



ISY Developer's Manual

**Web Services SDK and REST Interface
for INSTEON/UPB/Z-Wave
Based on firmware 4.0.5**

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Revision History			
Date/Firmware	Type	Change	Description
4.0.4	REST	NEW	Added /rest/nodes/[node_id]/enable and /rest/nodes/[node_id]/disable Added commError attribute to ZigbeeNetwork (zigbeee.xsd)
2013/03/25 4.0.3	WSDL	NEW	Added Elevation (action=25) to Climate events (udevnts.xsd)
2013/02/24 4.0.2	WSDL	MODIFY	Fixed OpenADRStatus syntax (udiobj.xsd) Added maxTriggers to <configuration> (udiobj.xsd)
2013/02/14 4.0.1	WSDL	MODIFY	Added more Zigbee Network States in zigbee.xsd Updated OpenADRState to include Profile udiobj.xsd
2012/12/10 3.3.6	DOC	FIX	Authentication header
2012/10/31 3.3.4	WSDL	MODIFY	Support for LEAK SENSOR 2852-222 Support for Open/Close Door Sensor 2843-222 1_fam.xml
2012/09/04 3.3.1	WSDL	NEW	Added Device Linker Events
2012/07/13	WSDL	MODIFY	Added version to <security> element in <configuration>
2012/06/26	DOC	MODIFY	Added section 7 for Programs
2012/06/26	WSDL	FIX	Node Revised event is RV and not NR Added more info for Program Status event
2012/06/21	WSDL	MODIFY	Added <baseDriver> to <configuration> Added CLIEMD (Climate Energy Saving Mode) as a control (insteon.xsd)
2012/05/17	WSDL	DOC	Subscribe using Web Services Added <driver_timestamp> to <configuration>
2012/05/15	WSDL	MODIFY	Moved Zigbee objects to zigbee.xsd
2012/04/28	WSDL	MODIFY	Support for Support for 2475DA1 1_fam.xml
2012/03/19 3.2.1	WSDL	NEW	Support for FanLinc, TempLinc, 2474DWH, 2477S
2012/03/15 3.2.0	REST	FIX	PP53 ... member->members
	WSDL	NEW	Err Control
2012/01/05 3.1.17	WSDL	MODIFY	Added CC, CV, PPW, PF controls for ISY994 Removed CPW control Most electricity events are now only handled in ISY994 Added 7_fam.xml (UDI) Added 8_fam.xml (Brultech)
2011/12/02 3.1.14	DOC	MODIFY	/rest/security moved to ISY-WS-SDK-ELK.docx/pdf
2011/10/19 3.1.12	WSDL	NEW	/rest/zb/nodes/[euid]/ep ... retrieves active endpoint list *** ELK *** 21090 – ELK Module/Feature elkobj.xsd ... defines ELK Objects/Classes/Events udielkws1.wsdl ... defines ELK Web Services ISY-WS-SDK-ELK.docx/pdf ... WSDK for ELK 5.19 ... Events: ELK Control 6.16 REST: ELK REST udiobj.xsd: <ul style="list-style-type: none"> o Addition of SupportedSecuritySystem and SecuritySystemType classes

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			<ul style="list-style-type: none"> ○ Inclusion of SecuritySystemType in the configuration element
	WSDL	MODIFY	1_fam.xml: - SwitchLine Relay and SwitchLine Relay Timer were reported incorrectly
	LOG	NEW	ERROR DEADLOCK DETECTED
2011/10/18 3.1.10	WSDL	ADDITION	Support for the following products in 1_fam.xml <i>DEV_SCAT_REMOTE_LINC_2_KEYPAD_4</i> <i>DEV_SCAT_REMOTE_LINC_2_SWITCH</i> <i>DEV_SCAT_REMOTE_LINC_2_KEYPAD_8</i>
2011/08/11 3.1.7	Document	MODIFY	Base64 for admin:admin was wrong
	WSDL	NEW	-Added <family> to Node -Definition for family/device category/device sub category -- family.xsd ... defines objects for family -- cat.xml ... defines high level device categories -- 1_fam.xml (for INSTEON) -- 3_fam.xml (for RCS)
	WSDL	NEW	-Added LogInfo objects and instances -- log.xsd ... defines system wide log objects -- loginfo.xml .. system wide errors/messages -- insterr.xml ... INSTEON errors -- upberr.xml ... UPB errors -- smtperr.xml ... SMTP errors -- netstat.xml ... Network Interface errors
	WSDL	MODIFY	-Updated udiobjs.xsd to add the following with their respective namespaces -- Point to LogInfo (in log.xsd) -- Point to family.xsd
	DOC	UPDATE	-Added Irrigation Module
2011/07/01 3.1.5	WSDL	NEW	-Added ZigbeeSignal element to ZigbeeNode. Includes RSSI (~Signal to Noise ratio) and LQI (Signal Level/Quality) -Added RestResponse object
	REST Zigbee	NEW	/rest/zb/scanNetwork /rest/zb/ntable /rest/zb/nodes/[euid] /rest/zb/nodes/[euid]/ping /rest/zb/nodes/[euid]/remove
2011/06/20 3.1.4	WSDL	NEW	Added Irrigation Requirement & Water Deficit Yesterday to Climate Events
	WSDL	NEW	Zigbee node enhancements include Endpoints, DeviceId, ProfileId, and Clusters
2011/05/23 – 3.1.3	DOC	NEW	Added UPB Device Types
	DOC	MODIFY	Structure: Moved INSTEON Cat/Subcat to Appendix A

2011/04/17 – 3.1.3	REST	NEW	Zigbee Support for ISY994 Series
	WSDL	NEW	Zigbee Support for ISY994 Series
	EVENT	NEW	Zigbee Support for ISY994 Series
	EVENT	MODIFY	OpenADR Price Updated → OpenADR Status Update
	EVENT	DELETE	OpenADR Pending State
	WSDL	NEW	OpenADR State
	WSDL	NEW	udiobjs.xsd:SystemActor – user id in log/error log
	WSDL	NEW	Added <i>ADRPST</i> to control types (insteon.xsd, upb.xsd) which toggles auto inclusion in Open AutoDR events
	EVENT	NEW	Climate/WeatherBug Evapotranspiration
	MOD	NEW	New module: RCS Zigbee 22000
2011/03/18 - 3.1.1	Nodes	NEW/UPB	pnode, sgid, tx, rx, qrv, ctl, rsp tags for nodes
	REST	NEW	/rest/vars/definitions
	WSDL	CHANGE	Moved common objects to udiobjs.xsd Schema file. It's now imported with namespace udiobjects
	WSDL	CHANGE	Moved event objects to udievnts.xsd Schema file. It's now imported with namespace udievents
	WSDL	CHANGE	Moved INSTEON specific types/enumerations to insteon.xsd Schema file. It's now imported with namespace isy_insteon
	WSDL	CHANGE	Moved UPB specific types/enumerations to upb.xsd Schema file. It's now imported with namespace isy_upb
	WSDL	CHANGE	ControlType is now a union of CommonControlType, INSTEON_ControlType and UPB_ControlType
2011/03/11 - 3.1.0	WSDL 3.0		
	SOAP	NEW	GetStartupTime – Returns a timestamp of when the ISY was last started
	SOAP	NEW	SendHeartbeat – Immediately sends a heartbeat message to all subscribers
	SOAP	NEW	SetVariable – Sets the variable to the given value
	SOAP	NEW	GetVariable – Returns the current value of the variable and the last time it was updated
	SOAP	NEW	GetVariables – Returns all the variables of the given type
	SOAP	NEW/UPB	RestoreNodesFromDevice – Reverse of Restore Device
	SOAP	NEW/UPB	GetNodeDeviceProps – Gets the device properties for a node
	SOAP	NEW/UPB	SetNodeDeviceProps – Sets the device properties for a node
	SOAP	MODIFIED	IsSubscribed – Returns an intResponse instead of DefaultResponse
	SOAP	MODIFIED	Unsubscribe – a new <flag> element
	EVENT	NEW	UD_TRIGGER_EVENT_VAR_STATUS (_1 : 6) – Variable status
	EVENT	NEW	UD_TRIGGER_EVENT_VAR_INIT (_1 : 7) – Variable was initialized
	EVENT	NEW	UD_NODE_ERROR_CLEARD_ACTION (_3 : CE) – The node is no longer in error
	EVENT	NEW/UPB	UD_NODE_REVISD_ACTION (_3 : RV) – Node revised

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	EVENT	NEW/UPB	UD_NODE_DEVICE_ID_CHANGED (_3 : DI) – The ID of the node changed
	EVENT	NEW/UPB	UD_NODE_DEVICE_PROPERTY_CHANGED (_3 : DP) – The node device properties have changed
	EVENT	NEW/UPB	UD_PROGRESS_REPORT (_7) – Progress report
	EVENT	NEW/UPB	UD_UPB_LINKER_EVENT (_14) – UPB Linker Events
	EVENT	NEW/UPB	UD_UPB_DEVICE_ADDER_EVENT (_15) – UPB Adder State
	EVENT	NEW	UD_ENERGY_MONITOR_ZIGBEE_STATUS (_13 : 3) – Status of Zigbee Radio
	REST	NEW	Variable support

1.0 Introduction

ISY is a sophisticated events based network platform which affords its clients unprecedented levels of integration and functionality. Now, with the introduction of WSDK, most of ISY functions are externalized as Web Services and defined in a well formed WSDL which can immediately be imported into an IDE of choice.

