ZKSoftware Inc

SOAP development Manual

Version: 2.0

2006 .12

Release history

Date	Revision	Change
2006.12	1.0	First release

1 ZK Web Server SOAP definition and description

1.1Summarize

1 SOAP Summary

SOAP is a lightweight protocol intended for exchanging structured information in a decentralized, distributed environment. SOAP uses XML technologies to define an extensible messaging framework, which provides a message construct that can be exchanged over a variety of underlying protocols. The framework has been designed to be independent of any particular programming model and other implementation specific semantics. Second, SOAP can be used over any from transport message and RPC all kind of system

SOAP include three parts

- SOAP envelope structure has defined an whole framework that may express any content which the message contain, who process these contents, and these contents may be optional or necessary.
- SOAP encoding rule define a series of mechanisms that exchange data type of the application.
- SOAP RPC defines an agreement that express the remote procedure call and the respond.

Although these three parts all together are described as a SOAP part, but their function are in intersection. Special, the encapsulation and coding rule are defined in the different namespace, this module definition method increased the simplicity to the SOAP envelope, beside of the SOAP encoding rule and the SOAPRPC agreement, this standard also defined two binding agreements, which describes how to transmit the SOAP message which is contained in the HTTP message whether there are HTTP extension the framework or not.

2 with the XML relation

all SOAP message base on XML (more information please refer to the documents which related XML), for a SOAP application message, the SOAP definition attribute and the attribute must include the correct namespace . The SOAP application must be able to process SOAP namespace of the message which it received, and it may process SOAP message that is without the SOAP namespace, they are same as result, just like it own the correct namespace. SOAP defined two namespace (more related XML namespace information please t refer to related XML documents)

- the soap envelope namespace sign is " Http://schemas.xmlsoap.org/soap/envelope/
- the soap encoding rule namespace sign is " Http://schemas.xmlsoap.org/soap/encoding/

SOAP message cannot contain the documents type statement, also cannot include the message handling instruction. SOAP uses The " ID" Type " Id" attribute to assign only sign to attribute, simultaneously this attribute is partial and do not need to verify. SOAP uses The " Uri-reference" Type " Href" attribute to assign this value citation, simultaneously this attribute is partial and do not need to verify. So it comply with the XML standard, the XMLSchema standard and the XML connection language standard style. Besides of SOAP the mustUnderstand attribute and the SOAPactor attribute, generally allow the attribute and their value appears in the XML documents example or Schema (two effects is same). In other words, the default value or the fix value is stated by DTD or Schema, and set its value in the XML documents example is in semantic affinity.

3 SOAP envelopes

SOAP message is a XML document; include an essential SOAP envelope, optional header and an mandatory SOAP body. In residual part of this standard, when mention SOAP message that refer to this XML documents. In this defined attribute and attribute namespace sign is: “Http://schemas.xmlsoap.org/soap/envelope/"

A SOAP message including below part:

1. In the XML documents to express this message, the envelope is the top layer attribute.

2. All quarters which use SOAP exchange information is dispersible and without prearrange, SOAP header has provided with the mechanism that add certain essential element which is about this SOAP message (feature) to the SOAP message. SOAP defines a few attribute that indicate this essential element (feature) whether could be optional or who processes it.

3. SOAP body is a generic container in that it can contain the message finally the receiver wants. SAOP defines an element named **Fault** for representing errors within the Body element when things go wrong. This is essential because without a standard error representation.

4.SOAP Syntax rule：

Envelopes

1. Attribute name is "Envelope"
2. must appear in the SOAP message 在 SOAP.
3. may include the namespace statement and append attribute, if include append attribute, must limit the namespace of the these attribute, like as these, “"Envelope" may include append sub-attribute, also these namespace must be limited and follow the SOAP body .

SOAP Header

1. Attribute name is "Header"
2. May appear in the SOAP message, if it appear, must be the first sub- attribute of the SOAP envelop.
3. SOAP header may include many items, each item is direct sub- attribute of the SAOP attribute, and all direct sub-attribute of the SOAP header must be limit namespace.

