

Based on the c # and XML Antenna Automatic Test System

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Abstract—At present most of the antenna tuning devices bring program, but these scripts format, content, incompatible, bring difficulties to test automation implementation. In order to solve this difficulty, this paper use XML to describe the test script. On the basis of the test framework, built on c # automated test program, combined with the function of the c # and XML language extensions, design test results in XML file. This article in detail elaborated the structure of the automation test framework and design patterns, the design concept for the antenna hand in the test automation has a certain reference value.

Keywords—antenna automatic test; hand in the test; C #; XML; SUMMITEK; traceability system

I. INTRODUCTION

With the development of mobile communication, the communication system of the transmitted power and receiver sensitivity has further improved, under the condition of high power, some thought has the linear characteristic of passive components, such as: filter, duplexer, transmission cables and connectors, antennas, show the nonlinear characteristics. Therefore, it is possible to make produce between the signals of different frequency modulation. This is passive adjustable (PIM), passive/tuning results is to make effective transmission signal distortion, noise and clutter, affect the signal transmission rate[1]. In global mobile communications (GSM), data communication system (DCS) 1800, personal communication service (PCS) 1900 on the base station, due to large transmission power, and the duplexer, rf coaxial connector and antenna is used in the transmission channel. And, the system is a duplex (that is, the multicarrier transmission channel is also receiving channels) so in the system can produce passive adjustment, as shown in fig.1. Therefore, the components of PIM requirement is very strict in the system[2].

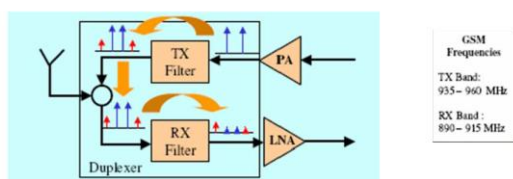


Figure 1.

Now, antenna tuning measuring equipment has a purple light SUMMITEK, R&S, hangzhou, nanjing, etc., this paper mainly aimed at SUMMITEK for, today in the use of adjustable instrument only SUMMITEK can support to make the function of automatic testing, other

manufacturers are doing, but the follow-up technical support is not very good[3].

II. SUMMITEK HAND IN THE TEST SOFTWARE

SUMMITEK intermodulation instrument testing software frequency sweep mode as shown in the fig.2 below.

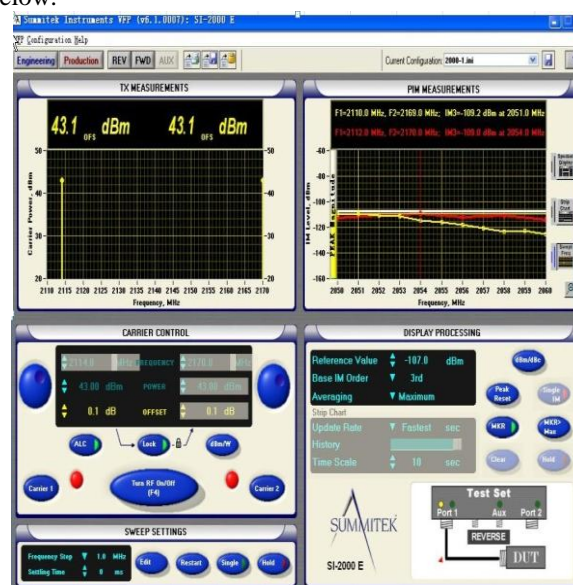


Figure 2.

First open a computer into the testing software and select the frequency sweep test; Set the corresponding use frequency (800 m: 869-894; 900 m: 935-960; 1800 m: 1805-1880; 1900 m: 1930-1990; 2000 m: 2110-2170); Set the power value 43 DBm and cable loss 0.1 0.2 db; Set the standard - 107 dBm (- 150 dBc) and test order number 3 rd; Sweep frequency set the range of 0.4 to 0.4 MHZ; Test the product after frequency sweep a spectrum click on MKR/MAX view the test results[4].

III. THE ANTENNA DESIGNED THE SOFTWARE AUTOMATIC TEST METHOD

Antenna in the test currently adopted by the software is still in manual testing, manual testing and reading data, which makes the testing process, inefficient and error-prone need to design a kind of test method, realize automatic test of tone value[5]. Through the API program interface design to complete record command and control and executive measure SUMMITEK PIM analyzer. The design of the API to use common language interface method, making it easy to adopt the most modern

programming platform. This article USES the API flexibly integrated in your own custom PIM design software[6].