At a high level, ISY operates and may be communicated with in the following order:

1. Upon power up, ISY sends out broadcasts messages of its location to all the UPnP clients on the network
2. Interested clients may choose to:
 - a. Search for a specific ISY (based on the device type it supports such as Insteon)
 - b. Listen in for ISY generated announcements on the network
 - c. Immediately start communicating with ISY using a predefined IP (static) address and port, if one is already known
3. Upon discovery of an ISY – regardless of the method chosen – communications with ISY takes place through Web Services/SOAP 1.2 calls:
 - a. All requests need to have an HTTP Basic Authentication Header (Realm=“/”)
 - b. Optionally ***subscribe*** to the ISY events from which time ISY continuously notifies the subscriber(s) of the changes in its state. Upon successful subscription, ISY publishes all its current states to the client so that the client and ISY are in synch at the moment of subscription. In this respect, then, the clients are started with the current state of ISY and are notified of all the changes as they occur and thus will never have to poll ISY
4. During application exit, the client must notify ISY that it wishes to terminate its session. This is achieved by issuing:
 - a. Unsubscribing from ISY
5. During normal operations, the client *must* always respond back (immediately) with an Ack to ISY's Heartbeat events otherwise ISY assumes a client malfunction (the client didn't exit gracefully as outlined in step 4) and terminates the associated session

As mentioned before, ISY is event driven and thus every change in ISY is notified/published to all the ISY subscribed clients in real-time and almost immediately. In this respect, then, one could use the default ISY User Interface (a signed Java applet) to effect a change while using one's own client to view all the changes that are taking place (and vice versa).

2.0 Basic Concepts

2.1 *Control*

A *Control* is the logical representation of either a state or a function that may be performed on a physical device (or a scene) linked to ISY. For example, “DON” is the name of the *Control* which instructs ISY to turn a “Device On” while “ST” is the name of the *Control* which holds that *state* of a device.

In essence, then, Control is what “captures” and “controls” changes in the states of physically linked devices or groups/scenes. Since Controls may be associated with states, thus, all ISY publications (publish) to all clients contain a Control parameter which identifies “what changed”.

For example, a CLISP (Climate SetPoint) Control not only allows the client to effect a SetPoint change on a linked Thermostat but also, as soon as the change takes effect (or the state changes), ISY notifies all the clients of the change in “CLISP” and the current value thereto ([see section 2.2: Action](#)) if any.

The most important attributes of a Control are:

A Name – this is the Control’s only meaningful unit of communications with ISY such as “CLISP”, “DON”, “DIM”, etc.

A Label – this is an optional label that the developer/manufacture may ascribe to a Control such as “SetPoint”, “On”, “Dim”, “Fast On”, etc.

Actions – this is a list of optional while permissible actions which may be performed on a Control such as “50” which, when applied to “DON”, means turn the “Device On to 50%”. Or, when “HEAT” is applied to “CLIMD” (Climate Mode) it means change the thermostat “Mode to Heat”. For more details, [see section 2.2: Action](#).

2.2 Action

An *Action* is the permissible “value” which may be applied to a *Control*. A *Control* may have a set of permissible Actions which are captured by a list.

When communicating a state change request to ISY, Action may be null. This said, however, when ISY publishes (to its subscribers) changes to a *Control* – and if the *Control* is associated with some state – then this attribute holds the “current value” of the state. For example, when issuing a “DON” to ISY the “ST” *Control* (which is associated with a state) is updated and, as such, ISY shall notify all the subscribed clients of a change in “ST” with Action being the current value of “ST” such as “50”%.

The most important attributes of an Action are:

A Name – this is the Action's only meaningful unit of communications with ISY. Depending on the *Control*, this attribute may take the form of a free text/object field the value of which is filled in by ISY upon publications of events.

A Label – this is an optional label that the developer/manufacture may ascribe to an Action such as “Heat”.

2.3 Node

A *Node* is a logical representation of a physical device linked to ISY. So, for instance, KeypadLinc's button A is a node and so are its buttons B, C, D through H.

In essence – and when put in the context of a *Control* and *Action* – the *Node* is the only missing piece which, when all put together, enables effecting the desired change on a physical device linked to ISY.

The most important attributes of *Node* are:

An Address – this is the address which ISY uses to communicate with the actual physical device such as 4 E 52 1

A Name – this is the user friendly name which can be changed by any ISY client

States (device Variables) – this is the list of all the *Controls* for a *Node* and their current associated *Actions* (values)

A note on Insteon addresses:

Since, as mentioned before, every button is also considered a device within ISY, thus, each button shall have its own address conforming to the following syntax: X X X B – where X is the actual Insteon address for the device in hex and B is the button group number.

For instance, a 6 button KeypadLinc with address 04 E8 52 will have the following nodes within ISY:

- 4 E8 52 1 – the main [loaded] button
- 4 E8 52 A – Button A
- 4 E8 52 B – Button B
- 4 E8 52 C – Button C
- 4 E8 52 D – Button D

2.4 Group/Scene

A Group is a specialization of Node with the added capability of aggregating associated/linked Nodes. Just like a Node, a Group may also be used to effect a change in ISY. The only difference is that issuing a state change on a Group results in ISY sending notifications on the states of all the Nodes within that Group/Scene (if there were any changes).

2.5 Putting it Together

By having a triplet {control, action, [node or group/scene]} it's quite easy to effect change on the physical devices which are linked/attached to ISY. For instance:

1. To turn on the light at address 7 B0 B2 to 60%, a simple service call of the type *UDIService* (“DON”, “60”, “7 B0 B2 1”), is all it takes.
2. To turn off the scene at address 52626, a simple method call of the type *UDIService*(“DOF”, null, “52626”), is all it takes.

2.6 *ISY Messages and Web Services*

All messages, Web Services, Parameters, Objects, and Events are captured in a WSDL file stored on ISY.

3.0 Discovering ISY and its Resources

ISY Can be found using UPnP Search method. ISY also advertises its presence on the network every 30 seconds.

3.1 *Discovering ISY Using UPnP Search*

Send the following UDP Packet to UPnP Multicast group of **239.255.255.250** and port **1900**

```
M-SEARCH * HTTP/1.1
HOST:239.255.255.250:1900
MAN:"ssdp:discover"
MX:1
ST:urn:udi-com:device:X_Insteon_Lighting_Device:1
```

Note: X_Insteon_Lighting_Device is the UPnP Device Type for INSTEON ISY devices

ISY replies with:

```
HTTP/1.1 200 OK
CACHE-CONTROL:max-age=30
EXT:
LOCATION:http://192.168.0.208/desc
SERVER:UCoS, UPnP/1.0, UDI/1.0
ST:urn:udi-com:device:X_Insteon_Lighting_Device:1
USN:uuid:00:03:f4:03:0f:61::urn:udi-
com:device:X_Insteon_Lighting_Device:1
```

3.2 *Listening For ISY Advertisements on the Network*

As mentioned before, ISY advertises its existence on the network every 30 seconds. To receive these notification events, join the UPnP Multicast group at **239.255.255.250** and port **1900**. ISY advertisements are as follows:

1. Root Device

```
NOTIFY * HTTP/1.1
HOST:239.255.255.250:1900
CACHE-CONTROL:max-age=30
LOCATION:http://192.168.0.208/desc
NT:upnp:rootdevice
NTS:ssdp:alive
```


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```
SERVER:UCoS, UPnP/1.0, UDI/1.0
USN:uuid:00:03:f4:03:0f:61::upnp:rootdevice
```

2. Service

```
NOTIFY * HTTP/1.1
HOST:239.255.255.250:1900
CACHE-CONTROL:max-age=30
LOCATION:http://192.168.0.208/desc
NT:urn:udi-com:service:X_Insteon_Lighting_Service:1
NTS:ssdp:alive
SERVER:UCoS, UPnP/1.0, UDI/1.0
USN:uuid:00:03:f4:03:0f:61::urn:udi-
com:service:X_Insteon_Lighting_Service:1
```

3. Device

```
NOTIFY * HTTP/1.1
HOST:239.255.255.250:1900
CACHE-CONTROL:max-age=30
LOCATION:http://192.168.0.208/desc
NT:urn:udi-com:device:X_Insteon_Lighting_Device:1
NTS:ssdp:alive
SERVER:UCoS, UPnP/1.0, UDI/1.0
USN:uuid:00:03:f4:03:0f:61::urn:udi-
com:device:X_Insteon_Lighting_Device:1
```

3.3 Capturing ISY Resources

Regardless of how ISY is discovered, the **LOCATION** header defines where other ISY resource URIs are located (UPnP Description file). Simply do an HTTP Get on the URL defined by the LOCATION header. The following is an example of the contents of: <http://192.168.0.208/desc>; The most important elements are in **bold**:

```
<?xml version="1.0" ?>
<root xmlns="urn:schemas-upnp-org:device-1-0">
<specVersion>
  <major>1</major>
  <minor>0</minor>
</specVersion>
<URLBase>http://192.168.0.208</URLBase>
<device>
  <deviceType>urn:udi-com:device:X_Insteon_Lighting_Device:1</deviceType>
  <friendlyName>My Lighting</friendlyName>
  <manufacturer>Universal Devices Inc.</manufacturer>
  <manufacturerURL>http://www.universal-devices.com</manufacturerURL>
  <modelDescription>X_Insteon_Lighting_Device:1</modelDescription>
  <modelName>Insteon Web Control</modelName>
  <modelNameNumber>Insteon Web Control</modelNameNumber>
<UDN>uuid:00:03:f4:03:0f:61</UDN>
  <UPC>uuid:00:03:f4:03:0f:61</UPC>
  <serviceList>
    <service>
      <serviceType>urn:udi-
com:service:X_Insteon_Lighting_Service:1</serviceType>
```

