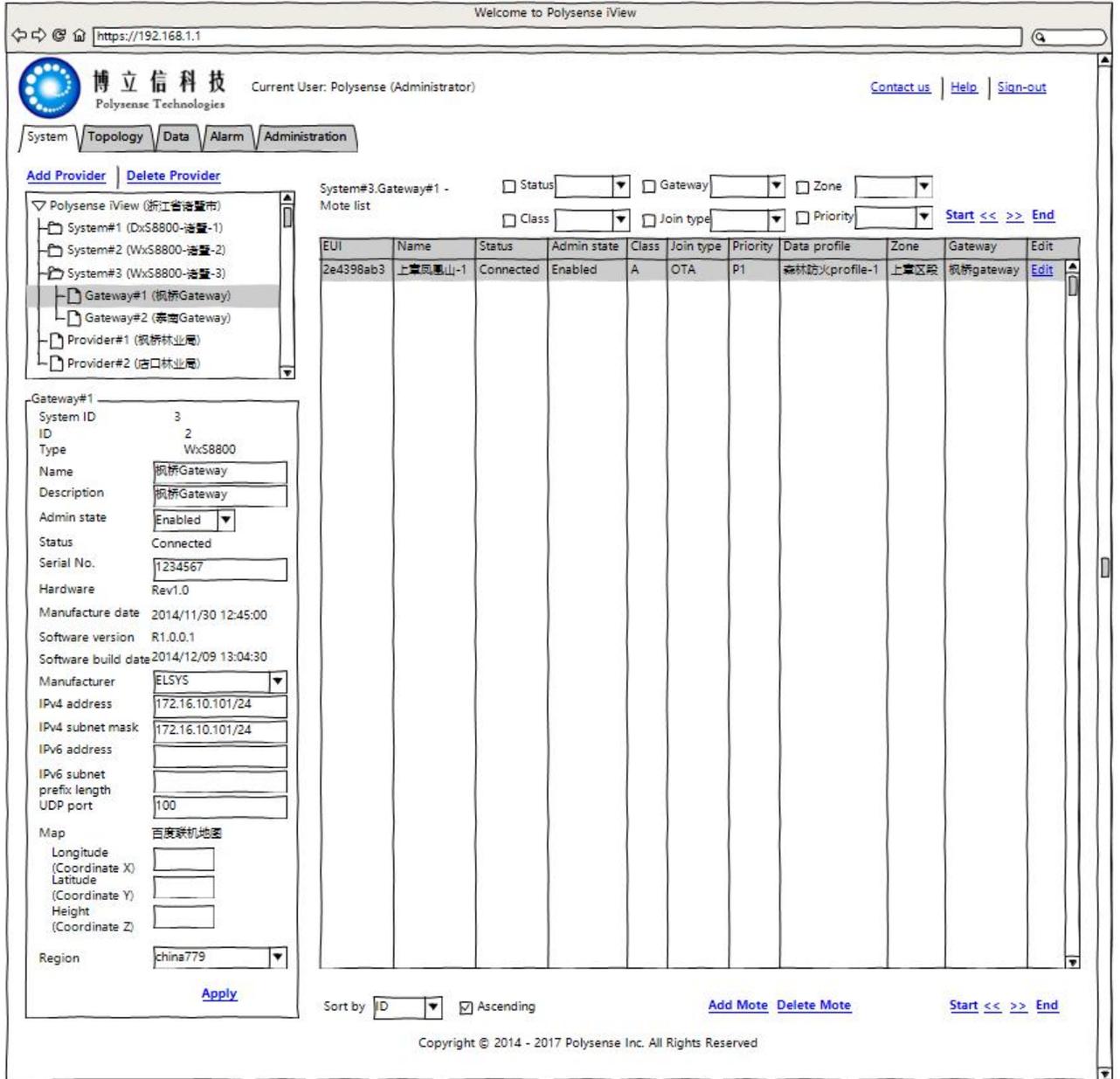


Figure 3.4.2-1b [System] window - WxS8800 System

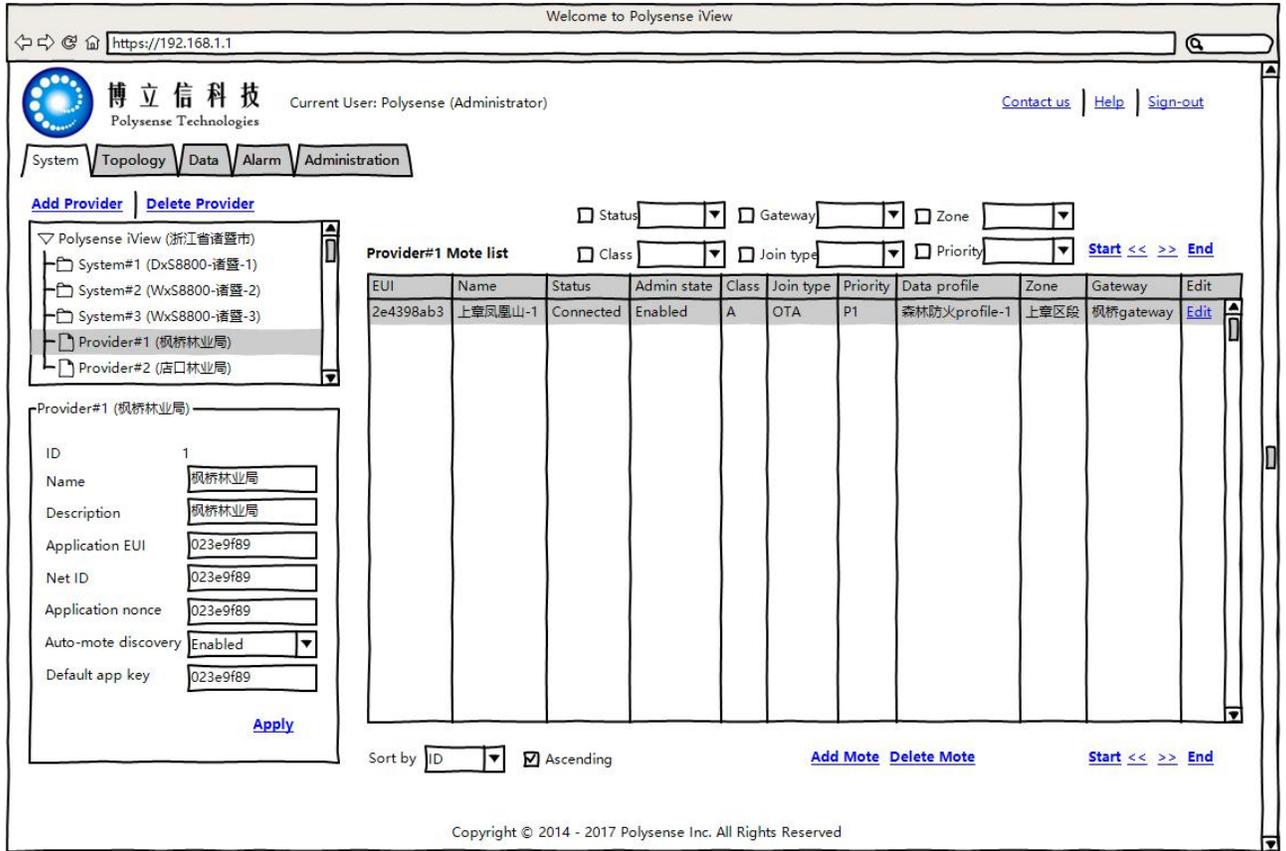


Figure 3.4.2-1c [System] window - Provider

3.5.1.1. Mote

The screenshot shows a web form titled "Add Mote" with the following fields and values:

Mote EUI	2e4398ab3	System	Wxs8800-诸暨-2	OK
Provider	枫桥林业局	Class	A	
Admin state	Enabled	Modulation	LoRa	Apply
Status	Disconnected	Join type	Over the air	
Name	农民甲	Application key	2b7e151628aed2a6abf715880	
Description	上章村11弄1号	Upstream RF attributes	Counter: 1024	
Priority	P8	Downstream RF attributes	Power: -24 dBm	
Installation timestamp	2016/10/19 08:45:20	Code rate	4/6	
Manufacturer	ELSYS	Antenna	3	
Data profile	森林防火profile-1	CRC admin state	Enabled	
Zone	上章区段	Counter	1024	
Map	百度联机地图			
Longitude (Coordinate X)	136.58			
Latitude (Coordinate Y)	57.34			
Altitude (Coordinate Z)				
<input checked="" type="checkbox"/> Sub-map	农民甲住宅			
Longitude (Coordinate X)	10			
Latitude (Coordinate Y)	10			
Altitude (Coordinate Z)				

When adding a new mote, if the JoinType of the mote is set to 'Over the air', then the application key should automatically be filled with the default application key of the provider the mote belongs to. User still can change the application key to assign an unique value to the mote.

Add Note

Mote EUI	<input type="text" value="2e4398ab3"/>	System	<input type="text" value="WxS8800-诸暨-2"/>	OK
Provider	<input type="text" value="枫桥林业局"/>	Class	<input type="text" value="A"/>	
Admin state	<input type="text" value="Enabled"/>	Modulation	<input type="text" value="LoRa"/>	Apply
Status	<input type="text" value="Disconnected"/>	Join type	<input type="text" value="Personalization"/>	
Name	<input type="text" value="农民甲"/>	Device address	<input type="text" value="473894a43"/>	
Description	<input type="text" value="上章村11弄1号"/>	Authentication key	<input type="text" value="2b7e151628aed2a6abf715880"/>	
Priority	<input type="text" value="P8"/>	Encryption key	<input type="text" value="2b7e151628aed2a6abf715880"/>	
Installation timestamp	<input type="text" value="2016/10/19 08:45:20"/>	Upstream RF attributes		
Manufacturer	<input type="text" value="ELSYS"/>	Counter	<input type="text" value="1024"/>	
Data profile	<input type="text" value="森林防火profile-1"/>	Downstream RF attributes		
Zone	<input type="text" value="上章区段"/>	Power	<input type="text" value="-24"/> dBm	
Map	<input type="text" value="百度联机地图"/>	Code rate	<input type="text" value="4/6"/>	
Longitude (Coordinate X)	<input type="text" value="136.58"/>	Antenna	<input type="text" value="3"/>	
Latitude (Coordinate Y)	<input type="text" value="57.34"/>	CRC admin state	<input type="text" value="Enabled"/>	
Altitude (Coordinate Z)	<input type="text" value=""/>	Counter	<input type="text" value="1024"/>	
<input checked="" type="checkbox"/> Sub-map	<input type="text" value="农民甲住宅"/>			
Longitude (Coordinate X)	<input type="text" value="10"/>			
Latitude (Coordinate Y)	<input type="text" value="10"/>			
Altitude (Coordinate Z)	<input type="text" value=""/>			

Mote#1 - Edit Window ✕

<p>Mote EUI: 2e4398ab3</p> <p>Provider: 枫桥林业局</p> <p>Admin state: <input type="text" value="Enabled"/></p> <p>Status: <input type="text" value="Disconnected"/></p> <p>Name: <input type="text" value="农民甲"/></p> <p>Description: <input type="text" value="上章村11弄1号"/></p> <p>Priority: <input type="text" value="P8"/></p> <p>Installation timestamp: 2016/10/19 08:45:20</p> <p>Manufacturer: <input type="text" value="ELSYS"/></p> <p>Data profile: <input type="text" value="森林防火profile-1"/></p> <p>Zone: <input type="text" value="上章区段"/></p> <p>Map: <input type="text" value="百度联机地图"/></p> <p>Longitude (Coordinate X): <input type="text" value="136.58"/></p> <p>Latitude (Coordinate Y): <input type="text" value="57.34"/></p> <p>Altitude (Coordinate Z): <input type="text"/></p> <p><input checked="" type="checkbox"/> Sub-map: <input type="text" value="农民甲住宅"/></p> <p>Longitude (Coordinate X): <input type="text" value="10"/></p> <p>Latitude (Coordinate Y): <input type="text" value="10"/></p> <p>Altitude (Coordinate Z): <input type="text"/></p>	<p>System: WxS8800-诸暨-2</p> <p>Gateway: 枫桥gateway</p> <p>Class: <input type="text" value="A"/></p> <p>Modulation: <input type="text" value="LoRa"/></p> <p>Device nonce: 12345</p> <p>Join type: <input type="text" value="Personalization"/></p> <p>Device address: <input type="text" value="473894a43"/></p> <p>Authentication: <input type="text" value="2b7e151628aed2a6abf71588c"/></p> <p>Encryption key: <input type="text" value="2b7e151628aed2a6abf71588c"/></p> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>Upstream RF attributes</p> <p>Frequency: 833.4 Mhz</p> <p>Data rate: SF1BW2</p> <p>Code rate: 4/6</p> <p>Antenna: 1</p> <p>Channel: 1</p> <p>RSSI: -136 dBm</p> <p>LSNR: 21 dB</p> <p>Counter: <input type="text" value="1024"/></p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>Downstream RF attributes</p> <p>Power: <input type="text" value="-24"/> dBm</p> <p>Frequency: 833.4 Mhz</p> <p>Data rate: SF1BW2</p> <p>Code rate: <input type="text" value="4/6"/></p> <p>Antenna: <input type="text" value="3"/></p> <p>CRC admin state: <input type="text" value="Enabled"/></p> <p>Counter: <input type="text" value="1024"/></p> </div>
--	--