SOAP body

1. Attribute name is"Body"
2. Must appear in the SOAP message and be direct sub-attribute of the SOAP envelop attribute, which must follow the SOAP attribute behind ,SOAP body may include many item, each item is direct sub- attribute of the SAOP body attribute, all direct sub-attribute of the SOAP body may be limit namespace , SOAP defines an element named **Fault** for representing errors.

5. Based on the WEBSERVER SOAP realization

ZK fingerprint machine's SOAP interface base on the built-in WebServer foundation, realized a lightweight simple, extensible, and rich XML messaging framework for defining higher-level application protocols.

Note：

1. Character set

This SOAP interface supports the character set that is the ISO8859-X series character coding, also the single byte character set, simultaneously also supports partial double byte character coding ,like Chinese and so on (Chinese and so on double byte character set possibly not to support in MS SOAP SDK, when use Chinese and so on double byte character set, please refer to relative MS SOAP SDK technology documents which about Chinese solution)

2. **XML Formats**

this SOAP interface support XML the standard WELL FORMAT formats, namely do not support high-level XML the characteristic, like DTD data verification mode, regarding the SOAP " Header " in SOAP any content will be neglected. this SOAP XML code format produces by the attribute value form,

<Arg Value=" xxxx " ></Arg>

cannot write is: <Arg><Value>xxxx</Value></Arg>xxxx the wrong code

1.2Agreement

All parameter is transferred by **<Arg/>** form.

All return value is indicated by **<Row>** form.

All SOAP provide with POST method.

the agreement about return value:

Regarding all SET method, which return form **<Row RetCode="xx" RetValue="xxxx"></Row>**

RetCode is return status code, RetValue is the description character strings to returns condition

wrong code

If the format provided by SOAP-XML is different with WELL FORMAT or the name of visiting way does not exist, the system will return 500 universality server faults. ，E.g：The 404 error occur when visiting name make mistake took HTTP head to return 404

Serve Name：iWsService，This Serve Name indicate that Web Server supply SAOP server

HTTP Head：Pursuant the SOAP-HTTP head rule, the description is follow

POST /iWsService HTTP/1.0‘Need SOAP sever

Content-Type: text/xml ‘Need to indicate that the XML is SOAP resolution format”.
Content-Length: nnnnn “Need to point out the size of SAOP request”. SOAPAction:”uri:someuri” ‘ Extension HTTP protocol”， show SOAP function field.
Maybe following URI is empty
E.g Ability to accept format is
SOAPAction:
SOAPAction:””
SOAPAction:”uri:someuri”
URI may be any legal domain name
After the Server responded the SAOP request, return
HTTP/1.0 200 OK ‘200 indicate successfully’
Server: ZKWEBSERVER
Content-Type: text/xml
Return XML-SOAP data