```
<serviceId>urn:udi-com:serviceId:uuid:00:03:f4:03:0f:61</serviceId>
<SCPDURL>/services.wsd</SCPDURL>
<controlURL>/services</controlURL>
<eventSubURL>/eventing</eventSubURL>
</service>
... other services such as SEP
</serviceList>
<presentationURL></presentationURL>
</device>
</root>
```

URLBase: is the absolute URL to ISY services. All the other URLs are relative to this URL

UDN: is the Unique Device Number which uniquely identifies ISY on the network

SCPDURL: is the location where the definition of ISY services are located (in WSDL).

Note: point your WebServices IDE to this URL to import all services. E.g.
<http://192.168.0.102:8080/services.wsd>

controlURL: is the URL to which all the Service requests are Posted

eventSubURL: is the URL to which clients subscribe and unsubscribe –
Deprecated. Please see section 4.3.

3.4 *ISY Configuration Resource*

ISY Configuration Resource defines how ISY is presently configured. The most important feature of this resource is that it defines the permissible Controls/Actions which may be invoked in ISY. Here's an example:

```

...
<?xml version="1.0" encoding="UTF-8"?>
<configuration>
-
  <deviceSpecs>
    <make>Universal Devices Inc.</make>
    <manufacturerURL>http://www.universal-
devices.com</manufacturerURL>
    <model>Insteon Web Controller</model>
    <icon>/web/udlogo.jpg</icon>
    <archive>/web/insteon.jar</archive>
    <chart>/web/chart.jar</chart>
    <queryOnInit>true</queryOnInit>
    <oneNodeAtATime>true</oneNodeAtATime>
  </deviceSpecs>
  <upnpSpecs>
    <upnpDevice>
      <utype>X_Insteon_Lighting_Device</utype>
      <version>1</version>
    </upnpDevice>
    <upnpService>
      <utype>X_Insteon_Lighting_Service</utype>
      <version>1</version>
    </upnpService>
  </upnpSpecs>
  <controls>
    <control>
      <name>ST</name>
      <label>Status</label>
      <readOnly>true</readOnly>
      <isQueryAble>true</isQueryAble>
      <isNumeric>true</isNumeric>
      <numericUnit>%</numericUnit>
    </control>
    <control>
      <name>OL</name>
      <label>On Level</label>
      <readOnly>false</readOnly>
      <isQueryAble>true</isQueryAble>
      <isNumeric>true</isNumeric>
      <numericUnit>%</numericUnit>
    </control>
    <control>
      <name>RR</name>
      <label>Ramp Rate</label>
      <readOnly>false</readOnly>
      <isQueryAble>true</isQueryAble>
      <isNumeric>true</isNumeric>
      <numericUnit>%</numericUnit>
  </controls>

```

```

</control>
<control>
    <name>DON</name>
    <label>On</label>
</control>
<control>
    <name>DFON</name>
    <label>Fast On</label>
</control>
<control>
    <name>DOF</name>
    <label>Off</label>
</control>
<control>
    <name>DFOF</name>
    <label>Fast Off</label>
</control>
<control>
    <name>BRT</name>
    <label>Brighten</label>
</control>
<control>
    <name>DIM</name>
    <label>Dim</label>
</control>
<control>
    <name>BMAN</name>
    <label>Fade Start</label>
</control>
<control>
    <name>SMAN</name>
    <label>Fade Stop</label>
</control>
<control>
    <name>BEEP</name>
    <label>Beep</label>
</control>
<control>
    <name>RESET</name>
    <label>Reset values</label>
</control>
<control>
    <name>CLISPH</name>
    <label>Heat Setpoint</label>
    <readOnly>false</readOnly>
    <isQueryAble>true</isQueryAble>
    <isNumeric>true</isNumeric>
    <numericUnit>F</numericUnit>
</control>
<control>
    <name>CLISPC</name>
    <label>Cool Setpoint</label>
    <readOnly>false</readOnly>
    <isQueryAble>true</isQueryAble>
    <isNumeric>true</isNumeric>
    <numericUnit>F</numericUnit>

```

```

</control>
<control>
  <name>CLIFS</name>
  <label>Fan State</label>
  <readOnly>false</readOnly>
  <isQueryAble>true</isQueryAble>
  <isNumeric>false</isNumeric>
  <actions>
    <action>
      <name>7</name>
      <label>On</label>
    </action>
    <action>
      <name>8</name>
      <label>Auto</label>
    </action>
  </actions>
</control>
<control>
  <name>CLIMD</name>
  <label>Thermostat Mode</label>
  <readOnly>false</readOnly>
  <isQueryAble>true</isQueryAble>
  <isNumeric>false</isNumeric>
  <actions>
    <action>
      <name>0</name>
      <label>Off</label>
    </action>
    <action>
      <name>1</name>
      <label>Heat</label>
    </action>
    <action>
      <name>2</name>
      <label>Cool</label>
    </action>
    <action>
      <name>3</name>
      <label>Auto</label>
    </action>
    <action>
      <name>4</name>
      <label>Fan</label>
    </action>
    <action>
      <name>5</name>
      <label>Program Auto</label>
    </action>
    <action>
      <name>6</name>
      <label>Program Heat</label>
    </action>
    <action>
      <name>7</name>
      <label>Program Cool</label>
    </action>
  </actions>
</control>

```

```

        </action>
    </actions>
</control>
<control>
    <name>CLIHUM</name>
    <label>Humidity</label>
    <readOnly>true</readOnly>
    <isQueryAble>true</isQueryAble>
    <isNumeric>true</isNumeric>
    <numericUnit>%</numericUnit>
</control>
<control>
    <name>CLIHCS</name>
    <label>Heat/Cool State</label>
    <readOnly>true</readOnly>
    <isQueryAble>true</isQueryAble>
    <isNumeric>false</isNumeric>
    <actions>
        <action>
            <name>0</name>
            <label>Off</label>
        </action>
        <action>
            <name>1</name>
            <label>Heat On</label>
        </action>
        <action>
            <name>2</name>
            <label>Cool On</label>
        </action>
    </actions>
</control>
<control>
    <name>UOM</name>
    <label>Unit</label>
    <readOnly>true</readOnly>
    <isQueryAble>true</isQueryAble>
    <isNumeric>false</isNumeric>
    <actions>
        <action>
            <name>1</name>
            <label>Celsius</label>
        </action>
        <action>
            <name>2</name>
            <label>Fahrenheit</label>
        </action>
    </actions>
</control>
<control>
    <name>CPW</name>
    <label>Current Power Usage</label>
    <readOnly>true</readOnly>
    <isQueryAble>true</isQueryAble>
    <isNumeric>true</isNumeric>
    <numericUnit>W</numericUnit>

```

```

        </control>
        <control>
            <name>TPW</name>
            <label>Total Power Used</label>
            <readOnly>true</readOnly>
            <isQueryAble>true</isQueryAble>
            <isNumeric>true</isNumeric>
            <numericUnit>kWs</numericUnit>
        </control>
    </controls>
    <app>Insteon_UD994</app>
    <app_version>2.8.11</app_version>
    <platform>ISY-C-994</platform>
    <build_timestamp>2011-01-20-01:09:20</build_timestamp>
    <root>
        <id>00:03:f4:03:65:96</id>
        <name>ISY994</name>
    </root>
    <product>
        <id>1100</id>
        <desc>ISY 994i 1024</desc>
    </product>
    <features>
        <feature>
            <id>21010</id>
            <desc>Open Auto-DR</desc>
            <isInstalled>true</isInstalled>
            <isAvailable>true</isAvailable>
        </feature>
        <feature>
            <id>21011</id>
            <desc>Electricity Meter</desc>
            <isInstalled>true</isInstalled>
            <isAvailable>true</isAvailable>
        </feature>
        <feature>
            <id>21012</id>
            <desc>Gas Meter</desc>
            <isInstalled>false</isInstalled>
            <isAvailable>true</isAvailable>
        </feature>
        <feature>
            <id>21013</id>
            <desc>Water Meter</desc>
            <isInstalled>false</isInstalled>
            <isAvailable>false</isAvailable>
        </feature>
        <feature>
            <id>21020</id>
            <desc>Weather Information</desc>
            <isInstalled>true</isInstalled>
            <isAvailable>true</isAvailable>
        </feature>
        <feature>
            <id>21030</id>
            <desc>Network Modules</desc>

```