[OK](#) [Cancel](#) [Apply](#) [< Previous point](#) [Next point >](#)

Mote#1 - Edit Window

Mote EUI	2e4398ab3	System	WxS8800-诸暨-2
Provider	枫桥林业局	Gateway	枫桥gateway
Admin state	Enabled	Class	A
Status	Disconnected	Modulation	LoRa
Name	农民甲	Device nonce	12345
Description	上章村11弄1号	Join type	Over the air
Priority	P8	Application key	2b7e151628aed2a6abf715880
Installation timestamp	2016/10/19 08:45:20	Upstream RF attributes	
Manufacturer	ELSYS	Frequency	833.4 Mhz
Data profile	森林防火profile-1	Data rate	SF1BW2
Zone	上章区段	Code rate	4/6
Map	百度联机地图	Antenna	1
Longitude (Coordinate X)	136.58	Channel	1
Latitude (Coordinate Y)	57.34	RSSI	-136 dBm
Altitude (Coordinate Z)		LSNR	21 dB
<input checked="" type="checkbox"/> Sub-map	农民甲住宅	Counter	1024
Longitude (Coordinate X)	10	Downstream RF attributes	
Latitude (Coordinate Y)	10	Power	-24 dBm
Altitude (Coordinate Z)		Frequency	833.4 Mhz
		Data rate	SF1BW2
		Code rate	4/6
		Antenna	3
		CRC admin state	Enabled
		Counter	1024

OK Cancel Apply < Previous pointNext point >

Warning

 Are you sure to delete the selected Mote 1?

OK Cancel

3.5.2. View Setting

Figure 3.4.3-3 shows the [View Setting] window which provides a very flexible way for user to build his/her own workbench – topology view (refer to section 3.4.3.1)

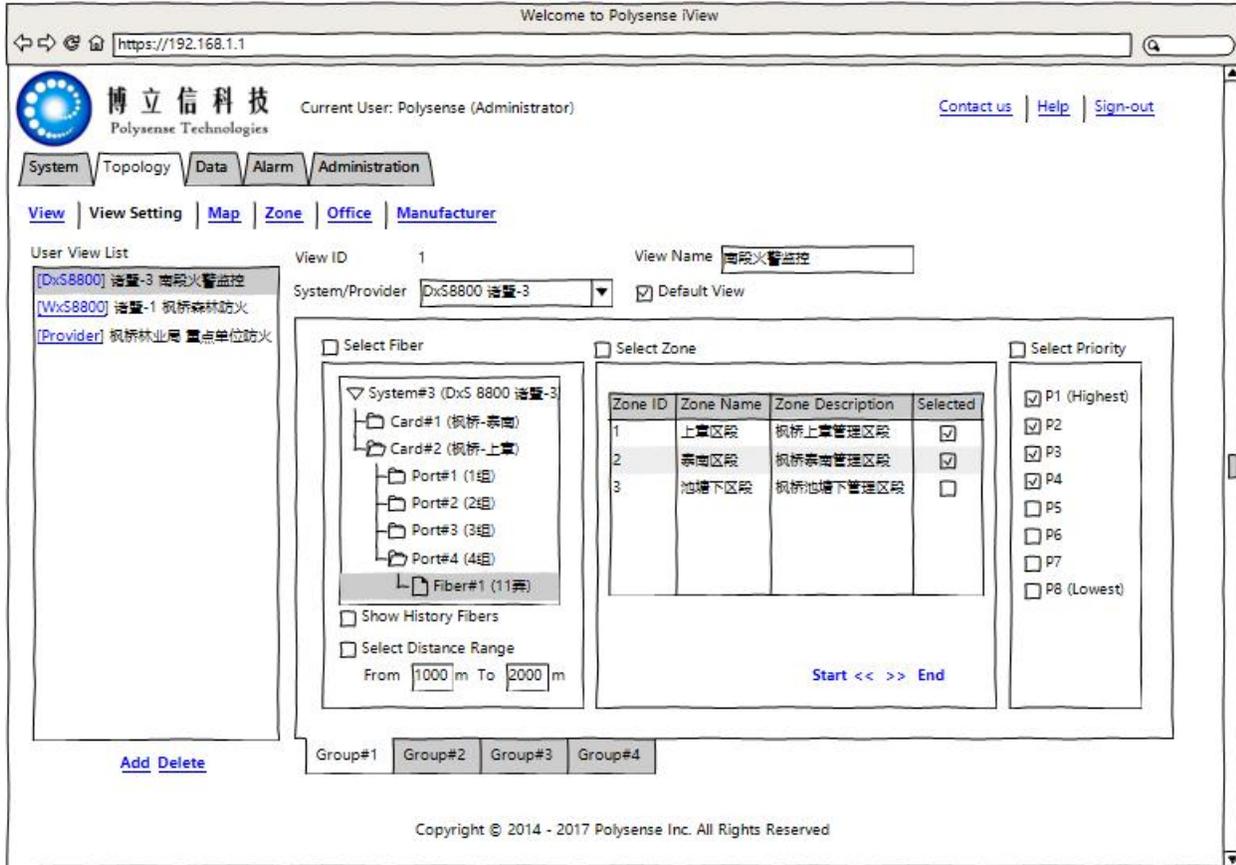


Figure 3.4.3-3a [View Setting] window – DxS8800 System

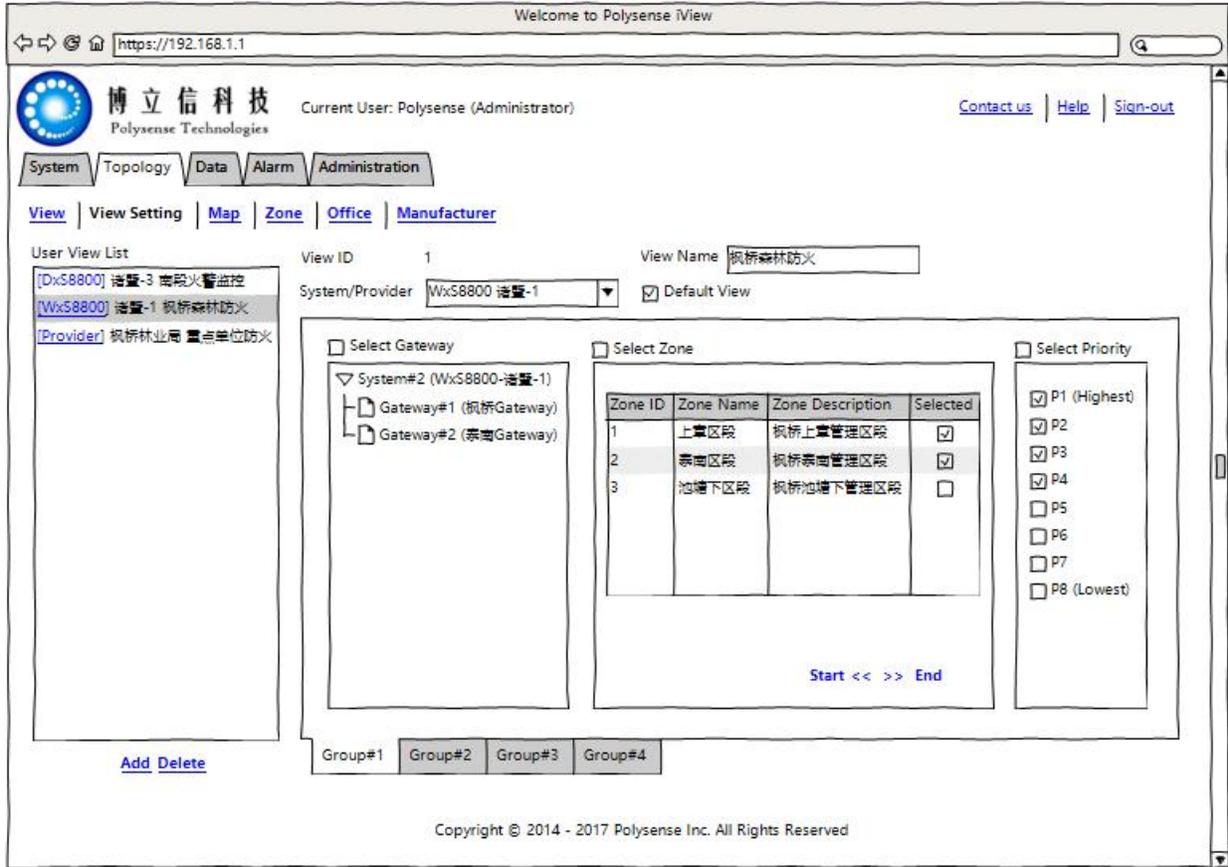


Figure 3.4.3-3b [View Setting] window – WxS8800 System

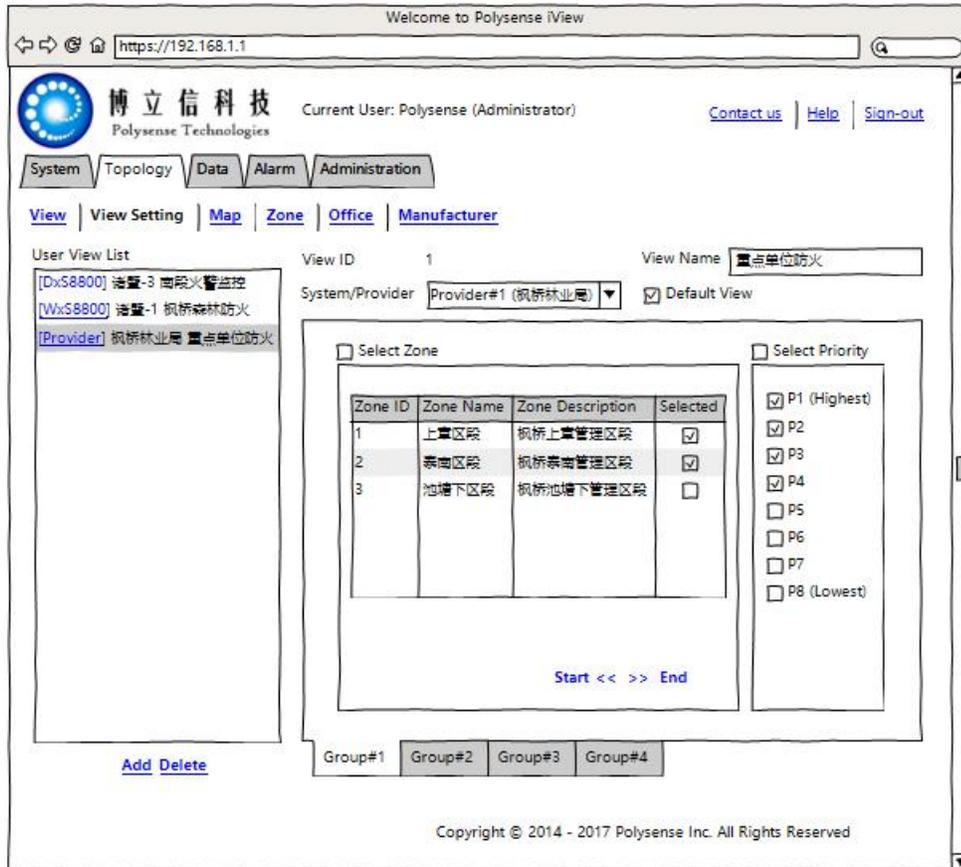


Figure 3.4.3-3b [View Setting] window – Provider

As there may be over thousand or even 10 thousand sensor points deployed and managed by DxS8800 system, it is very difficult for one user to look after all the points at the same time, so the essence of the [View Setting] window is to only select the points which user is interested in on a specific map. The requirements of the [View Setting] are:

1. Support up to 4 point groups, each one refers to one combined-condition which can query a group of points from one fiber. So 4 point groups mea user can query points from up to 4 fibers and display them on the [View] page
2. The collections from each valid point group construct the final points to be displayed on map of the [View] window
 - a. The combined-conditions among multiple point groups are OR relationship in querying the points
3. User can build the point group (or construct the condition combination) of one specific fiber according to point distance range, zone, priority or the 3 condition combinations:
 - a. User MUST specify one fiber via selecting one fiber node in the fiber tree list before to build the point group. If no fiber is selected, then the point group will be treated as invalid even there is point distance range, zone or priority condition is selected

- b. User can deselect the fiber node in the fiber tree list and click [Apply] button to invalidate current point group (i.e. the query condition associated with the point group will be removed from database)
 - c. Only if the checkbox before the [Select Distance Range] is selected, then the distance range user inputs will be valid in querying the points of the fiber
 - d. Only if there are zones selected, then the zone condition will be valid in querying the points of the fiber
 - e. Only if there are priorities selected, then the priority condition will be valid in querying the points of the fiber
 - f. The conditions among fiber, point distance range, zone and priority are AND relationship in querying the points
4. Usually user operation procedure is
- a. Select a map in the [Select Map] dropdown list
 - If there are conditions already inputted by user based on a previous map, then they all should be cleared on the GUI
 - Software should update the fiber tree view to only include the fibers deployed on the map
 - b. Select a group in the [Port Groups] list
 - If there are conditions already inputted by user based on an old group, then the conditions all should be cleared on the GUI
 - If the newly selected group has some conditions inputted before (e.g. user changes to another group and changes back again), then the conditions should be restored on GUI
 - c. Define the further conditions for the selected point group
 - Select one fiber from the fiber tree list
 - Define the distance range, zone and/or priority conditions

3.5.3. Map

Figure 3.4.3-4 shows the [Map] window which supports below operations

1. Add a map
2. Edit an existing map
3. Delete a selected map
4. Deploy fiber on map

For deploy fiber on map, please refer to 3.4.2.2.4 for the detail description. In this section, only add/edit/delete map is covered.