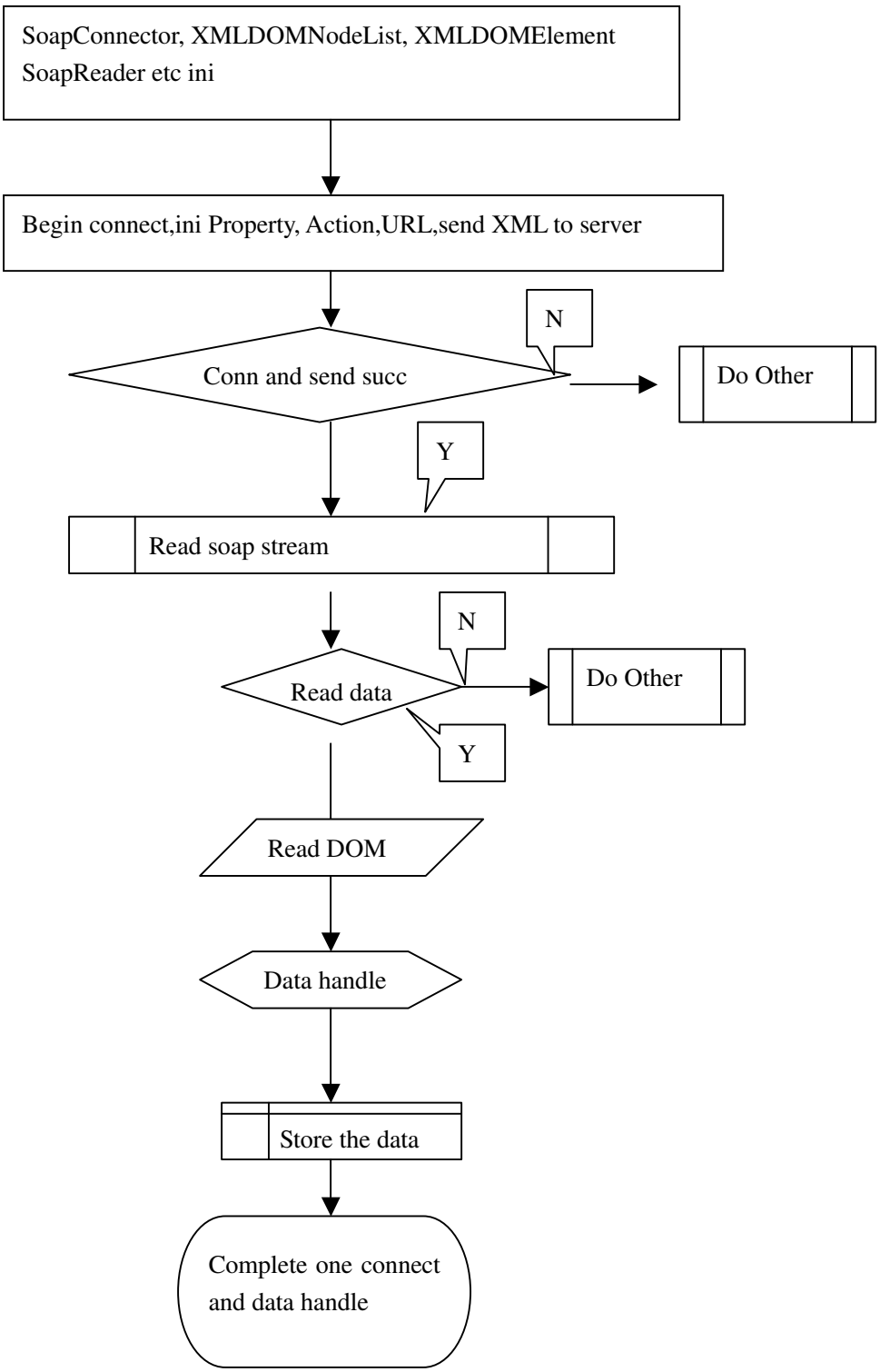
1.3 prepare developments

There is a built-in WevServer in the equipment with the SOAP interface. Therefore only needs to develop the SOAP client end communication.