```

        <isInstalled>>false</isInstalled>
        <isAvailable>>false</isAvailable>
    </feature>
    <feature>
        <id>21040</id>
        <desc>Networking Module</desc>
        <isInstalled>>true</isInstalled>
        <isAvailable>>true</isAvailable>
    </feature>
    <feature>
        <id>21050</id>
        <desc>Utility Meter (Electricity)</desc>
        <isInstalled>>false</isInstalled>
        <isAvailable>>true</isAvailable>
    </feature>
    <feature>
        <id>21051</id>
        <desc>SmartMeter ESP</desc>
        <isInstalled>>false</isInstalled>
        <isAvailable>>false</isAvailable>
    </feature>
    <feature>
        <id>21060</id>
        <desc>A10/X10 for Insteon</desc>
        <isInstalled>>false</isInstalled>
        <isAvailable>>false</isAvailable>
    </feature>
    <feature>
        <id>21070</id>
        <desc>Portal Integration - Check-it.ca</desc>
        <isInstalled>>true</isInstalled>
        <isAvailable>>true</isAvailable>
    </feature>
    <feature>
        <id>21014</id>
        <desc>Current Cost Meter</desc>
        <isInstalled>>false</isInstalled>
        <isAvailable>>true</isAvailable>
    </feature>
    <feature>
        <id>21080</id>
        <desc>Broadband SEP Device</desc>
        <isInstalled>>true</isInstalled>
        <isAvailable>>true</isAvailable>
    </feature>
    <feature>
        <id>21071</id>
        <desc>Portal Integration - GreenNet.com</desc>
        <isInstalled>>false</isInstalled>
        <isAvailable>>true</isAvailable>
    </feature>
</features>
<triggers>true</triggers>
<security>SSL</security>
<isDefaultCert>>false</isDefaultCert>
</configuration>

```


3.4.1 Modules (Features)

ISY allows for optional modules to be installed. The correct behavior of the client may depend on the installed modules such as Climate and A10/X10. Modules are identified by the **<feature>** element in the configuration resource (see section 3.4). As such, it's advised that the client code queries the modules to enable/disable functionality accordingly.

Currently available modules are listed herein under:

- 21010 - Open Auto-DR
- 21011 - Electricity Meter (Brultech)
- 21012 - Gas Meter
- 21013 - Water Meter
- 21014 - Current Cost Meter
- 21020 - Weather Information (WeatherBug)
- 21030 - Network Modules (NOT AVAILABLE)
- 21040 - Networking Module
- 21050 - Utility Meter (Electricity): Zigbee SEP
- 21051 - SmartMeter ESP
- 21060 - A10/X10 for Insteon
- 21070 - Portal Integration - Check-it.ca
- 21071 - Portal Integration - GreenNet.com
- 21073 - Portal Integration - MobiLinc Connect
- 21080 - Broadband SEP Device
- 21090 - ELK Module
- 21100 - Z-Wave Module
- 22000 - Zigbee RCS Module
- 23000 - Irrigation Module

3.5 *ISY Nodes Configuration Resource*

ISY Nodes Configuration Resource defines all the Nodes/Scenes as configured in ISY with their relationships.

There are 3 types of nodes in ISY:

Node ... identifies and end or virtual device or button (<node>)

Group ... identifies a scene or a logical grouping between devices (<group>)

Folder ... identifies a logical grouping of nodes and groups without regards to their relationships

Note:

1. A **Node** can belong to multiple **Groups** acting as Controller or Responder
2. A **Node** can belong only to ONE and only ONE **Folder** or another **Node**
3. A **Group** can belong only to ONE and only ONE **Folder**
4. A **Folder** can belong only to ONE and only ONE **Folder**

3.5.1 Types of Nodes/Parents

```
UD_HIERARCHY_NODE_TYPE_NOTSET 0 (unknown)
UD_HIERARCHY_NODE_TYPE_NODE 1
UD_HIERARCHY_NODE_TYPE_GROUP 2
UD_HIERARCHY_NODE_TYPE_FOLDER 3
```

3.5.2 Node (<node>)

This element defines a configured node in ISY. A node is anything that can be impacted upon or if it can impact some change in the environment. As such, a node could be a KeypadLinc's button or a Thermostat.

```
<node flag="0">
  <address>The address of the node</address>
  <name>Friendly name</name>
  <parent type="see 3.5.1">the address of the parent</parent>
  <family>optionally defines device's family; see below</family>
  <type>device type; see below</type>
  <enabled>"true"|"false"</enabled>
  <deviceClass>1024</deviceClass>
  <wattage>2000</wattage>
  <dcPeriod>60</dcPeriod>
  <pnode>The primary node address (see below)</pnode>
  <sgid>Subgroup ID (see below)</sgid>
  <tx>Controller end-point bitmask</tx>
  <rx>Responder end-point bitmask</rx>
```

```
<qry />
<ctl />
<rsp [type="<rsp-type>"] />
```

</node>

Terms:

end-point a single feature on a device such as the load or a KPL button.
subgroup A subset of one or more *end-points* for a device
primary node The node designated as the overall representative of a device

e.g. Sample nodes for a single device

```
<node><address>0015</address><pnode>0015</pnode><sgid>1</sgid>...
<node><address>0029</address><pnode>0015</pnode><sgid>2</sgid>...
<node><address>0042</address><pnode>0015</pnode><sgid>3</sgid>...
```

<pnode>

The address of the primary node for the device partially represented by this node. If this node is the primary node then <pnode> will equal <address>

A device may be represented by one or more nodes. One of these nodes is designated the *primary node* and is used to help group the set of nodes for a device.

*Note: UPB Only

<sgid>

The ID identifying the subgroup of end-points for the device.

Each node representing a subset of the end-points for a device is identified by a unique *subgroup ID*. This is similar in function to the last digit in an Insteon Node Address.

*Note: UPB Only

<qry />

If present then this node may be queried.

*Note: UPB Only

<ctl />

If present then this node may be used as a scene controller.

*Note: UPB Only

<rsp [type="<rsp-type>"] />

If present then this node may be used as a scene responder.

type

U_DIM	Standard dimmer (Default Value)
U_S_DIMT	SAI Dimmer with Off Timer
U_RELAY	Relay Device (on/off only)
U_LED_6	Button LEDS for 6-Button KPL
U_LED_8	Button LEDS for 8-Button KPL

*Note: UPB Only

<tx>

Bitmask indicating the controller endpoints represented by this node

*Note: UPB Only

<rx>

Bitmask indicating the responder endpoints represented by this node

*Note: UPB Only

“flag” Attribute

Defines the characteristics of the <node> as well as the <group> elements as follows (represented in decimal):

```

NODE_IS_INIT          0x01 //needs to be initialized
NODE_TO_SCAN         0x02 //needs to be scanned

//Node operations flags
NODE_IS_A_GROUP       0x04 //it's a group!
NODE_IS_ROOT         0x08 //it's the root group
NODE_IS_IN_ERR        0x10 //it's in error!

NODE_IS_NEW           0x20 //brand new node
NODE_TO_DELETE        0x40 //has to be deleted later
NODE_IS_DEVICE_ROOT   0x80 //root device such as KPL load
    
```

<deviceClass> Element *

Defines the class of device for energy management (as defined by SEP):

```

DC_HVAC              0x0001
DC_STRIP_HEATER      0x0002
    
```

DC_WATER_HEATER	0x0004
DC_POOL_PUMP	0x0008
DC_SMART_APPLIANCE	0x0010
DC_IRRIGATION_PUMP	0x0020
DC_MANAGED_LOAD	0x0040
DC_SIMPLE	0x0080
DC_EXTERIOR_LIGHTING	0x0100
DC_INTERIOR_LIGHTING	0x0200
DC_EV	0x0400
DC_GENERATION_SYSTEM	0x0800
DC_WASHER	0x1000
DC_DRYER	0x2000
DC_OVEN	0x4000
DC_FRIG	0x8000
DC_ALL	0xFFFF

*Available in ISY994 Series/EMS models only

<dcPeriod> Element*

Defines the Duty Cycle period in minutes.

*Available in ISY994 Series/EMS models only

<family> Element

Defines a device/node family such as ZWave, RCS, INSTEON, etc.
This element is useful for multi-protocol configurations including with security systems.

Family is defined in **family.xsd** with accompanying **[id]_fam.xml** which defines the categories/subcategories for each family id.

<type> Element

Defines the Category and Subcategories of underlying devices as follows:

device category.device subcategory.version.reserved

[For INSTEON Device Types, please checkout Appendix A](#)

3.5.3 Group/Scene (<group>)

Same as node but defines a scene with a list of members and their relationships to the scene.

```
<group flag="see 3.5.2 (Node)">
  <address>The address of the group</address>
  <name>Friendly name</name>
  <fmtDevId>Friendly name</fmtDevId>
  <members>
    <link type="relationship type">5 8A 37 1</link>
    <link type="relationship type">5 8A 37 3</link>
    ...
  </members>
</group>
```

<fmtDevId>

A formatted device ID. In the case of UPB this contains the underlying UPB Link ID for the scene.

*Note: UPB Only

<members> Element

Is a list of members for the scene each one having different relationships defined by the **type** attribute of the **link** element.

<link> Element

Defines members of a group/scene.

“**type**” **Attribute** defines the role a node plays in relationship to other nodes in a scene:

NODE_IS_CONTROLLER 0x10 (decimal 16)

Other values should be considered Responders.

3.5.4 Folder (<folder>)

Same as node but identifies a folder.

4.0 Communicating with ISY

To successfully communicate with ISY, the following steps must be taken

1. **Find ISY** and retrieve its resources by parsing the contents of the LOCATION header ([see section 3](#))
 - a. Capture <controlURL> which should be the URL used for all the subsequent Web Services invocations
 - b. Point your WebServices IDE to SCPDURL to import web services
2. **Authenticate** – **no longer needed as of release 2.7.5**

Instead, you will use the **HTTP Basic Authorization** header to send the credentials to ISY with each request.

The format of the Authorization header is:
Authorization: Basic Base64(userid:password)

Where, base64 converts the string representation of userid followed by ':' and followed by the password.

As an example, the Authorization header for userid=admin , password= admin is:
Base64(admin:admin)→ YWRtaW46YWRtaW4=

Therefore the Authorization header shall be:

Authorization: Basic YWRtaW46YWRtaW4=

3. Subscribe

```
POST /services HTTP/1.1
Host: 192.168.0.129:80
Authorization: Basic YWRtaW46YWRtaW4=
Content-Length: 193
Content-Type: text/xml; charset="utf-8"

<s:Envelope><s:Body><u:Subscribe xmlns:u="urn:udi-
com:service:X_Insteon_Lighting_Service:1"><reportURL>REUSE_SOCKET</reportU
RL><duration>infinite</duration></u:Subscribe></s:Body></s:Envelope>
```

Note: you may provide a <reportURL> URL or you can keep this socket open (REUSE_SOCKET) to receive ISY events

4. Control Nodes/Scenes in ISY using UDIService

Simply provide the permissible values for <Control>, <Action>, and <Node>.

The <node> element is the address of the node/group to be impacted. The <flag> element **must be 4** if this is impacting a scene/group. Any other value is considered a node and not a group/scene.

Note: if you are using SOAP1.2 compliant IDE, **SOAPACTION** header is **not** required.

a. Turn Device Hall 2 On