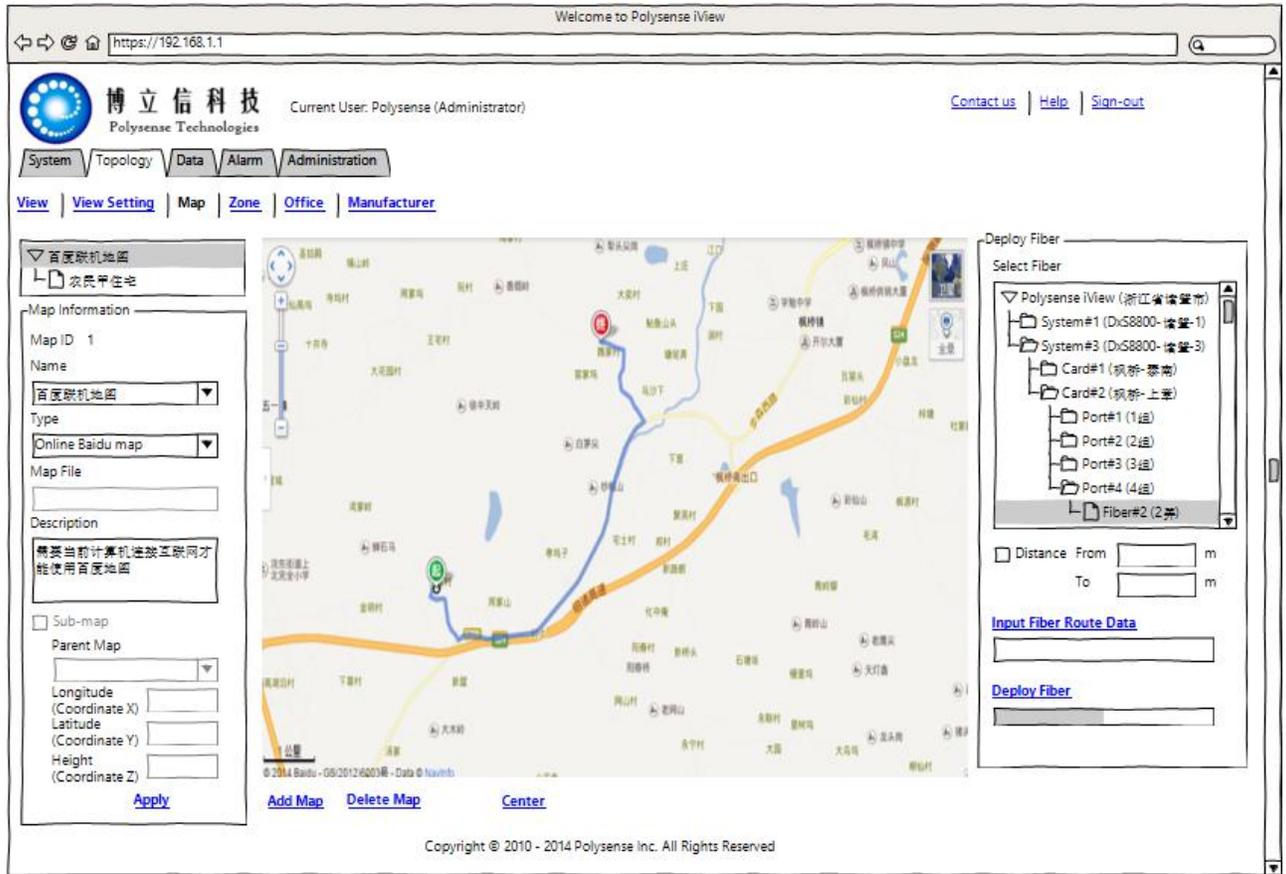


Figure 3.4.3-4 [Map] window

3.5.3.1. Add Map

Figure 3.4.3-5 shows the [Add Map] window when user clicks the [Add Map] button on the [Map] window. This is an example to add a user-defined non-GIS map.

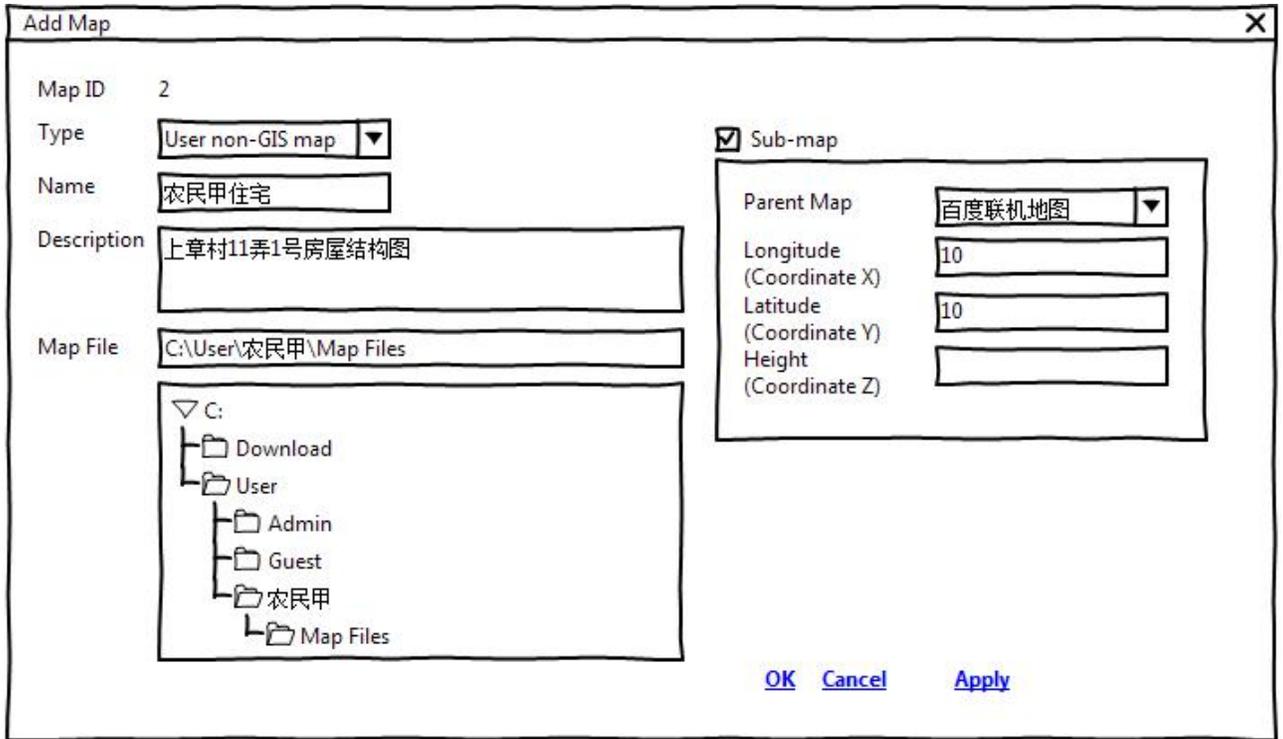
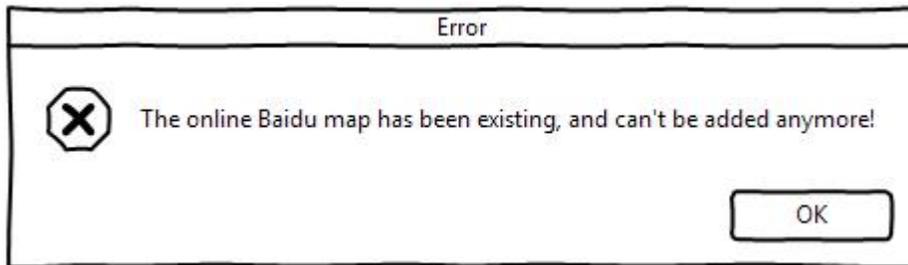


Figure 3.4.3-5 [Add Map] window

1. User can add any kind of map, but for the online Baidu or Google map, they can only be added for once, software should deny the operation if user is going to add more than one online map, and inform user with below pop-up dialog



2. During manufacture or system reset to default configuration, a default map entry (map ID#1) should be added into the map table (via the db_reset.txt script)
 - a. User can edit or delete the default map entry
3. The [Map File] edit box and directory tree view are only applicable to offline map types (including Offline Baidu map, Offline Google map, User GIS map and User non-GIS map), they should be greyed out when user selects the online map types (Online Baidu map and Online Google map) in the [Type] dropdown list
4. If the [Sub-map] checkbox is selected, then the new map will be added as a sub-map (the "Is sub-map" attribute in map table should be set to 1)
 - a. For sub-map, user MUST specifies its parent map and corresponding coordinate information on the parent map

- b. A sub-map can't be the parent map of another sub-map, so software should only add the non-sub-map entries into the [Parent Map] dropdown list
 - c. ONLY user non-GIS map can be defined as submap
5. Once a new map is added successfully, it should be set as current map in [Map] window automatically, i.e.
- a. It should be added into the [Select Map] dropdown list and selected as current map [Select Map] dropdown list
 - b. It should be displayed in the map view of [Map] window
 - c. Its information should be displayed in the [Map Information] view of [Map] window

3.5.3.2. Edit Map

For a selected map, user can change the map information in [Map Information] view and the [Map] window, Figure 3.4.3-6 shows the [Map Information] view.