1. May login the Microsoft official website to download the newest SDK, install the SDK, how to use the Microsoft SDK, please refer to Microsoft help.
2. download to the data structure and read the function descriptions, such as, reads the T&A record following form, may very clear see, the XML header, the XML structure body, and conclusion part.

```
<?xml version="1.0" standalone="no"?>
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/">
<SOAP-ENV:Body>
    i.   <GetAttLogResponse>
    ii.  …….
    iii. …….
</GetAttLogResponse>
</SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

3. Please understood the sending and receiving of the SOAP request, its essential is the TCP/IP connection request, and receive data.
4. Please understood XML DOM object use, the Microsoft SOAP SDK provided the object function to process, contain the XML resolution, analyze and read in the node and so on.
5. the development flow chart as follow, please refer:



6. Term explanation:

Element, refers to XML some row, node. May regard the database operation the record volume as the some corresponding row, please refer to understood.

Value: Up to corresponding attribute value. Like as Microsoft SOAP SDK SoapSerializer has the function WriteString to be allowed to give some attribute to read in a value, please refer understood.

7. Development flow

no matter is the transmission or receive, all its essential is TCP\IP (or the HTTP request) transmits. The middle transmission data all is the XML character data. The service end and the client process XML flow t, the client end may depend on the SOAP SDK to produce the XML transmission request, to receive XML, analyzes the XML node, simply completes communication, for the application, only needs to understand the SOAP the simple application method.

2. Function

2.1 Download Attendance log

Order：GetAttLog
Element：PIN
Value：Transfer "**ALL**" in**,** return all Attendance Log. Otherwise, return the user's attendance logs which user NO. has been transferred .
Meanings about node returning value ：
PIN：Personal identity number
Time second： Attendance Time.
verified： Matching Way.
status： State, E.g checkin\out
workcode：Work code
reserved1： Key word invalid
reserved2： Key word invalid
Note:All Download function,if hava data,it result data,else,it result null note in xml.

2.2 Download User information

Order：GetUserInfo
Element：PIN
Value：Transfer "**ALL**" in, return all user information. Otherwise, return the user's user information which user NO. has been transferred **.**
Meanings about node return value：
PIN：Personal identity number
Name：User name
Password：Password
Group：User's group privilege
Privilege：Privilege
Card：Card Number
PIN2：Personal identity Number (only above 5 digit is voild).
TZ1：User Time Zone 1

TZ2：User Time Zone 2
TZ3：User Time Zone 3

2.3 Download User Fingerprint Template

Order：GetUserTemplate
Element：PIN
Value：Transfer "**ALL**" in, return all user template,Transfer user No. in return the user's fingerprint template which user NO. has been transferred.
Meanings about node return value：
PIN：Personal identity number
FingerID：Fingerprint No.
Size： Size of fingerprint template, Note: take binary system to note.
Valid：The fingerprint template whether take effect, 1 is valid, 0 is not invalid.
Template：Fingerprint template

2.4 Upload User Information

Order：**SetUserInfo**
Element：It has same returning node and sequence as GetUserInfo.
Value：Transfer user No. name etc in, the Node is same configure and sequence as Get User Info return node
Meanings about node returning value：
Note:All SOAP request successfully and execute successfully or fail.it will return a note,include error code,content,the content will tell you what about it.

When you upload user successfully,please use command of RefreshDB to resfresh the device's database.please refer the describe the command RefreshDB.

2.5 Upload User Fingerprint Template

Order：SetUserTemplate
Element：It has same returning node and sequence as GetUser Template.
Value：Transfer user No. name etc in, the Node is same configure and sequence as Get User Template returning
Note:

When you upload user successfully,please use command of RefreshDB to resfresh the device's database.please refer the describe the command RefreshDB.

2.6 Delete User

Order：DeleteUser
Element：PIN。
Value：**T**ransfer User NO.
Note:

When you upload user successfully,please use command of RefreshDB to resfresh the device's database.please refer the describe the command RefreshDB.

2.7 Get MachineTime

Order：GetDate
Element：Nothing
If the value is empty, the performance is successful, otherwise it's failed.
Value: Nothing
Meanings about node returning Value：
Date: Return Date.
Time: Return Time.

2.8 Setting Time to Machine

Order：SetDate
Element：Date, Time
Value：Transfer in Date，Transfer in Time.

2.9 Setting Parameter to Machine

Order：SetOption
Element：Name, Value
Value：Datep :configure name，Value: Transfer parameter.
Note:
The parameter name are open by zksoftware.if you need,please contract with us,we will confirm and open for you.

2.10 Communication Password (security code)

use the SOAP service to obtain data from the equipment, should first establish the connection password, each time requestment all needs to verify password. .
Method：key
Element：Value
Value： Equipment communication password.
Note：this method work in other way to request, this method must add in the SOAP request every time, the data do not be returned until verify security code successfully, otherwise fail to return data.

2.11 Upgrade firmware

Method: Update

Element: Value
Value: Value introduce the parameter
Meaning: Update firmware to equipment. The firmware code must use the BASE64 code, introduce it through VALUE.
Note:
It must use the firmware firmware that it was supply by zksoftware.please do not use other file.

2.12 Clear data

Method: ClearData
Element: Value
Value: Value introduce the parameter
Meaning: Value is a flag at here,if Value input in 1,it will clear user information and template,if input 2, Clear template,if input 3,cleanr transaction.
Note:
This command will delete the data and can not restore.

2.13 Refresh device's database

Method: RefreshDB
Element: this command not need input in value
Note:
When you upload ,delete data for assure the data was refresh,please use this command to refresh device's database.

2.14 Reboot device

Method: Restart
Element: this command not need input in value,of course,every command need communication key.
Note:
If the command execute successfully,it will return a xml data,include error code and content.

3 Use MS SOAP-TOOLKIT 3.0

1. Download SOAP-TOOKIT SDK，there is downloading package in the Microsoft website, current version is 3.0

2. After installing this SDK，May utilize VC，VB，DELPHI，CB develop SOAP protocol

3. Follow is a SOAPTOOLKIT example by VC.