```
POST /services HTTP/1.1
Host: 192.168.0.208:80
Content-Length: 210
Authorization: Basic YWRtaW46YWRtaW4=
Content-Type: text/xml; charset="utf-8"
SOAPACTION:"urn:udi-
com:service:X_Insteon_Lighting_Service:1#UDIService"

<s:Envelope><s:Body><u:UDIService xmlns:u="urn:udi-
com:service:X_Insteon_Lighting_Service:1"><control>DON</control><actio
n></action><flag>65531</flag><node>7 B0 A5
1</node></u:UDIService></s:Body></s:Envelope>
```

b. Turn Device Hall 2 On to 46%

```
POST /services HTTP/1.1
Host: 192.168.0.208:80
Content-Length: 213
Authorization: Basic YWRtaW46YWRtaW4=
Content-Type: text/xml; charset="utf-8"
SOAPACTION:"urn:udi-
com:service:X_Insteon_Lighting_Service:1#UDIService"

<s:Envelope><s:Body><u:UDIService xmlns:u="urn:udi-
com:service:X_Insteon_Lighting_Service:1"><control>DON</control><actio
n>117</action><flag>65531</flag><node>7 B0 A5
1</node></u:UDIService></s:Body></s:Envelope>
```

c. Turn Master Scene On Immediately (Fast On)

```
POST /services HTTP/1.1
Host: 192.168.0.208:80
Content-Length: 203
Authorization: Basic YWRtaW46YWRtaW4=
Content-Type: text/xml; charset="utf-8"
SOAPACTION:"urn:udi-
com:service:X_Insteon_Lighting_Service:1#UDIService"

<s:Envelope><s:Body><u:UDIService xmlns:u="urn:udi-
com:service:X_Insteon_Lighting_Service:1"><control>DFON</control><acti
```


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```
on></action><flag>4</flag><node>34612</node></u:UDIService></s:Body></s:Envelope>
```

d. Increment Thermostat Setpoint

```
POST /services HTTP/1.1
Host: 192.168.0.208:80
Content-Length: 209
Authorization: Basic YWRtaW46YWRtaW4=
Content-Type: text/xml; charset="utf-8"
SOAPACTION:"urn:udi-com:service:X_Insteon_Lighting_Service:1#UDIService"
```

```
<s:Envelope><s:Body><u:UDIService xmlns:u="urn:udi-com:service:X_Insteon_Lighting_Service:1"><control>BRT</control><action><flag>65531</flag><node>0 0 11</node></u:UDIService></s:Body></s:Envelope>
```

e. Start Fading (Up) Ceiling 1

```
POST /services HTTP/1.1
Host: 192.168.0.208:80
Content-Length: 212
Authorization: Basic YWRtaW46YWRtaW4=
Content-Type: text/xml; charset="utf-8"
SOAPACTION:"urn:udi-com:service:X_Insteon_Lighting_Service:1#UDIService"
```

```
<s:Envelope><s:Body><u:UDIService xmlns:u="urn:udi-com:service:X_Insteon_Lighting_Service:1"><control>BMAN</control><action><flag>65531</flag><node>7 A5 95</node></u:UDIService></s:Body></s:Envelope>
```

For Fading Down, use `<action>0</action>`

f. Stop Fading Ceiling 1

```
POST /services HTTP/1.1
Host: 192.168.0.208:80
Content-Length: 211
Authorization: Basic YWRtaW46YWRtaW4=
Content-Type: text/xml; charset="utf-8"
SOAPACTION:"urn:udi-com:service:X_Insteon_Lighting_Service:1#UDIService"
```

```
<s:Envelope><s:Body><u:UDIService xmlns:u="urn:udi-com:service:X_Insteon_Lighting_Service:1"><control>SMAN</control><action><flag>65531</flag><node>7 A5 95</node></u:UDIService></s:Body></s:Envelope>
```

5. Process Events/Notifications (see section 5)

ISY Events are of the form:

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```
<?xml version="1.0"?><e:propertyset xmlns:e="urn:schemas-upnp-org:event-1-0"><e:property><ST>0</ST></e:property><e:property><node>9 89 8B 5</node><eventInfo>Event Specific elements</eventInfo></e:property></e:propertyset>
```

Where the first <property> element contains the Control which was changed, in this case ST (status) and the Action for this Control, in this case 0. The <node> element defines the node which was impacted.

5.0 Events

Events are very important feature of ISY and are published to subscribers. There can be a maximum of 10 simultaneous subscribers subscribing to ISY and all will get event notifications in real time. The following is a list of event definitions:

5.1 *Device Status (control = Device Property)*

action = Property value

Node = The address of the device

5.2 *Heartbeat (control = “_0”)*

action = Duration in seconds

node = null

eventInfo = null

5.3 *Trigger Events (control = “_1”)*

action = “0” →Event Status

node = null

eventInfo =

<eventInfo>

<id>Hex representation of program id</id>

<X/> ... X=**on** if enabled, and **off** if disabled

<Y/> ... Y=**rr** if run at reboot and **nr** if not run at reboot

<r> last run time in YYMMDD HH:MM:SS</r>

<f> last finish time in YYMMDD HH:MM:SS</f>

<s> status* </s>

</var>

</eventInfo>

*Status is a bitwise OR of **RUN_X** and **ST_X**:

RUN_IDLE = 0x01

RUN_THEN = 0x02

RUN_ELSE = 0x03

ST_UNKNOWN = 0x10

ST_TRUE = 0x20

ST_FALSE = 0x30

ST_NOT_LOADED = 0xF0

action = "1" →Get Status (notifies subscribers to refresh)

node = null
eventInfo = null

action = "2" →Key Changed

node = key
eventInfo = null

action = "3" →Info String

node = key
eventInfo = text

action = “4” → IR Learn Mode

node = null
eventInfo = null

action = “5” → Schedule (schedule status changed)

node = key
eventInfo = null

action = “6” → Variable Status (status of variable changed)

node = key
<eventInfo>
 <var id=”<var-id>” type=”<var-type>”>
 <val>value</val>
 <ts>YYYYMDD HH:MM:SS</ts>
 </var>
</eventInfo>

action = “7” → Variable Initialized (initial value of a variable was set)

node = key
<eventInfo>
 <var id=”<var-id>” type=”<var-type>”>
 <init>value</init>
 </var>
</eventInfo>

5.4 Driver Specific Events (control = “_2”)

Depends on the underlying protocol driver

5.5 Node Changed/Updated (control = “_3”)

action = “NN” → Node Renamed

node = the address of the node
<eventInfo>
 <newName>name</newName>
</eventInfo>

action = “NR” → Node Removed

node = the address of the node removed
eventInfo = null

action = “ND” → Node Added

node = the address of the node added

```
<eventInfo>
  <nodeName>name</nodeName>
  <nodeType>see 3.5.2</nodeType>
</eventInfo>
```

action = “MV” →Node Moved (into a scene)

node = the address of the **scene** to which the node was moved to

```
<eventInfo>
  <movedNode>the address of the moved node</movedNode>
  <linkType>controller/responder</linkType> (see 3.5.3)
</eventInfo>
```

action = “CL” →Link Changed (in a scene)

Not supported

action = “RG” →Removed From Group (scene)

node = the address of the group/scene

```
<eventInfo>
  <removedNode>the address of the removed
  node</removedNode>
</eventInfo>
```

action = “EN” →Enabled

node = the address of the node that was enabled/disabled

```
<eventInfo>
  <enabled>”true”|”false”</enabled>
</eventInfo>
```

action = “PC” →Parent Changed

node = the address of the node whose parent changed

```
<eventInfo>
  <node>the address of the node</node>
  <nodeType>see 3.5.1</nodeType>
  <parent>the address of tne new parent (NULL if
  none)</parent>
  <parentType>see 3.5.1</parentType>
</eventInfo>
```

action = "PI" → Power Info Changed

node = the address of the node whose power info changed

```
<eventInfo>  
  <deviceClass>see 3.5.1</deviceClass>  
  <wattage>see 3.5.1</wattage>  
  <dcPeriod>see 3.5.1</dcPeriod>  
</eventInfo>
```

action = "DI" → Device ID Changed

Not implemented.

action = "DP" → Device Property Changed

UPB only

action = "GN" → Group Renamed

node = the address of the group

```
<eventInfo>  
  <newName>name</newName>  
</eventInfo>
```

action = "GR" → Group Removed

node = the address of the group removed

eventInfo = null

action = "GD" → Group Added

node = the address of the node added

```
<eventInfo>  
  <groupName>name</groupName>  
  <groupType>see 3.5.2</groupType>  
</eventInfo>
```

action = "FN" → Folder Renamed

node = the address of the folder