Map Information

Map ID 2

Type
User non-GIS map

Name
农民甲住宅

Map File
C:\User\农民甲\Map Files

Description
上章村11弄1号房屋结构图

Sub-map

Parent Map
百度联机地图

Longitude (Coordinate X) 10

Latitude (Coordinate Y) 10

Height (Coordinate Z)

Apply

Figure 3.4.3-6 [Map Information] view

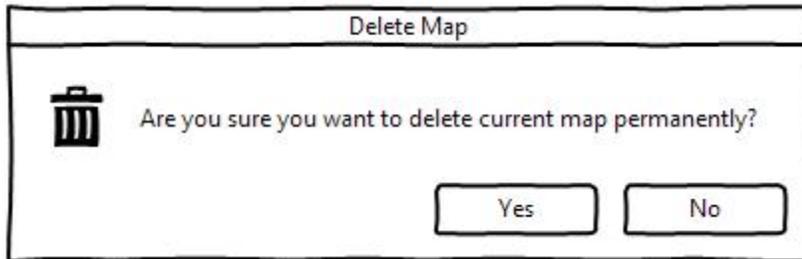
- 1. User can change
 - a. Map type

- b. Map name
- c. Map file
 - This field should be greyed out once the online Baidu or Google map is selected as map type
- d. Map description
- e. Sub-map
 - Parent map of the sub-map
 - Sub-map coordinates on its parent map
 - The [Parent Map] dropdown list and the sub-map coordinate edit boxes should be greyed out if the [Sub-map] checkbox is unselected

3.5.3.3. Delete Map

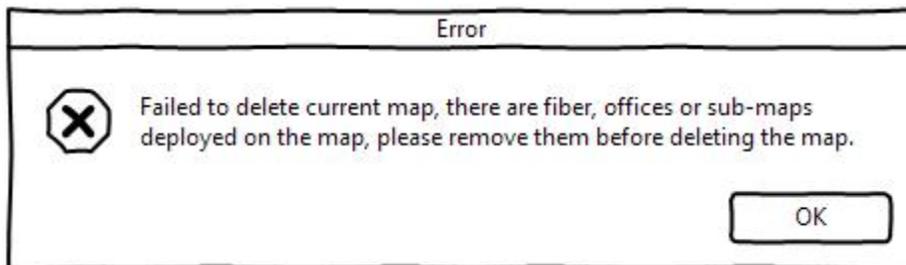
User can delete current map (selected in [Select Map] dropdown list) by clicking the [Delete Map] button on the [Map] window

1. If non-map is selected in [Select Map] dropdown list, then the [Delete Map] button should be greyed out
2. Below dialog should be popped up to confirm with user for the deletion operation



3. Once user confirms the deletion operation, software should do below validation check at first:
 - a. If there are fibers deployed on the map
 - b. If there are offices deployed on the map
 - c. If there are sub-maps deployed on the map

Only if the validation checks all pass, then software can remove the entry in map table, otherwise, the deletion operation should be denied and pop up below dialog to inform user for the failure:



- Once the deletion operation is successful, the next map in [Select Map] dropdown list should be selected automatically, and the map should be displayed in the map view and [Map Information] view of the [Map] window

3.5.4. Zone

As described in section 2.8, zone is used for fiber/point administration purpose, usually a long fiber (span over 10km) can be divided into multiple segments, and a user or a user group can only focus and manage one segment, the segment is called as zone.

Figure 3.4.3-7 shows the [Zone] window, which supports below functions:

- Add a zone
- Edit a selected zone
- Delete a selected zone
- Change point list of the zone
- Edit a specific point of the zone
 - Refer to section 3.4.2.3 for the description how to edit a point when user clicks the [Edit] button of the selected point on the [Point List] view of [Zone] window

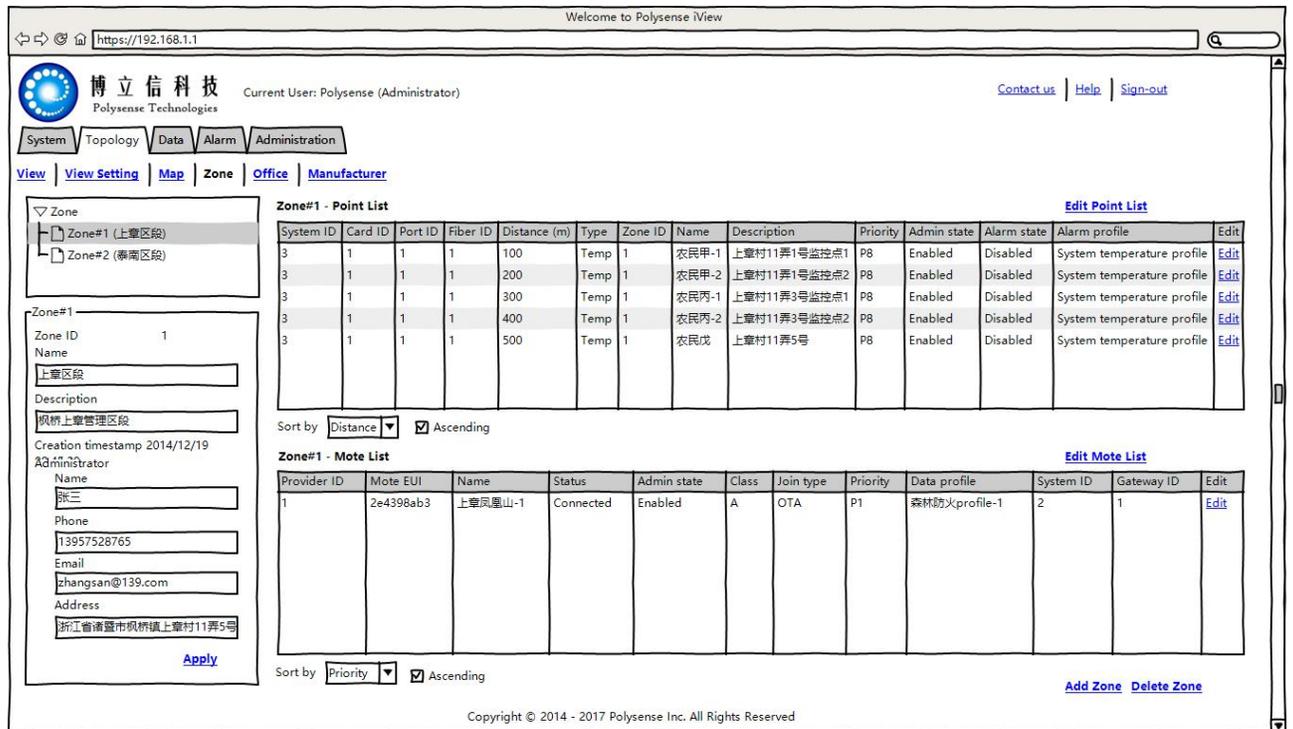


Figure 3.4.3-7 [Zone] window

3.5.4.1. Add Zone

Figure 3.4.3-8 shows the [Add Zone] window when user clicks the [Add Zone] button on the [Zone] window.

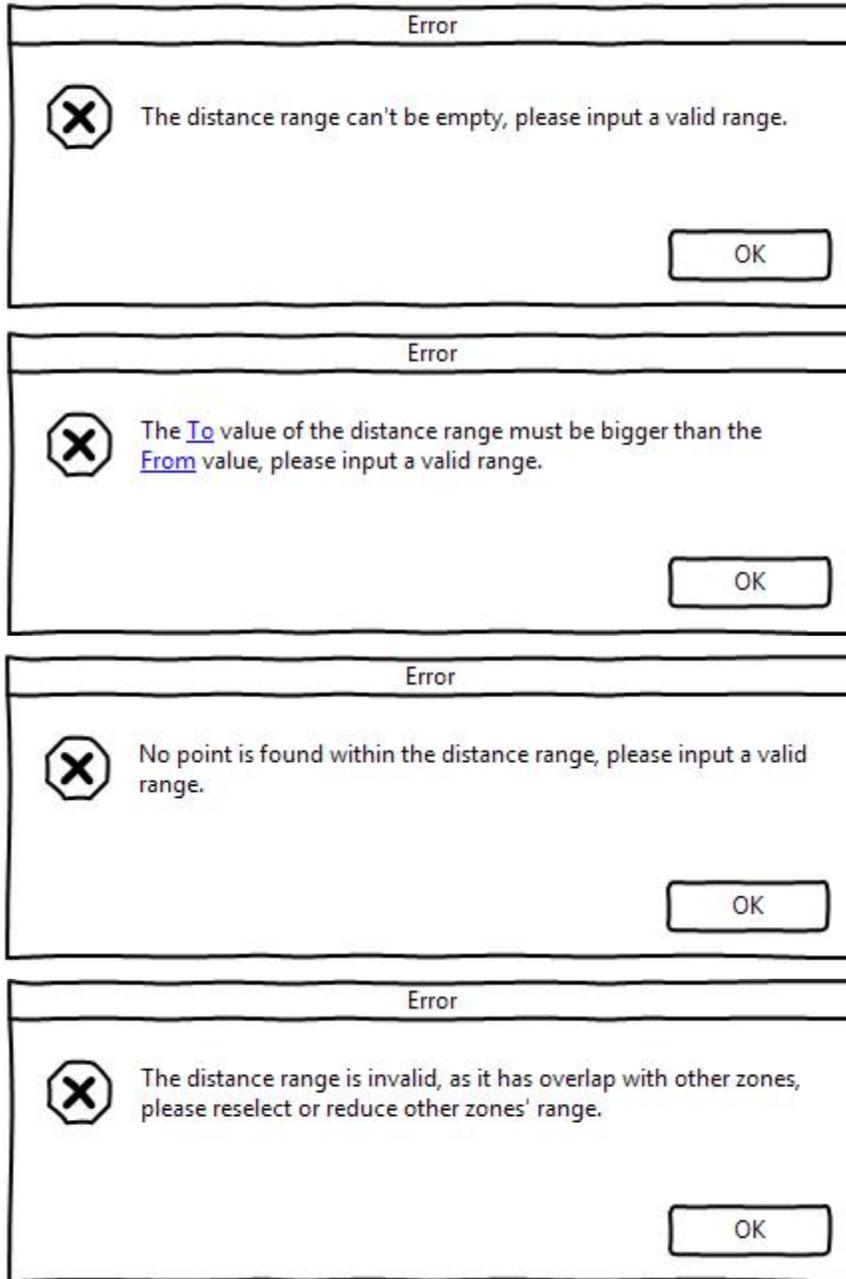
The screenshot shows a window titled "Add Zone" with a close button (X) in the top right corner. The window contains the following fields and values:

Zone ID	5	
Name	池塘下区段	OK
Description	枫桥池塘下管理区段	Cancel
Administrator Name	张三	Apply
Phone	13957528765	
Email	zhangsan@139.com	
Address	浙江省诸暨市枫桥镇上章村11弄5号	

Figure 3.4.3-8 [Add Zone] window

1. User can input the zone basic information in the [Zone Information] view, including zone name, description and the zone administrator name and contact information. These attributes can also be empty
2. User can add a zone with only its basic information, not assign the point list to the zone in the [Add Zone] window (i.e. unselect the [Select Fiber] checkbox)
 - a. In this case, the [Point List] view in [Zone] window should be empty after the zone addition operation
 - b. Later, user still can assign the point list to the zone via clicking the [Edit Point List] button as described in next section
3. User can also assign the zone point list in zone addition by selecting [Select Fiber] checkbox, in this case
 - a. User MUST select a fiber in the [Fiber] tree view
 - b. Once user selects the fiber, then software should:
 - Display the length of the selected fiber
 - Find out the existing zones on the fiber and fill into the [Other Zones] list
 - Select a free distance range (not assigned to any zone yet), and fill in the [Select Distance Range] edit boxes
 - c. User can change the distance range
 - d. Once user clicks the [OK] or [Apply] button, software should do below validation checks, only all the checks pass, then insert the new zone entry into zone table, and update the point entries in point table to assign with the new zone
 - A fiber MUST be selected in the [Fiber List] view
 - A valid distance range is inputted in [Select Distance Range] edit boxes, i.e. the distance range can't be empty, [To] distance is always bigger than the [From] distance, there are

points in between the range and there is no range overlap with existing zones on the fiber, below dialog windows should be popped up accordingly if the validation check fails



4. Once a new zone is added into database successfully
 - a. It should be added into the [Zone] tree view and selected by default automatically
 - b. The zone basic information should be displayed in the [Zone] information view
 - c. The points managed by the zone should be displayed in the [Zone Point List] view

3.5.4.2. Edit Zone

Below shows the requirements to edit an existing zone

1. In the [Zone] window, user can select a zone in the [Zone] tree view and edit the zone basic information in the [Zone] information view on the left side of [Zone] window
 - a. When user clicks the [Apply] button, then the basic information will be updated into the zone table
2. user can also change the zone point list via clicking the [Edit Point List] in the bottom of the [Zone Point List] view in [Zone] window, the [Edit Point List] window will be popped up as shown in Figure 3.4.3-9