```
#include "stdafx.h"

#import "C:\WINNT\system32\msxml4.dll"

using namespace MSXML2;

#import "C:\Program Files\Common Files\MSSoap\Binaries\mssoap30.dll"
exclude("IStream", "IErrorInfo", "ISequentialStream",
"_LARGE_INTEGER","_ULARGE_INTEGER", "tagSTATSTG", "_FILETIME")

using namespace MSSOAPLib30;

void Add()

{

    ISoapSerializerPtr Serializer=NULL;

    ISoapReaderPtr Reader=NULL;

    ISoapConnectorPtr Connector=NULL;

Connector.CreateInstance(__uuidof(HttpConnector30));

// Assign SOAP request

    Connector->Property["EndPointURL"] ="http://192.168.1.5/iWsService";

    Connector->Connect();

    // Begin a SOAP message.

    Connector->Property["SoapAction"] = "uri:zksoftware";

    Connector->BeginMessage();

    Serializer.CreateInstance(__uuidof(SoapSerializer30));

    Serializer->Init(_variant_t((IUnknown*)Connector->InputStream));

    // create a SOAP message XML description

    Serializer->StartEnvelope("","","");

Serializer->StartBody("");

    // method name of SOAP request
```

```
Serializer->StartElement("SetUserInfo","http://www.zksoftware/Service/message/","","");
Serializer->StartElement("Arg","","","");
//this method parameter value
    Serializer->SoapAttribute("PIN","","11","");
    Serializer->SoapAttribute("Privilege","","14","");
    Serializer->SoapAttribute("Name","","Soap","");
    Serializer->SoapAttribute("Card","","119119","");
    Serializer->SoapAttribute("Group","","1","");
    Serializer->SoapAttribute("PIN2","","11","");

    Serializer->EndElement();
     Serializer->EndElement();
     Serializer->EndBody();
     Serializer->EndEnvelope();
     // Send the message to the XML Web service.
     Connector->EndMessage();
    if(Connector->OutputStream!=NULL)
    {
         Reader.CreateInstance(__uuidof(SoapReader30));
         Reader->Load(_variant_t((IUnknown*)Connector->OutputStream), "");
         printf("xml:%s \n",(char *)Reader->Dom->xml);
    MSXML2::IXMLDOMDocumentPtr pDoc;
         HRESULT hr = pDoc.CreateInstance(__uuidof(MSXML2::DOMDocument30));
       MSXML2::IXMLDOMElementPtr    childNode;
```

```
        pDoc->loadXML(Reader->Dom->xml);
        childNode = (MSXML2::IXMLDOMElementPtr)(pDoc->selectSingleNode("//Row"));
       while(childNode!=NULL)
      {
          MSXML2::DOMNodeType nodeType;
          childNode->get_nodeType(&nodeType);
          BSTR var;
          VARIANT varVal;
          childNode->get_nodeName(&var);
          childNode->get_nodeTypedValue(&varVal);
          printf("\nTag:%s %s\n", (char*)(_bstr_t)var,(char*)(_bstr_t)varVal);
          //Node attributes. Put into link table.
          MSXML2::IXMLDOMNamedNodeMapPtr pAttrs = NULL;
          MSXML2::IXMLDOMNodePtr pAttrItem;
          childNode->get_attributes(&pAttrs);
          long nCount
          pAttrs->get_length(&nCount);
          for(int i = 0 ; i < nCount ; i++)
          {
                    pAttrs->get_item(i,&pAttrItem);
                  // through the function get_nodeName,get_nodeTypedValue get attribute name and
attribute value
                    printf("%s=",(char*)(_bstr_t)pAttrItem->nodeName);
                    printf("%s\n", (char*)(_bstr_t)pAttrItem->nodeTypedValue);
```

```
            }
            childNode=childNode->nextSibling;
        }
getchar();
        }
}
int main(int argc, char* argv[])
{
        CoInitialize(NULL);
        Add();
        CoUninitialize();
       return 0;
}
```