```
<eventInfo>  
  <newName>name</newName>  
</eventInfo>
```

action = “FR” → Folder Removed

node = the address of the group removed
eventInfo = null

action = “FD” → Folder Added

node = the address of the folder added
eventInfo=null

action = “NE” → Node Error (Comm. Errors)

node = the address of the node with communications errors

action = “CE” → Clear Node Error (Comm. Errors Cleared)

node = the address of the node with communications errors

action = “SN” → Discovering Nodes (Linking)

node = null

action = “SC” → Node Discovery Complete

node = null

action = “WR” → Network Renamed

node = the new name for network

action = “WH” → Pending Device Operation

node = the address of the node for which there's pending operations

action = “WD” → Programming Device

node = the address of the node to which programming/write operations are being carried out

action = “RV” → Node Revised (UPB)

Indicates the node may have been drastically changed therefore the UI should throw away any information about the node and reconstruct/repopulate it with the new information

node = the address of the node to which programming/write operations are being carried out

<eventInfo>standard node structure</eventInfo>

5.6 System Configuration Updated (control = “_4”)

action = “0” → Time Changed

action = “1” → Time Configuration Changed

action = “2” → NTP Settings Updated

action = “3” → Notifications Settings Updated

action = “4” → NTP Communications Error

action = “5” → Batch Mode Updated

node = null

<eventInfo>

<status>”1”|”0”</status>

</eventInfo>

action = “6” → Battery Mode Programming Updated

node = null

<eventInfo>

<status>”1”|”0”</status>

</eventInfo>

5.7 System Status Updated (control = “_5”)

node = null

action = “0” → Not Busy

action = “1” → Busy

action = “2” → Idle

action = “3” → Safe Mode

5.8 *Internet Access Status (control = “_6”)*

action = “0” → Disabled

action = “1” → Enabled

node = null

<eventInfo>external URL</eventInfo>

action = “2” → Failed

5.9 *Progress Report (control = “_7”)*

node = null

eventInfo = text

action = “1” → Update

action = “2.1” → Device Adder Info (UPB Only)

action = “2.2” → Device Adder Warn (UPB Only)

action = “2.3” → Device Adder Error (UPB Only)

5.10 Security System Event (control = “_8”)

node = null
eventInfo = null

action = “0” → Disconnected

action = “1” → Connected

action = “DA” → Disarmed

action = “AW” → Armed Away

action = “AS” → Armed Stay

action = “ASI” → Armed Stay Instant

action = “AN” → Armed Night

action = “ANI” → Armed Night Instant

action = “AV” → Armed Vacation

5.11 System Alert Event (control = “_9”)

Not implemented and should be ignored

5.12 OpenADR and Flex Your Power Events (control = “_10”)

**Only applicable to ISY994 Z Series.*

action = “1” → Open ADR Error

node = null
eventInfo = null

action = “2” → Open ADR Status Update

node = null
Namespace: **udiobjects (udiobjs.xsd)**
<eventInfo>
udiobjects:OpenADRState
</eventInfo>

action = “5” → Flex Your Power Error

node = null
eventInfo = null

action = “6” → Flex Your Power Status Updated

node = null
<eventInfo>
 <active>whether or event has been issued</active>
</eventInfo>

5.13 Climate Events (control = “_11”)

*Requires WeatherBug Module

action = “0” → Error

node = null
eventInfo = null

action = “1” → Temperature

node = null
<eventInfo>
 <value>The value for this event</value>
 <unit>The unit of measure for this value</unit>
</eventInfo>

action = “2” → Temperature High

node = null
<eventInfo>
 <value>The value for this event</value>
 <unit>The unit of measure for this value</unit>
</eventInfo>

action = "3" → Temperature Low

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = "4" → Feels Like

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = "5" → Temperature Rate

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = "6" → Humidity

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = "7" → Humidity Rate

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = "8" → Pressure

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = "9" → Pressure Rate

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = "10" → Dew Point

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = "11" → Wind Speed

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = "12" → Average Wind Speed

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = "13" → Wind Direction

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = "14" → Average Wind Direction

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = "15" → Gust Wind Speed

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = "16" → Gust Wind Direction

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = "17" → Rain Today

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = "18" → Ambient Light

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = "19" → Ambient Light Rate

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = "20" → Rain Rate

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = "21" → Max Rain Rate

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = "22" → Evapotranspiration

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```


action = “23” → Irrigation Requirement

```
node = null
<eventInfo>
  <value>The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = “24” → Water Deficit Yesterday

```
node = null
<eventInfo>
  <value>(Signed) The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

action = “25” → Elevation

```
node = null
<eventInfo>
  <value>(Signed) The value for this event</value>
  <unit>The unit of measure for this value</unit>
</eventInfo>
```

5.14 AMI/SEP Events (control = “_12”)

Only applicable to ISY994 Series!
See OR-WS-SDK-Manual-Energy Management.pdf.

If you do not have this manual, please send an email to support@universal-devices.com.

5.15 External Energy Monitoring Events (control = "_13")

ISY994 Series currently support Brultech ECM1240 Energy Monitors.

Note: In ISY994 Series, all these events are incorporated into node events and no longer valid

action = "1" → Number of Channels

node = null

```
<eventInfo>
  <numChannels>The number of monitored
  channels</numChannels>
</eventInfo>
```

action = "2" → Channel Report

node = null

```
<eventInfo>
  <channel num="channel num" sampling=" ">
    <power unit="unit">Instantaneous</power>
    <total unit="unit">Total accumulative</total>
    <voltage unit="unit">voltage</voltage>
    <current unit="unit">current</current>
    <polarized unit="unit">polarized power</polarized>
  </channel>
</eventInfo>
```

action = "3" → Zigbee Status

**Only applicable to ISY994 Z Series.*

node = null

```
<eventInfo>
  "Down " |
  "Establishing PAN" |
  "Established"
</eventInfo>
```

Down = Zigbee Network Down

Establishing PAN = Trying to Establish Network

Established = Network Established and Operational

action = “7” → Raw Packet

node = null

<eventInfo>

[![CDATA]

Raw binary packet directly from Brultech]

</eventInfo>

5.16 UPB Linker Events (control = “_14”)

Only applicable to UPB enabled units.

action = “1” → Device Status

Status info for a device being linked

action = “2” → Pending Stop Find

Device Adder Stop Find Pending

action = “3” → Pending Cancel Device Adder

Device Adder Cancel Device Adder Pending

5.17 UPB Device Adder State (control = “_15”)

5.18 UPB Device Status Events (control = “_16”)

Only applicable to UPB enabled units.

action = “1” → Device Signal Report

action = “2” → Device Signal Report Removed

5.17 Gas Meter Events (control = “_17”)

Only applicable to ISY994 Series.

action = “1” → Status

```
node = null
<eventInfo>
    <total>The actual meter value</total>
    <lastReadTS>Timestamp of the last read</lastReadTS>
</eventInfo>
```

action = “2” → Error

```
node = null
eventInfo = null
```

5.18 Zigbee Events (control = “_18”)

Only applicable to ISY994 Series.

Namespace: **udiobjects (udiobj.xsd)**

action = “1” → Status

```
node = null
<eventInfo>
    Zigbee.xsd:ZigbeeStatus
</eventInfo>
```

5.19 ELK Events (control = “_19”)

Only applicable when ELK Module is installed.

Consult ISY-WS-SDK-ELK

5.20 Device Linker Events (control = “_20”)

Device Linking events are all defined in **udievnts.xsd**.

action = “1” → Status

node = null

<eventInfo>DeviceLinkerEventInfo**</eventInfo>**

action = “2” → Cleared

Device linking list is now cleared

node = null

eventInfo = null

6.0 REST Interface

REST is an easy to use URL based command set which allows the developer to communicate and control ISY.

Except for uploading configuration files, all REST commands use HTTP GET method.

6.1 *Batch Commands*

/rest/batch

Returns the Batch mode:

```
<batch><status>[0|1]</status></batch>
```

/rest/batch/on

Turns on Batch mode. Does not write changes to device. Only internal configuration files are updated

/rest/batch/Off

Turns off Batch mode. Writes all pending changes to devices and no longer buffers changes

/rest/batteryPoweredWrites

Returns the status of Battery Powered device operations

```
<batteryPoweredWrites>
```

```
<status>[0|1]</status>
```

```
</batteryPoweredWrites>
```

/rest/batteryPoweredWrites/on

Writes all pending changes to battery powered devices when Batch mode is off

/rest/batteryPoweredWrites/off

Does not write changes to battery powered devices when batch is off

6.2 *Configuration*

For schema, please review the WSDL.

/rest/config

Returns the configuration of the system with permissible commands

/rest/sys

Returns system configuration

/rest/time

Returns system time

/rest/network

Returns network configuration

/rest/subscriptions

Returns the state of subscriptions

6.3 *Nodes*

For schema, please review the WSDL.

/rest/nodes

Returns nodes, scenes, types, and their status

/rest/nodes/devices

Returns only devices and their status but no scenes

/rest/nodes/scenes

Returns only scenes but no devices

/rest/nodes/<node-id>

Returns all the attributes & property values for a specific node

/rest/nodes/<node-id>?members=true|false

Works on a scene only. Using members=true includes all the scene members in the result

6.4 X10

/rest/X10/<Housecode[Unitcode]/<X10 command>

UnitCode and X10 command are both optional

6.5 Properties

/rest/nodes/<node-id>/<property>

Returns the specific property value for a given node id

/rest/nodes/<node-id>/set/<property>/<value>

Insteon - OL/128 – Set On-Level to 50%

UPB - OL/50 – Set On-Level to 50%

/rest/nodes/<node-id>/write

Writes all pending changes to the device

/rest/nodes/<node-id>/cmd/command name/<param1>/<param2>/.../<param5>

eg:

/rest/nodes/<node-id>/cmd/DOF - turn off a device or a scene

Insteon - /rest/nodes/<node-id>/cmd/DON/128 - turn on a scene to 50%

UPB - /rest/nodes/<node-id>/cmd/DON/50 - turn on a scene to 50%

/rest/nodes/<node-id>/enable

Enables a device

/rest/nodes/<node-id>/disable

Disables a device

6.6 Status

/rest/status

Returns the status for all the nodes

/rest/status/<node-id>

Returns the status for the given node

6.7 Query

/rest/query

Queries all the nodes

/rest/query/<node-id>

Queries the given node

6.8 Programs

/rest/programs/<pgm-id>/<pgm-cmd>

e.g. /rest/program/0032/runThen -- Runs a command for a single program

/rest/programs/<pgm-id>

Returns single program, or folder with folders/programs within it

/rest/programs/<pgm-id>?folderContents=false

Returns single program or folder

/rest/programs/<pgm-id>?subfolders=true

Returns single program, or folder with folders/programs within it recursively

/rest/programs

Returns all the programs in the root folder e.g. same as /rest/programs/<root-pgm-id>

/rest/programs?folderContents=false

Returns root folder only (same as /rest/programs/<root-pgm-id>?folderContents=false)

/rest/programs?subfolders=true

Returns all programs & folders (same as /rest/programs/<root-pgm-id>?subfolders=true)

Defaults:

folderContents=true, subfolders=false

pgm-cmd:

run|runThen|runElse|stop|enable|disable|enableRunAtStartup|
disableRunAtStartup

'runIf' is supported as well, but 'run' should be used instead.

6.9 Modules

/rest/electricity

**Only applicable to 994 Z Series.*

Returns electricity module info and specifically Energy Monitor, Open ADR and Flex Your Power status

/rest/climate –

Returns climate module info

/rest/networking/resources

Returns the networking resources configuration

/rest/networking/resources/<resource_id>

Calls and executes net resource

/rest/networking/wol

Returns the networking Wake On LAN configuration

/rest/networking/wol/<wol_id>

Calls and executes the WOL resource

6.10 Security

Please see [section 6.16](#) or consult ISY-WS-SDK-ELK documentation for complete integration of ELK security features with ISY.

6.11 Energy Management AMI/Smart Grid/SEP

Please see the Energy Management section.

6.12 Gas

*Only available on 992

/rest/gmeter

Returns the status of the gas meter

/rest/gmeter/log

Returns gas meter log

/rest/gmeter?reset=true

Clears all gas meter log entries

6.13 Logs

/rest/log

Returns system/event log

/rest/log?reset=true

Clears all system log entries

/rest/log/error

Return error log

/rest/log/error?reset=true

Clears all error log entries

6.14 Variables

/rest/vars/init/<var-type>/<var-id>/<value>

Sets the initial value of variable at ISY startup

var-type:

1 – Integer

2 – State

/rest/vars/set/<var-type>/<var-id>/<value>

Sets a variable given by var-id

var-type:

1 – Integer

2 – State

/rest/vars/get/<var-type>/<var-id>

Retrieves a variable given by var-id

var-type:

1 – Integer

2 – State

/rest/vars/get/<var-type>

Retrieves all variables of the given type

var-type:

1 – Integer

2 – State

Schema (*udiobjects:Variable & udiobjects:Variables*):