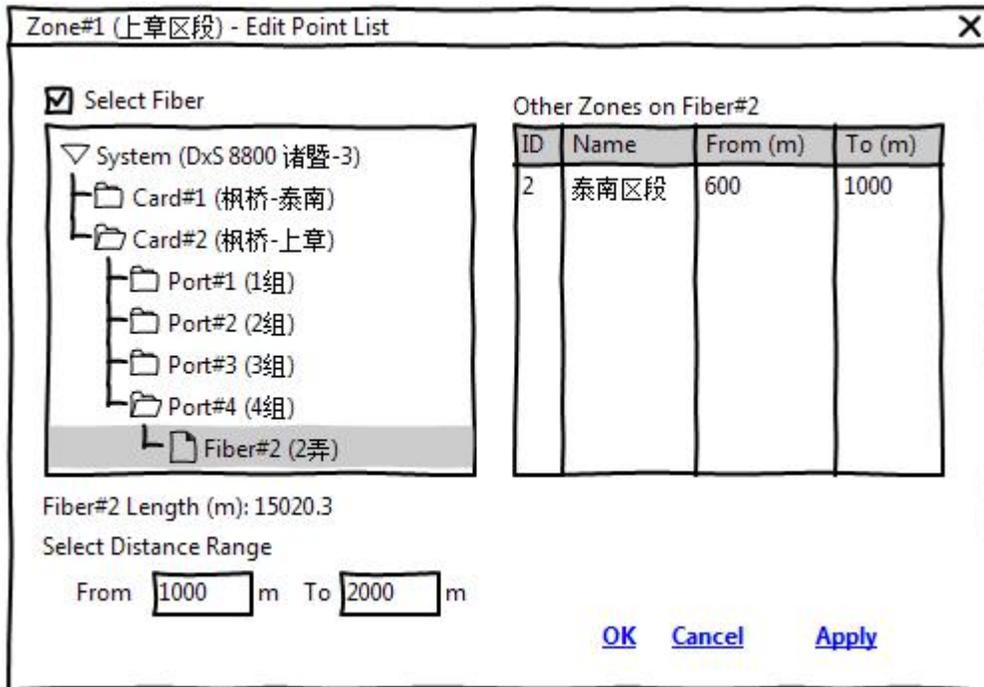


Figure 3.4.3-9a [Edit Zone Point List] window – DxS8800 System

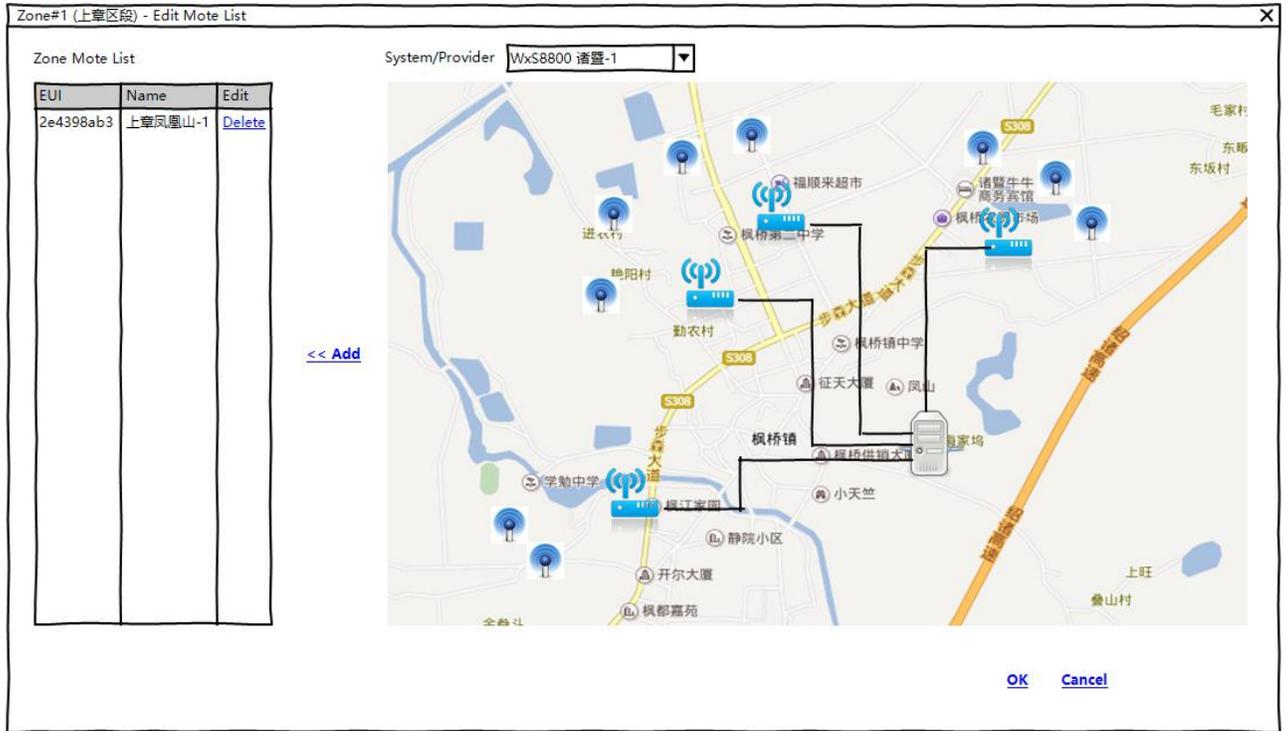


Figure 3.4.3-9b [Edit Zone Mote List] window – WxS8800 System

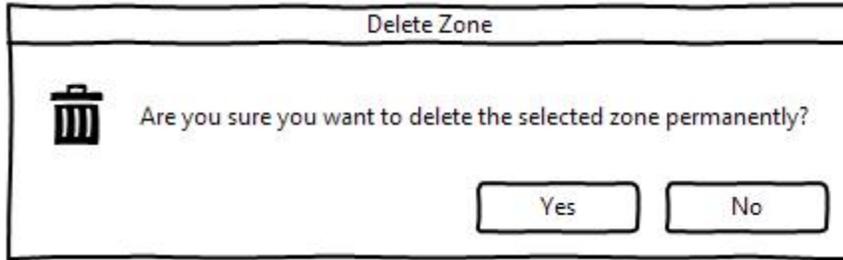
- a. If the zone has existing points being managed, then the [Select Fiber] checkbox should be selected, the fiber the points belonging to should be selected in the [Fiber] list view and the distance range of the points on the fiber should also be filled into the [Select Distance Range] edit boxes automatically
- b. User can delete all existing points managed by the zone via unselecting the [Select Fiber] checkbox and clicking the [OK] or [Apply] button
- c. When the [Select Fiber] checkbox is selected and user clicks the [OK] or [Apply] button, software should do below validation checks, only all the checks pass, then update the point entries in point table to assign with the new zone
 - Refer to section 3.4.4.1 for the requirements of the validation checks
- d. Once the zone point list is updated successfully, then the [Zone Point List] in the [Zone] window should be updated accordingly to reflect the new change

3.5.4.3. Delete Zone

User can delete an existing zone via clicking the [Delete Zone] button in [Zone] window

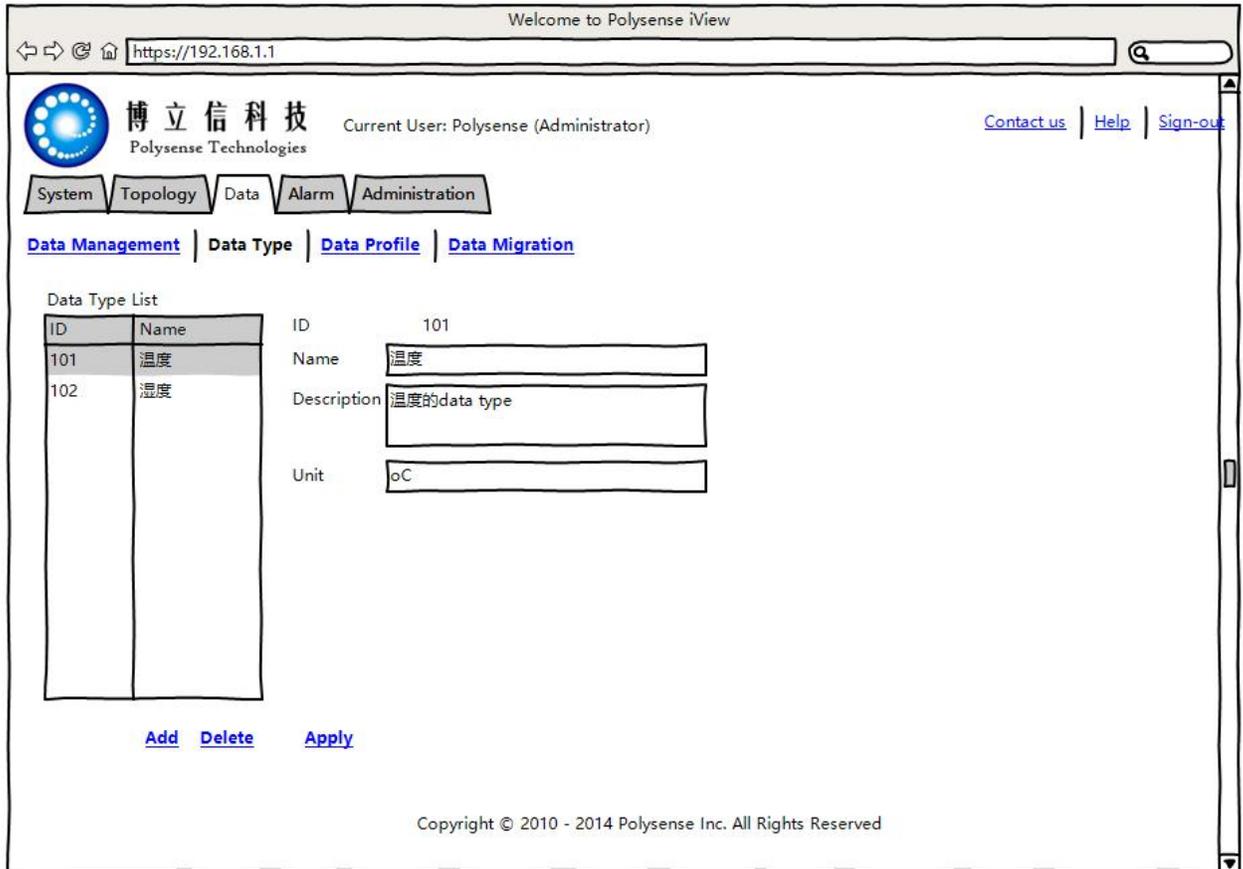
1. User must select a zone at first in the [Zone] tree view, otherwise the [Delete Zone] button should be greyed out
2. Once user clicks the [Delete Zone] button, below dialog window should be popped up, only user confirms the deletion operation (click [Yes] button), then:
 - a. Software should set the zone ID attribute of the point entries which are managed by the zone to NULL

- b. Delete the zone entry from zone table



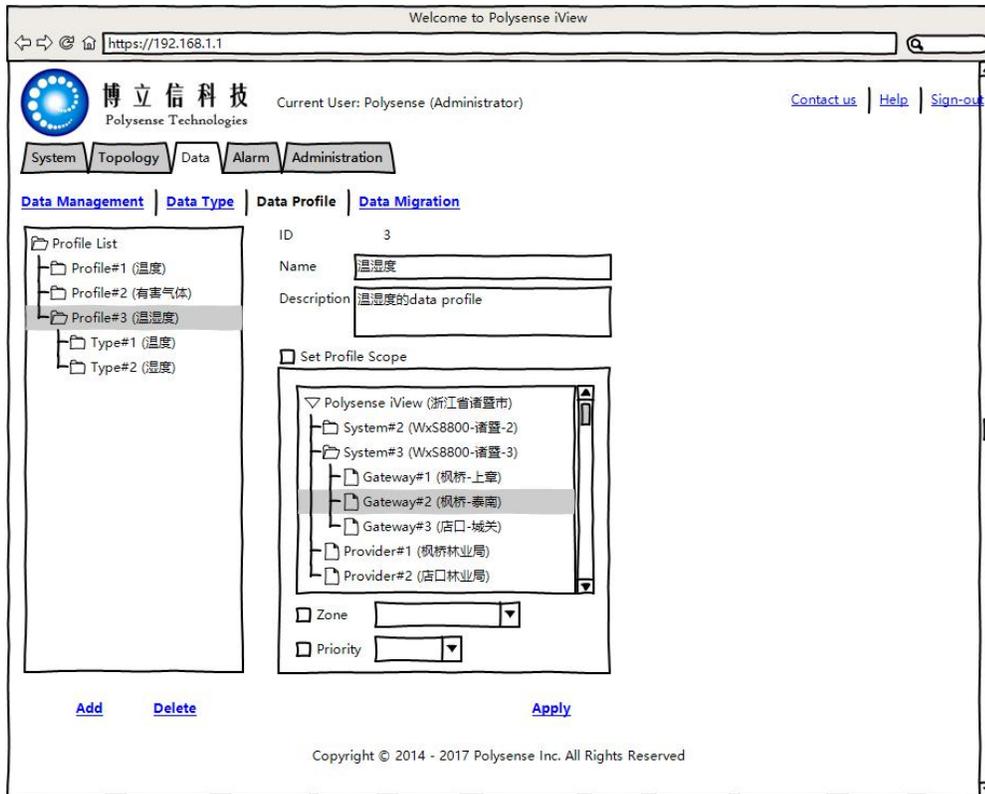
- 3. Once a zone is deleted in database successfully
 - a. It should be deleted from the [Zone] tree view and the next zone item in the [Zone] tree view should be selected automatically
 - b. The next zone basic information should be displayed in the [Zone] information view
 - c. The points managed by the next zone should be displayed in the [Zone Point List] view

3.5.5. Data Type



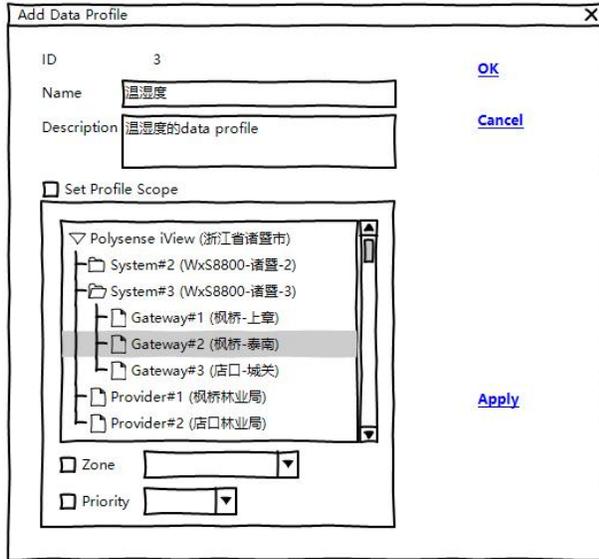


3.5.6. Data Profile

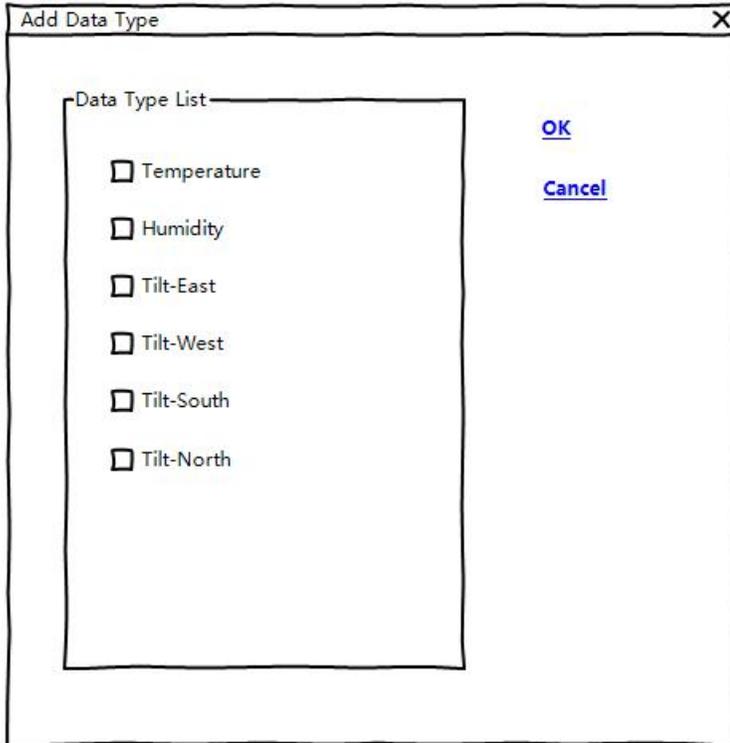


NOTE:

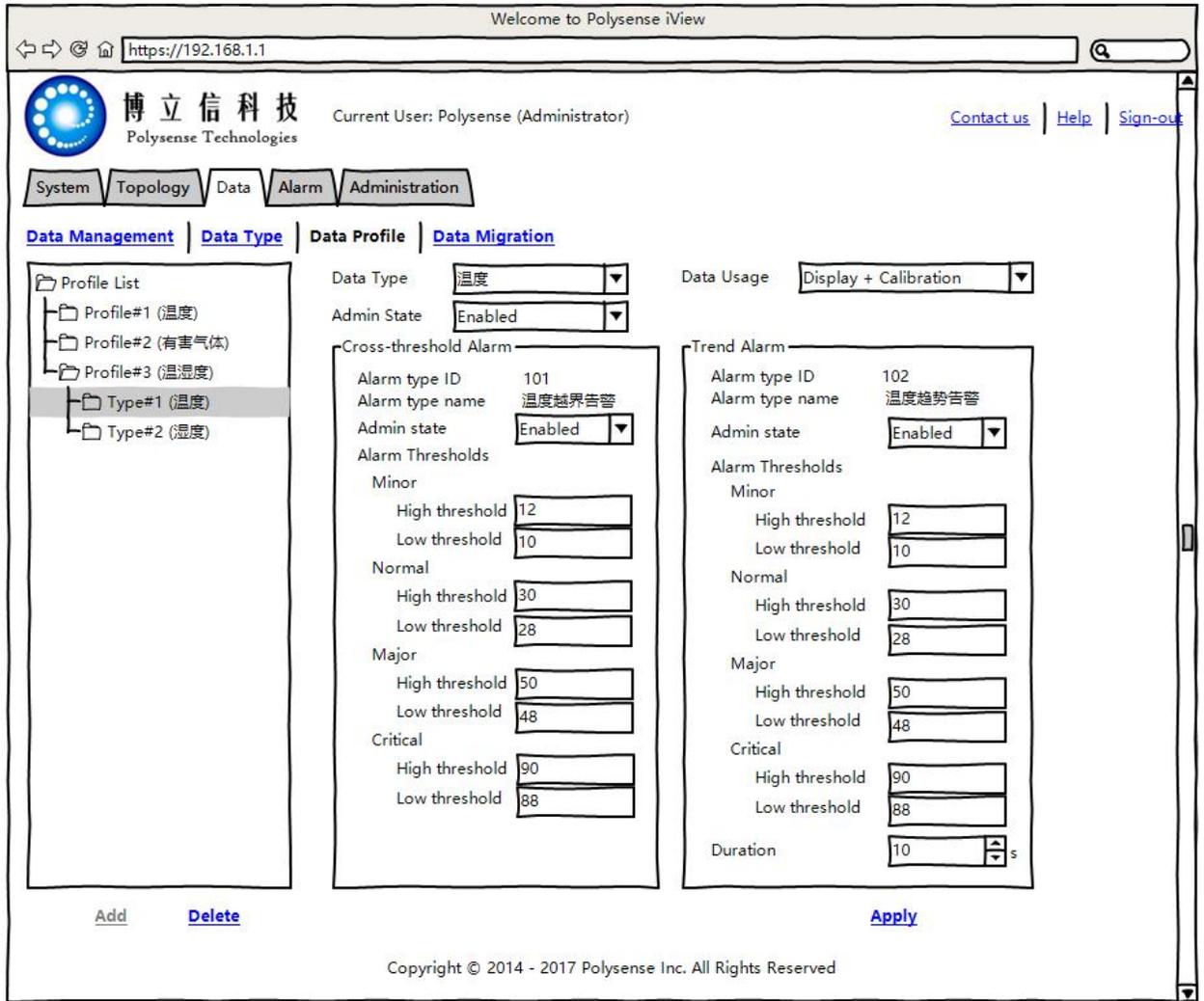
- Depending on the selected item in the profile list, if the “Profile List” is selected, then the [Add] operation refers to add profile operation, if the “Profile” node is selected, then the [Add] operation refers to add Data type. If the “Type” node is selected, then the [Add] operation should be disabled
- In the [Set Profile Scope] list, the DxS8800 system node should be filtered out



- o In the [Set Profile Scope] list, the DxS8800 system node should be filtered out



Edit individual data type of the profile



NOTE:

- Once a data type is added into a profile, its data usage should be set as “Display + Calibration” by default
- User can change data usage to “Display only” or “Calibration only” in below page

3.5.7. Alarm Management

System#3.Card#1.Port#4.Fiber#1 - Alarm List Sort by **Raise Timestamp** Ascending

ID	Distance (m)	Type	Severity	Status	Raise Timestamp
1	300	Temperature	Critical	Active without handling	2014/12/20 12:30:10

Point Information

System ID	3
Card ID	1
Port ID	4
Fiber ID	1
Deployment ID	1
Distance	300m
Type	Temperature
Name	农民甲-1
Description	上章村11弄1号监
控点1	
Priority	P8
Creation timestamp	2014/12/19 08:45:20
Zone ID	4
Admin state	Enabled
Cross threshold alarm state	Enabled
Trend alarm state	Enabled
Alarm profile	System temp profile
Current temperature	9.9C
Change from previous reading	-0.9C
Previous point (200m)	10.8C
Next point (400m)	10.1C

Alarm Description
 <Display the description of the selected alarm in Alarms list above when the Alarm Description checkbox is selected>

[Search](#) [Clear Alarm](#) [Delete Alarms](#) [Start](#) << >> [End](#)

Copyright © 2014 - 2017 Polysense Inc. All Rights Reserved

Figure 3.4.5-4a [Alarm] window – DxS8800 System

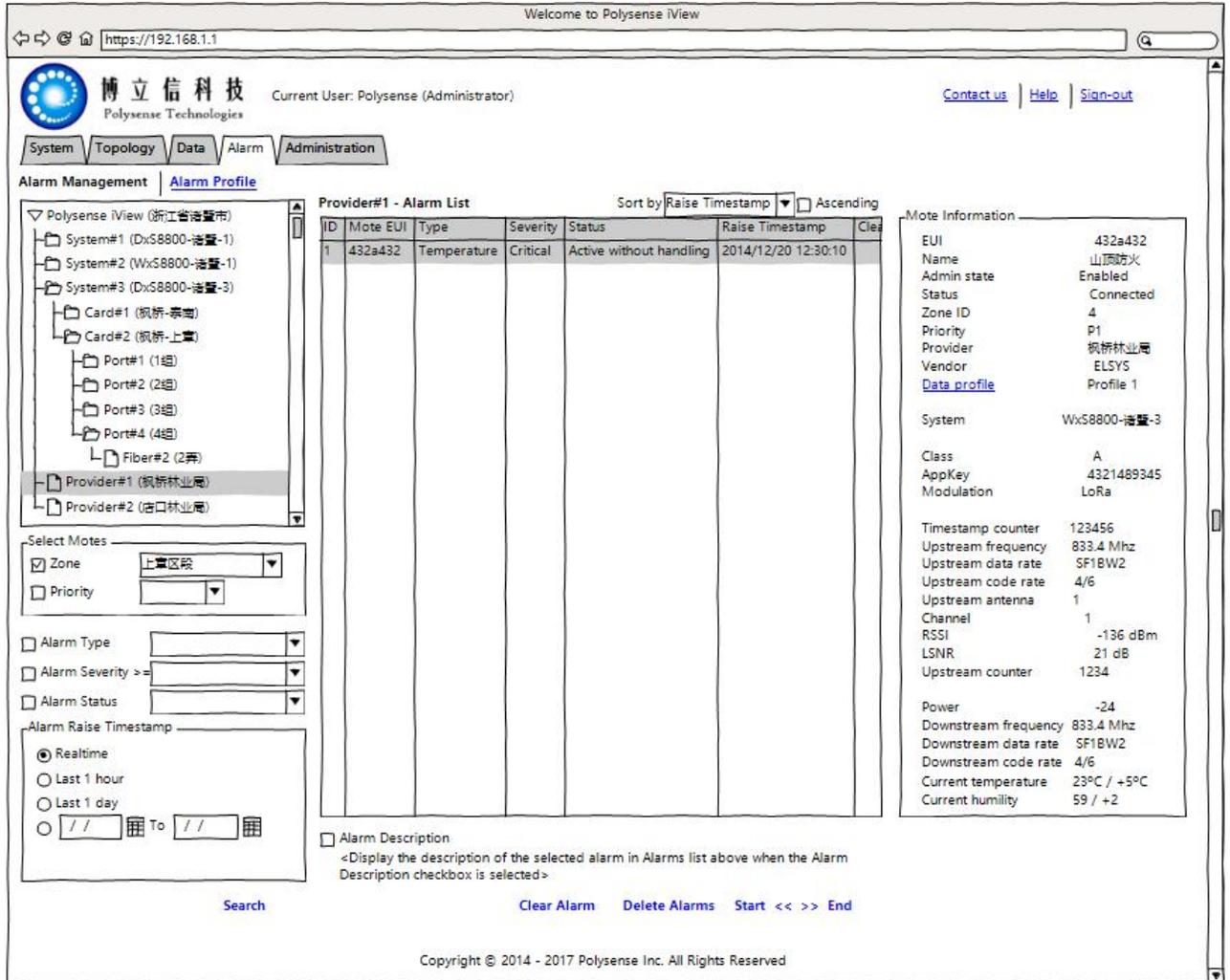


Figure 3.4.5-4b [Alarm] window – WxS8800 System

Figure 3.4.5-4 shows the [Alarm] window, which is the key page to manage the entire alarms of the system.