```
<var id="<var-id>" type="<var-type>">
    <val>value</val>
    <init>init-value</init>
    <ts>YYYYMDD HH:MM:SS</ts>
</var>
```

ts is the last changed timestamp of the current value

/rest/vars/definitions/<var-type>

Retrieves all variable definitions of the given type

var-type:

1 – Integer

2 – State

Schema (*udiobjects:VarDefinition & udiobjects:VarDefinitions*):

```
<CList type="VAR_INT">
    <e id="<var-id>" name="<var-name>" />
    ...
    <e id="<var-idN>" name="<var-nameN>" />
</CList>
```

type	The low level data type (integer)
var-id	The variable id
var-name	The variable name

6.15 Zigbee

**Only applicable to ISY994 Z Series.*

/rest/zb

Retrieves the status of Zigbee Network including Joined nodes if any

Namespace: **udizb (zigbee.xsd)**

Returns udiobjects:ZigbeeStatus

/rest/zb/scanNetwork

Sends a broadcast to all nodes already in the PAN so that they would announce themselves again. This is a good diagnostics tool for orphaned nodes

Namespace: **udizb (zigbee.xsd)**

Returns udiobjects.RestResponse

/rest/zb/ntable

Retrieves the neighbor table for the COO. This is a good diagnostics tool for retrieving LQI for each node in the PAN

Namespace: **udizb (zigbee.xsd)**

Returns udiobjects.RestResponse

/rest/zb/nodes

Retrieves all the nodes which have joined the PAN

Namespace: **udizb (zigbee.xsd)**

Returns udiobjects:ZigbeeNodes

/rest/zb/nodes/[euid]

Retrieves information for the node with the given euid (joined only)

Namespace: **udizb (zigbee.xsd)**

Returns udiobjects:ZigbeeNode

/rest/zb/nodes/[euid]/ping

Pings the node with the given euid (joined only)

Namespace: **udizb (zigbee.xsd)**

Returns udiobjects:ZigbeeNode if successful, udiobjects.RestResponse otherwise

/rest/zb/nodes/[euid]/remove

Removes the node with the given euid (joined only) from the PAN

Namespace: **udizb (zigbee.xsd)**

Returns udiobjects.RestResponse

/rest/zb/nodes/[euid]/ep

Retrieves the active endpoints for a node

Namespace: **udizb (zigbee.xsd)**

Returns udiobjects.RestResponse

6.16 ELK

**Only applicable when ELK Module is installed.*

/rest/elk/...

Please refer to ISY-WS-SDK-ELK .

7.0 Programs

You can setup and configure ISY programs using either SOAP or REST commands.

1. You can use the REST commands to retrieve programs or their status ([see section 6.8](#))
2. You can update programs by POSTing a well-defined (see below for example) XML to /program/upload/ID?key=KEY
 - a) Where ID is the 4 digit hexadecimal representation of the program ID you retrieved in #1
 - b) KEY is used to let ISY know if there are concurrent changes (see below for more details).

Warning: please note that if you upload bad programs or bad keys you might render ISY inoperable

7.1 Program IDs

1. It is the clients responsibility (i.e. your responsibility) to manage program IDs for the full set of programs and folders
2. Every program has a unique ID from 1-1024
3. When a program is deleted its program ID is reused
4. Folders are programs and have a program ID (note: These are different from the folders used for organizing your Insteon devices on the main device page)
5. All programs reference a parent folder by program ID
6. The root folder has a parent of 0
7. The root folder may have any program ID, there is no guarantee it will be 1

7.2 Key

1. All changes to programs are scoped to the entire set of programs by a Key. In other words, if you change one thing it's like you've changed everything
2. When saving/deleting programs you do the following:
 - a. Create a new key, using "D2DCommand" "setKey". You must create the new key string: <timestamp>.<random number>
 - b. Save all new and changed folders and programs one at a time
 - c. Save the program:
"/program/upload/<4_digit_hexadecimal_program_id>?key=<current key>"
 - d. Enable or Disable the program using "D2DCommand" "enable"/"disable"
 - e. Remove all deleted folders and programs, using "D2DCommand" "delete"

- f. Create another new key as in step 1
- g. Inform all other clients of the change by sending "D2DCommand" "broadcast". When the admin console receives one of these messages, it reloads the programs

Note: Programs may be implicitly deleted using save, for example, You delete program id=7 and then create a new program assigning it the newly available id=7, when it comes time to "Save Changes", you just save program id=7 and the other will implicitly be deleted.

7.3 Details

To send commands to programs you must first get all the programs. This gives you:

- A key value
- The content of all programs, allowing you to map between program name and program ID

The key-value ensures the client is using a current version of the programs. Whenever programs are added/changed/deleted, the key value changes, and thus all clients must get all the programs again.

To get all programs, issue the u:GetAllD2D command or you could use the REST equivalent ([see section 6.8](#)):

The XML you get back contains all the programs:

```
<key>key-value</key>
<triggers>
  <d2d>
    <trigger><id>1</id>
    <name>Living Room Program</name>
    ...
  </trigger>
</d2d>
<d2d>
  <trigger><id>3</id>
  <name>Kitchen Off</name>
  ... </trigger>
</d2d> ...
</triggers>
```

To run a command for a program, use the u:D2DCommand, with the following content:

(Note: you do not need to specify the <mask> tag)

```
<u:D2DCommand xmlns:u="urn:udi-
com:service:X_Insteon_Lighting_Service:1">
  <id>pgm-id</id>
  <key>key-value</key>
  <CDATA><cmd>cmd-tag</cmd></CDATA>
</u:D2DCommand>
```

You can send the following commands:

```
<enable />
<disable />
<runif />
<runthen />
<runelse />
<runAtReboot />
<notRunAtReboot />
<stop />
```

eg. The following runs the 'Then path of program 'Kitchen Off' using the key-value of 914CEA.6967A0 returned from GetAllD2D

```
<u:D2DCommand xmlns:u="urn:udi-
com:service:X_Insteon_Lighting_Service:1">
  <id>3</id>
  <key>914CEA.6967A0</key>
  <CDATA><cmd><runthen /></cmd></CDATA>
</u:D2DCommand>
```

7.3 Examples

Setting the Key - Sets the current key

Use the <setKey> subcommand of <D2DCommand>

<key> - The current key

<setKey> - The new key

e.g.

```
<s:Envelope><s:Body><u:D2DCommand xmlns:u="urn:udi-
com:service:X_Insteon_Lighting_Service:1">
  <key>FFA019C6.7C7E</key>
  <CDATA><cmd><setKey>FFA0A130.7C7E</setKey></cmd></CDATA>
</u:D2DCommand></s:Body></s:Envelope>
```

Deleting a program

Use the <delete /> subcommand of <D2DCommand>

- <id> - The program ID (not in hexadecimal)
- <key> - The current key

e.g.

```
<s:Envelope><s:Body><u:D2DCommand xmlns:u="urn:udi-com:service:X_Insteon_Lighting_Service:1">
  <id>10</id>
  <key>FFA0A130.7C7E</key>
  <CDATA><cmd><delete /></cmd></CDATA>
</u:D2DCommand></s:Body></s:Envelope>
```

Enabling a program

Use the <enable /> subcommand of <D2DCommand>

- <id> - The program ID (not in hexadecimal)
- <key> - The current key

e.g.