3.5.7.1. Query Condition

The M-data query conditions include:

10. Fiber

- d. Fiber is mandatory condition
- e. Only single fiber can be selected at one time
- f. Both current fiber and history fiber - can be selected, by default only the current fiber shows up under the port node, when [Show history fiber data] checkbox is selected, then all the history fiber nodes as well as current fiber will show up under the port node

11. Zone

- c. Zone is optional condition
 - d. By default, software should select the [Zone] checkbox and fill in the dropdown list with the Zone that current user belongs to. If current user doesn't belong a valid zone (Zone ID of the user entry equals to NULL), then leave the checkbox unselected
12. Distance
- c. Optional condition
 - d. Distance refers to the point distance range on the selected fiber
13. Deployment
- c. Optional condition
 - d. When user selects the deployment checkbox, then software should query all the deployments of the fiber and fill into the dropdown list
14. Point priority
- b. Optional condition
15. Alarm type
- b. Optional condition
16. Alarm severity
- b. Optional condition
17. Alarm status
- b. Optional condition
18. Sample timestamp
- d. Mandatory condition
 - e. Sample timestamp refers to the M-data sample timestamp
 - f. User can specify to monitor the alarm of the selected points in realtime (select the [Realtime] radio button), or just query the history alarms of the selected points according to the sample timestamp range, including:
 - Last 1 hour (from now to 1 hour ago)
 - Last 1 day (from now to 24 hours ago)
 - Specify a datetime range

All the selected conditions are ANDed together to construct the final condition.

3.5.7.2. Query Action

- 2. The query is triggered through clicking the [Search] button, as the consequent actions, the old alarm records in the [Alarm List] should be flushed, and filled in with the new queried alarm entries

3.5.7.3. Query Result

5. Support to show the queried alarms in form of list (in the [Alarm List] view of [Alarm] window)
 - d. In the alarm list, the alarms is displayed up in descending order of raise timestamp by default
 - e. User can change the ranking item and order by selecting the [Sort by] dropdown list and [Ascending] checkbox
 - f. User can select the [Alarm Description] checkbox, then the alarm description of the selected alarm entry in the alarm list will be displayed under the [Alarm Description] checkbox. If user selects another alarm entry, its alarm description will be updated accordingly
6. When [Realtime] radio button is selected, the alarm list should keep being updated with the latest alarms according to the query conditions
 - d. The behavior is, the latest M-data entry will always be inserted into the top place of the list (and other entries will be moved down accordingly), user still can do the page operations for the list
 - e. The ranking item and order settings are inapplicable to this case
 - f. If there are alarm entries in the alarm list queried from last time, then they all should be flushed before the realtime alarm entries are filled in
7. When user selects one alarm entry in the alarm list and the alarm is raised on one point, then the point information should be displayed in the [Point Information] view
8. Support to manually clear the selected alarm entry in the alarm list through clicking the [Clear Alarm] button
 - e. The status of the select alarm entry in the alarm list should be changed to “Cleared manually” after the clear operation (when DE clears the alarm, it should update the alarm status to “Cleared non-manually”
 - f. If the selected alarm entry has been cleared already either manually or non-manually, then software should just ignore the operation silently (should NOT touch the “ClearTimestamp_” in Alarm table)
 - g. Once the active alarm is cleared successfully, the “AlarmTopSeverity_” and “ActiveAlarmCount_” in Point table should be updated accordingly, i.e. “AlarmTopSeverity_” should be changed to next low alarm severity if there is such severity active alarm on the point, or “None” if there is no active alarm on the point. “ActiveAlarmCount_” should be minored with 1 till it is 0 (which means there is no active alarm on the point)
 - h. Once one active alarm is cleared manually, DE shouldn’t touch the alarm entry in alarm table, and the “AlarmTopSeverity_” and “ActiveAlarmCount_” in Point table anymore even there is alarm-clear event raised from DE after the manual-clear
9. Support to delete the entire queried alarm entries when user clicks the [Delete Alarms] button, this function is inapplicable when [Realtime] radio button is selected, which the [Delete Alarms] button should be greyed out

- a. When user clicks the [Delete Alarms] button, below dialog window should be popped up, only user confirms the deletion operation (click [Yes] button), then the queried alarm entries can be deleted from database permanently



- b. After all the queried alarm entries are deleted, software should flush the [Alarm List] view and the [Point Information] view
- c. Once the active alarms are deleted successfully, the “AlarmTopSeverity_” and “ActiveAlarmCount_” in Point table should be updated accordingly

3.5.8. Software Management

The software image only refers to the Polysense own software programs, excludes OS/Linux and MySQL upgrade which will be considered in the future. During software image upgrade (upload and activate), both software images and database table definitions can be upgraded.

Below shows the directory structure of Polysense applications on target board:

```
/polysense/dxs8800/  
|--program/ # Polysense programs extracted from the MIF file saved in image directory  
| |--Application/ # Driver, DE and CLI programs  
| | |--... # Subdirectories of application  
| |--UI/ # Web server  
| | |--... # Subdirectories of web server  
| |--Tool/ # Database SQL files and Linux scripts  
| |--version # Polysense release version file, including the software release version  
| | (specified during release build) and DB version (i.e. the db_reset.sql  
| | file revision)  
|--data/ # Data/log used/generated by Polysense programs in runtime  
| |--Application/ # Linked to /tmp directory via command ln -s /tmp Application  
| |--UI/ # Web server data/log  
| | |--... # Subdirectories of application  
|--image/ # MIF image files
```

3.5.8.1. About Software Image

- 1. All Polysense application programs should be packaged into one file (with extension as .mif – Multiple Image File) when being released to customer. So the “Software Image” terminology in this document always refers to the MIF file (instead of individual application images)

2. The MIF file content should be confidential to customer (customer can't open it), it can only be opened by Polysense applications
3. The MIF file should be named as: plss_dxs8800_rx.y.z.mif for PPC system (target bard) or plss_dxs8800_rx.y.z_x86.mif for x86 system (simulation system), where rx.y.z is the image version information
4. The MIF file should be in binary format and have an embedded signature for Polysense applications to justify if this is a valid MIF file or not
5. Support up to 10 MIF images, and all the MIF images should be saved in image/ on target board which is different from program/ (which saves all Polysense programs extracted from the activated MIF image)
6. Each MIF image should be in one of below 3 statuses
 - a. Activated: the MIF image is being used now, i.e. it has been extracted to program/
 - There should be ONLY one MIF image in this status
 - There is one text file in image/plss_activated_image to save the activated MIF image name
 - b. Inactivated: the MIF image is not being used now
 - c. Activated later: the MIF image will be in used later, e.g. in next reboot, the MIF image will replace current activated MIF image to be extracted to program/
 - There should be ONLY one MIF image in this status
 - There is one text file in image/plss_activated_later_image to save the "activated later" MIF image name

3.5.8.2. Manage Software on Web

Customer can do the software image management via web or CLI. Figure 3.4.6-9 shows the web page for software image management on web.

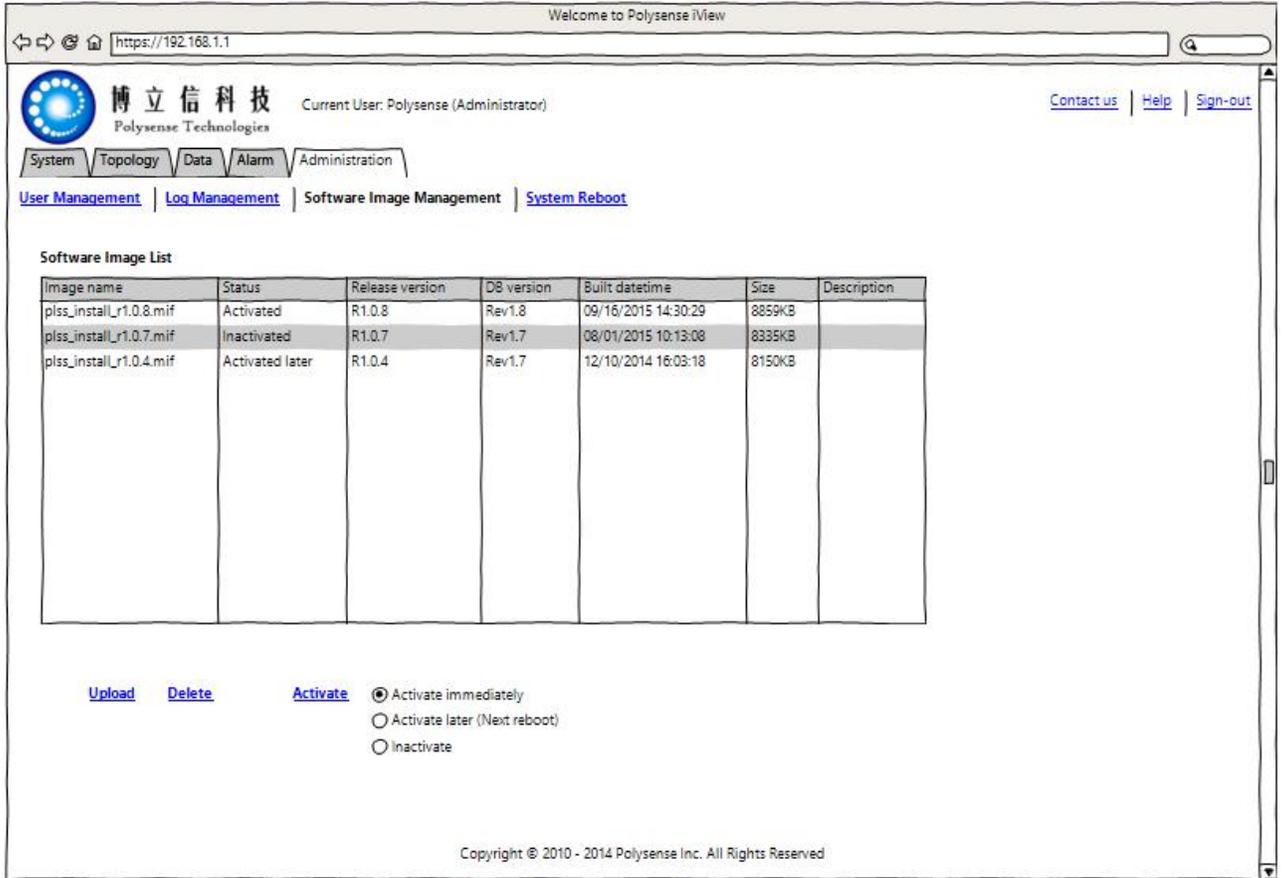


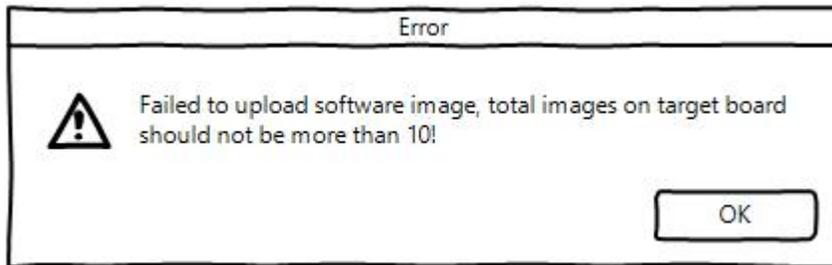
Figure 3.4.6-9 Software image management

1. Browse software image

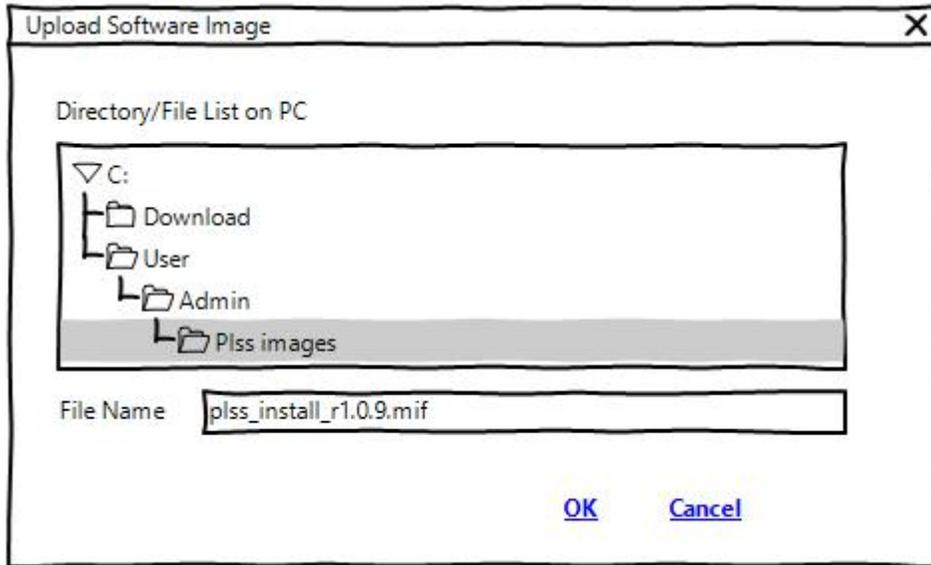
Once the [Software image management] page is opened, all the software MIF images saved in image/ directory on target board should be retrieved out, and extracted the image information from image header, then displayed in the [Software Image List].