```
<s:Envelope><s:Body><u:D2DCommand xmlns:u="urn:udi-com:service:X_Insteon_Lighting_Service:1">
  <id>10</id>
  <key>FFA0A130.7C7E</key>
  <CDATA><cmd><enable /></cmd></CDATA>
</u:D2DCommand></s:Body></s:Envelope>
```

Saving a program (used for both creating and changing a program)

Use /program/upload/<4_digit_hexadecimal_program_id>?key=<current key>

e.g. This saves program id=10 (hexadecimal 000A):

<https://isy.url/program/upload/000A?key=FFABF47E.7C7E>

8.0 Logs

You can retrieve logs by using REST commands (see section 6.13)

/rest/log – retrieves system log

/rest/log/error – retrieves error log

All logs are tab delimited with an new line (\n) at the end of each line.

8.1 System Log (/rest/log)

System log has the following format:

Node – the address of the node to which the log belongs

Control – the control that was impacted and which caused the log entry

Action – the value of the control

Time – in NTP format with epoch of 36524 (see section 7.3)

UID* – the user or task which initiated the event

```
{
    SYSTEM_USER=0 | SYSTEM_DRIVER_USER=1 | WEB_USER=2,
    SCHEDULER_USER=3 | D2D_USER=4, ELK_USER=5 |
    SEP_DEVICE_UMETER_USER=6 | SEP_DEVICE_UPRICE_USER |
    SEP_DEVICE_UMSG_USER | SEP_DEVICE_UDR_USER |
    GAS_METER_USER
}
```

Log Type – the type of entry ... for a list of errors/types see section 7.4

To clear System Log, use **/rest/log/reset=true**.

* *udiobj.ssd:SystemActor*

8.2 Error Log (/rest/log/error)

Error log has the following format:

Time – in NTP format with epoch of 36524 (see section 7.3)

UID* – the user or task which initiated the event

```
{
    SYSTEM_USER=0 | SYSTEM_DRIVER_USER=1 | WEB_USER=2,
    SCHEDULER_USER=3 | D2D_USER=4, ELK_USER=5 |
    SEP_DEVICE_UMETER_USER=6 | SEP_DEVICE_UPRICE_USER |
    SEP_DEVICE_UMSG_USER | SEP_DEVICE_UDR_USER |
    GAS_METER_USER
}
```

Log Type – the type of entry ... for a list of errors/types see section 7.4

Error Message – free form text

To clear Error Log, use **/rest/log/error/reset=true**.

* *udiobj.ssd:SystemActor*

8.3 Converting NTP Formatted Time

For efficiency, Time in the log is an unsigned integer (4 Bytes) formatted using NTP with the following parameters:

```

EPOCH_OFFSET = 36524 (01/01/200)
SEC_IN_DAY=86400
EPOCH_YEAR = 2000
EPOCH_DAY = 1
EPOCH_MONTH = 1
YEAR_STARTS_WITH_DAY=1
    
```

There are very many code libraries that support conversion from NTP/UTC time to a Time structure. This said, the following code snippet should get you started

```

/**
 * Returns a <code>DateTime</code> object from an NTP
 * representation of date/time
 * @param cv - the NTP representation of date/time
 * @param bt - the <code>DateTime</code> object which is
 * returned (may be empty)
 * @param epochOffset - the offset to be used from epoch ;
 * USE EPOCH_OFFSET
 * @return a <code>DateTime</code> object converted from NTP
 */
public static DateTime FromNTP( long cv, DateTime bt, long
epochOffset )
{
    int w;
    long x = epochOffset*SEC_IN_DAY;
    long tv = ( cv - x );
    long tmp = 0;

    bt.dow = (int)( ( ( cv / SEC_IN_DAY ) + 1 ) % 7 );

    for ( w = EPOCH_YEAR; tmp <= tv; w++ )
    {
        tmp += DAYS_IN_YEAR( w ) * SEC_IN_DAY;
    }

    w--;

    tmp -= DAYS_IN_YEAR( w ) * SEC_IN_DAY;

    bt.year = w;
    tv -= tmp; /* Now we are ready for days */

    bt.day_of_year = (int)( tv / SEC_IN_DAY ) ;

    //+ YEAR_STARTS_WITH_DAY ) %
    //      ( IsLeap( bt.year ) ? 366 : 365 );
    tv = tv % SEC_IN_DAY;

    bt.hour = (int) tv / 3600;
    bt.min = (int)( tv / 60 ) % 60;
    bt.sec =(int) tv % 60;
    
```

```

    bt = FixMonthDay( bt );
    if (YEAR_STARTS_WITH_DAY == 1)
        bt.day_of_year++;
    return bt;
}

/**
 * Fixes the day/month combination
 * @param bt - a <code>DateTime</code> object
 * @return the fixed <code>DateTime</code> object
 */
public static DateTime FixMonthDay( DateTime bt )
{
    bt.month = 0;
    bt.day = 0;
    long dn = bt.day_of_year;

    if ( IsLeap( bt.year ) )
    {
        if ( dn == 59 )
        {
            bt.month = 2;
            bt.day = 29;
            return bt;
        }
        else if ( dn > 59 )
        {
            dn--;
        }
    }

    /* Now we find the month */
    for ( bt.month = 1; bt.month < 12 && monthdays[bt.month + 1]
        <= dn; bt.month++ )
        ;

    bt.day = (int) dn - monthdays[bt.month] + 1;
    /* Month starts with 1 not 0 */
    return bt;
}

/**
 * Returns whether or not the year is a leap year
 * @param year - the year
 * @return - true if leap year, false otherwise
 */
public static boolean IsLeap( int year )
{
    return ( ( year % 4 ) == 0 );
}

```

8.4 Log/Error Types

All Log related objects are defined in:

Schema: **log.xsd** and **udiobjs.xsd** (*uo:LogInfo*); namespace=**ulog**

Instances:

1. **loginfo.xml** : defines all log information and messages
2. **insterr.xml** : sub definition for INSTEON error messages
3. **upberr.xml**: sub definition for UPB error messages
4. **smtper.xml**: sub definition for SMTP error messages
5. **netstat.xml**: sub definition for Network Layer error messages

Appendix A – INSTEON Device Categories/Subcategories

A1. Device Categories

All system wide and high level device categories are defined in:
Schema: **family.xsd**; namespace=**ufamily**
Instance: **cat.xml**

A2. Device Sub-Categories

Device sub-categories are defined in the respective family instances:
Schema: **family.xsd**; namespace=**ufamily**
Instance: **[familyId]_fam.xml**
e.g. INSTEON Family ID=1 → **1_fam.xml**

Appendix B – UPB Device Types

Device types are stored in the type field of a node and are in the form

<MID>.<PID>.<firmware_level>, where the MID is the manufacturer ID, the PID is a product ID within a MID.

B1. PCS Device Types

PCS Device Types currently supported:

WS1D, WS1E, WS1N, WMC6, DTC6, WMC8, DTC8, AM1, FMR1, KPC6, KPLR6, KPLR8, KPLD6, KPLD8, KPC8, LM1, LM2, FMD2, OCM, ICM2, DBM, ICM, SPR, TPR

PIDs for PCS (MID == 1)

WS1D	1	// Wall Switch - 1 Channel - Dimmer
WS1N	2	// Wall Switch - 1 Channel - Non-Dimmer
WMC6	3	// Wall Mount Controller - 6 Button
WMC8	4	// Wall Mount Controller - 8 Button
CRM	5	// Controlled Receptacle Module
OCM	6	// Output Control Module - 2 Channel
LCM1	7	// Load Control Module - 1 Channel
LCM2	8	// Load Control Module - 2 Channel
LM1	9	// Lamp Module - 1 Channel
LM2	10	// Lamp Module - 2 Channel
ICM2	11	// Input Control Module - 2 Channel
DTC6	13	// Desktop Controller - 6 Button
DTC8	14	// Desktop Controller - 8 Button
AM1	15	// Appliance Module - 1 Channel
CLC1	16	// Commercial Lighting Controller
CFC	17	// Commercial Fixture Controller
RRS	18	// Phase Repeater Slave
RRM	19	// Phase Repeater Master
MSC	20	// Motion Sensor Controller
HFC	21	// HID Fixture Controller
RNM	22	// Repeater Master Chip
RNS	23	// Repeater Slave Chip
WS1E	24	// Wall Switch - 1 Channel - Electronic low voltage Dimmer
LSM	25	// Load Shedding Module
TEC	26	// Timed-Event Controller
RFC	27	// Radio-Frequency Input Controller
RNC	28	// Repeater Network Controller
XUB	29	// X10-to-UPB Bridge
VHC	32	// Vacuum Handle Controller
VPC	33	// Vacuum Power Controller
VIM	34	// Vacuum Interrupt Module
VPM	35	// Vacuum Pan Module
DBM	36	// Doorbell Module
TCM	37	// Telephone Control Module
SPR	40	// Split-Phase Repeater

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PIM	41	// <i>Powerline Interface Module</i>
DIAG1	49	// <i>Diagnostics 1</i>
DIAG2	50	// <i>Diagnostics 2</i>
DIAG3	51	// <i>Diagnostics 3</i>
DIAG4	52	// <i>Diagnostics 4</i>
TX4	53	// <i>Test Transmitter 4</i>
TM4	54	// <i>Test Module 4</i>
UTM	55	// <i>UPB Test Module</i>
ATM	56	// <i>UPB Alpha Test Module</i>
RIM	57	// <i>Repeater Powerline Interface Module</i>
FMD2	60	// <i>Inline Fixture Dimmer Module - 2 Channel</i>
FRM	61	// <i>Inline Fixture Relay Module</i>
WS2D	62	// <i>Wall Switch Dimmer - Bar Graph</i>
KPLD6	63	// <i>Controller</i>
SCM	64	// <i>Shade Control Module</i>
KPC6	65	// <i>Controller</i>
KPC8	66	// <i>Controller</i>
KPLD8	69	// <i>8-Button Keypad Light Dimmer</i>