2. Upload software image

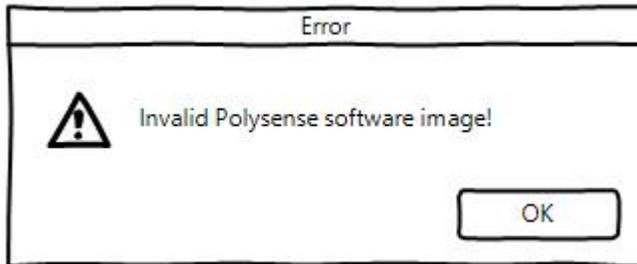
User can upload a new software image from local PC to the target board. Once user clicks the [Upload] button and the total images under image/ equals to 10, then below dialog should show up to deny the upload operation:



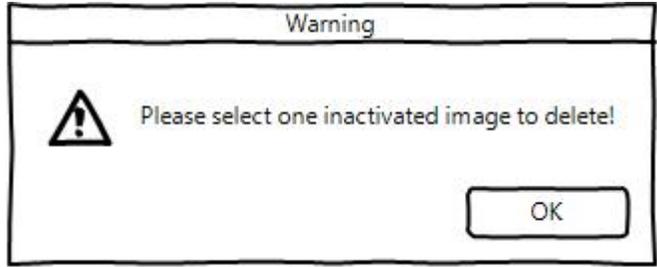
Otherwise, the [Upload Software Image] dialog should show up:



- a. User can select a MIF from the [Directory/File List] on local PC, or input the file name into the [File Name] edit box
- b. Once user clicks [OK] button, then software should check if this is a valid image, i.e. a correct Polysense MIF image. If this is NOT a valid image, then software should inform user



- c. Only if the validation check is passed, then the image can be uploaded to the target board and put in image/ directory. After writing the image into image/, software should extract out the image information from MIF file header and add a new entry into the [Software Image List], and the new entry should be set as selected in the list automatically
 - [TBD] After writing the image into image/, software should do a correction check to ensure there is no corruption during the image uploading and writing into image/ through network. If the check fails, then software should try to upload the image for 2 more times, if all fail, then software should give up the upload and promote user with the error message as "Failed to upload the image to target board, please check!"
 - It is allowed to upload an existing image (the new image name is same with the existing image on target board), in this case, the existing image will always be overwritten regardless of the image status, but the [Software image list] won't have new entry being added
3. Delete software image
- a. User must select one image from the [Software Image List] at first, otherwise, once user clicks the [Delete] button, below dialog should show up to remind user:



- b. The activated image can't be deleted, if user tries to delete the activated image, then below dialog should show up to remind user:



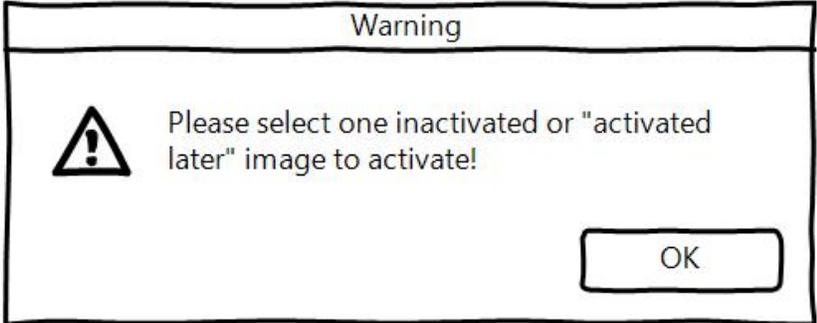
- c. If user clicks the [Delete] button to try to delete a selected inactivated image or activated later image, then below dialog should show up to confirm the deletion operation, and only user clicks [Yes] button, then software can delete the selected image in image/ physically



- If the deleted image is the "Activated later" image, then software should erase it from plss_activated_later_image file (i.e. to flush the plss_activated_later_image file)

4. Activate software image

- a. User must select one image from the [Software Image List] at first, otherwise, once user clicks the [Activate] button, below dialog should show up to remind user:



- b. User can't change the activated image to inactivated or activated later via clicking the [Activate] button. When the activated image is selected, the [Activate] button should be disabled (greyed out)
- c. User can change the inactivated image or activated later image to activated via clicking the [Activate immediately] radio button and then the [Activate] button, and below dialog should show up to confirm with user for the activation operation:



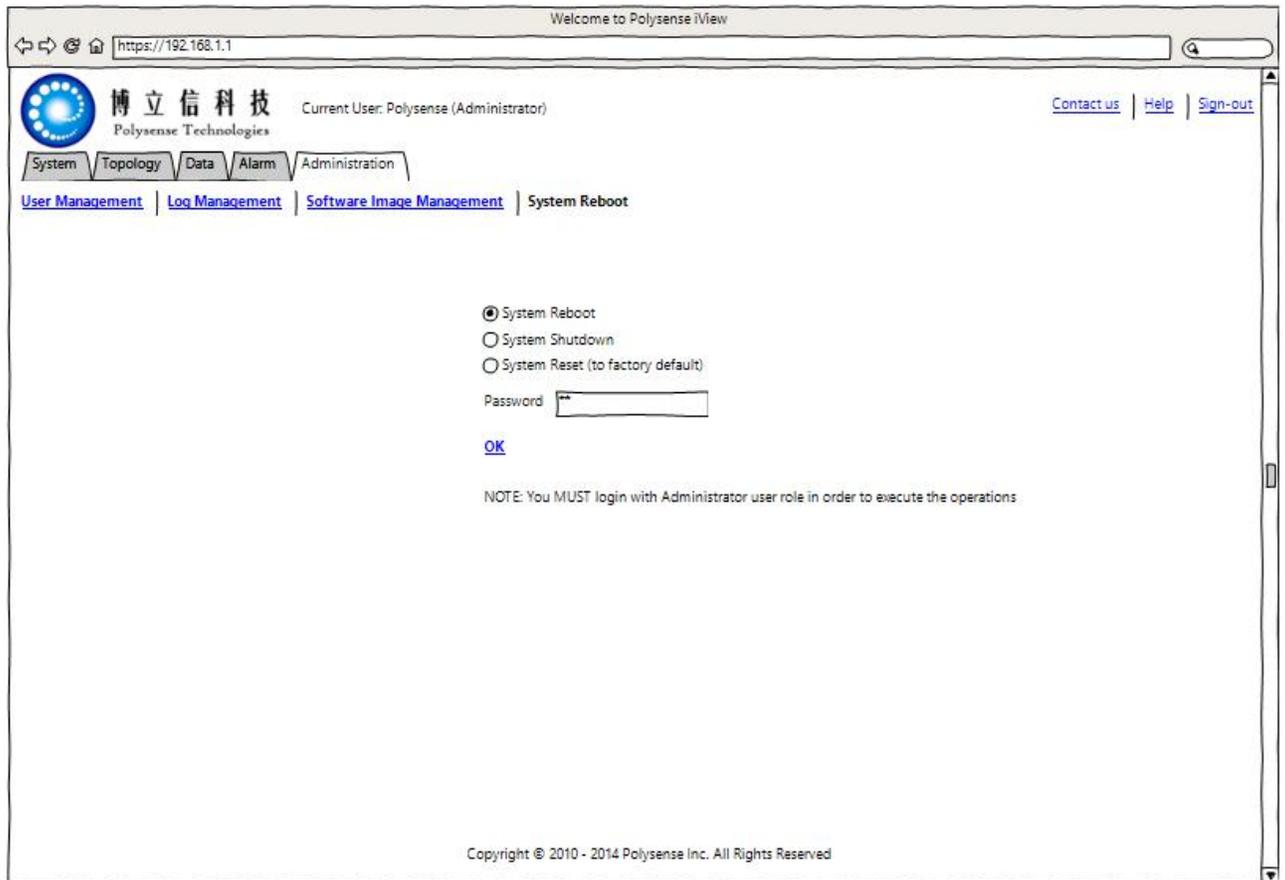
Only user clicks [Yes], then software should start to activate the selected image by following below procedure:

- Show below message in the status bar:
"Activating the selected new image now, it will take several minutes, please wait ..."
- Execute "plss activate <the selected new image name>" command on Linux console, which will take below actions consequentially
 - Stop all Polysense applications
 - Stop MySQL
 - Remove program/ subdirectory
 - Install the new activated image (MIF file) according to plss_activated_later_image file, including:
 - ✓ Extract Polysense programs from the new MIF file and put them under program/
 - ✓ Change mode/owner/group and setup links (ln) for some executable files, etc.
 - Optionally execute the upgrade.sh script saved under /polysense/dxs8800/program/Tool/ for this new image. As for one specific release, maybe some actions need be taken after the new image upgrade, for example, to upgrade DB table definition, to install some new data etc. The upgrade.sh is the file designed for this purpose
 - Start MySQL
 - Update the new image version information into System_ table
 - Start driver
 - Start DE
 - Start UI
 - All above steps are executed successfully, then:

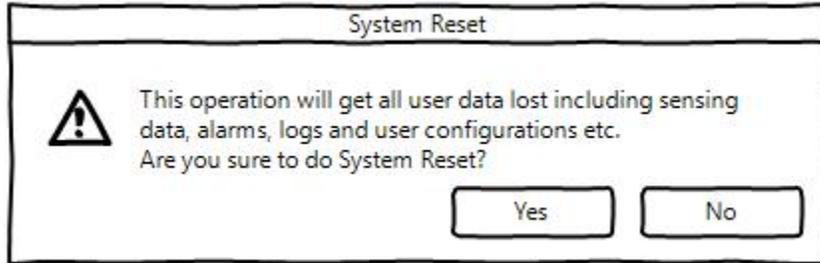
- ✓ Replace the image name in plss_activated_image file with the selected new image name
 - ✓ Flush plss_activated_later_image file
- d. User can change the inactivated image to activated later image via clicking the [Activate later] radio button and then the [Activate] button, then software should take below actions consequentially:
- Replace the image name in plss_activated_later_image file with the selected image name
 - In the [Software Image List], change the activated later image to inactivated status
 - In the [Software Image List], change the selected image to activated later status
- e. User can change the activated later image to inactivated image via clicking the [Inactivate] radio button and then the [Activate] button, then software should take below actions consequentially:
- Flush the plss_activated_later_image file
 - In the [Software Image List], change the selected image to inactivated status

3.5.9. Reboot

Figure 3.4.6-9 shows the window of [System Reboot]



1. To execute any of the 3 operations, it needs:
 - a. User MUST login system with Administrator user role in order to execute the 3 operations
 - b. Password authentication , i.e. the input password must match current user's password
 - c. For System Reset (to factory default), it needs user further confirmation below after above 2 conditions are met, and only user clicks [Yes], then software will start to do system reset (to factory default)



2. Software should take below actions for System Reboot
 - a. Call script "plss stop" to stop all Polysense services
 - b. Trigger Linux to reboot
 - c. On webpage, give below message prompt:
DxS8800 is in reboot, it will take couple minutes, please wait ...
 - d. Once DxS8800 bootup successfully, login window should show up automatically
3. Software should take below actions for System Shutdown
 - a. Call script "plss stop" to stop all Polysense services
 - b. Trigger Linux to shut down the system and power off DxS8800 automatically
 - c. On webpage, give below message prompt:
DxS8800 is being shut down ...
 - d. If Linux on DxS8800 doesn't support shut down/power off automatically, after step a, give below message webpage to prompt user to manually turn off DxS8800 power
DxS8800 has been shut down, you can power off it safely
4. Software should take below actions for System Reset (to factory default)
 - a. Call script "plss stop" to stop all Polysense services
 - b. On webpage, give the message prompt as: Stop Polysense services ...
 - c. Call script "plss start mysql init" to start mysql and reset database
 - d. Clean the program data in /polysense/dxs8800/data/
 - e. On webpage, give the message prompt as: Execute system reset to factory default ...
 - f. Call script "plss start" to start other Polysense services
 - g. On webpage, give the message prompt as: Start Polysense services ...

- h. Once web client is reconnected with web server on DxS8800, then login window should show up automatically