This program will provide equipment interface controller software is used in the PIM version 9.0 and above. Each PIM controller will use a new software components called PIM Web engine, will run on the state of the default startup Window. Engine is a PIM network hardware instrument driver and a web server API. This server is your direct command interface, can be used to control the PIM analyzer instruments and connect to the client machine. Send command is a standard HTTP connection (support HTTP / 1.1), the interface is suitable for most popular programming environment, it can use TCP/IP socket connection. This allows the web service can be from any computer support HTTP protocol, the PIM can only limit in the Windows system using web engine.

A. XML program writing

XML and ACCESS, such as ORACLE and SQL database, the database provides a more powerful data storage and analysis ability, for example: data indexing, sorting, search, consistency, etc., XML is only stored data. In fact is the most important difference between XML data with other forms: he is extremely simple. This is a look a bit trivial advantages, but it is this that XML is different. XML simple makes it easy to read and write data in any application, it makes XML quickly become the only public data exchange language, although different applications also support other data interchange formats, but soon they will support XML, it means that the program can be more easily with Windows, Mac OS, Linux, and other platform of information, and then can easy to load the XML data to the program and analysis it, and the output in XML format.

B. The XML schema definition

API command and response formats use a custom XML schema definition, follow standard definition, W3C recommendation document at <http://www.w3.org/TR/xmlschema-1>. This article provides the content of the XML is used to describe and constraints, including the use of XML namespaces. Program and defined in the XML Schema language limitation, this paper has developed a customized model, it defines the syntax command and response, allowing any generated XML syntax validation is a response to explain before execution, to help ensure that communication model is applied to the PIM API. For this purpose, this paper developed an XML schema definition file, to define the PIM. Model clearly defines the PIM command/response model, can identify which attributes is allowed and is sent. For PIM WEB service apis, because each communication is the need to generate an XML document, each command/response must be formatted, so with a proper XML definition. Below is a sample XML document formatting right PIM. Command to send and receive response of the service will also follow the PIM API defined format.

```
<?xml version="1.0"?>
<PIM xmlns="http://www.summitekinstruments.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance"
```

```
xsi:schemaLocation="http://www.summitekinstruments.co
m PIMXMLSchema.xsd">
```

```
...
</PIM>
```

C. The XML command format

In order to verify that the command must use a valid API token key, you can use the method described earlier in this document. Optional other properties, send a set of commands is heritage properties. If true, the legacy of attribute tells the API web service release these commands an older PIM hardware engine (communicate using this method the old A/B series PIM analyzer). Legacy properties are completely optional, excluding command string, the API assumes that communication and modern PIM analyzer by PIM Web engine applications. Command may be with or without parameters, however some commands need specific parameter Settings is executed correctly (see commands are defined as follows).

This command must be released in a valid PIM XML documents (as above). In order to correctly parse and execute. Command is not correct format will strictly be ignored, the PIM WEB service apis can lead to empty response returned. XML documents from top to bottom, the order will be the order of execution (according to the traditional way of batch receive commands).

```
<Commands Token="[API Token]"
Legacy="[TRUE/FALSE]">
<!-- Comments may appear within a command string if
formatted as a valid XML comment -->
<!-- The following command has no parameters -->
<Command Action="[NoParamCommand]" />
<!-- The following command requires 4 parameters of
type [DataType] to be issued -->
<Command Action="[ParamsCommand]">
<[DataType]>[Data]</[DataType]>
<[DataType]>[Data]</[DataType]>
<[DataType]>[Data]</[DataType]>
<[DataType]>[Data]</[DataType]>
</Command>
</Commands>
```

D. the XML response format and data types

API WEB service receives the response described according to the format of the XML schema definition, to ensure that the received data. The API WEB services can easily explain in a custom application and management, the response data can take two forms, either command response, or connect the response.

Command response on behalf of the command, the result of the return order was receiving orders. Each ResponseSet will contain a single attribute, indicating whether to execute commands on existing PIM analyzer. And some answer will return only confirm execution, some may contain response parameters (this is the API will return data to the custom applications). Each reaction also contains a unit is easy to identify the data format (for example: "MHZ", "dBm", "dBc", etc.)[7].

```
<Responses Legacy="[TRUE/FALSE]">
<!-- The following response has no parameters -->
```

```

<Response Action="[NoParamCommand]" Units="" />
<!-- The following response includes 4 response
parameters of type [DataType] -->
<!-- NOTE: These are the data returned based on the
issued command -->
<Response Action="[ParamsCommand]"
Units="[DataFormat]">
<[DataType]>[Data]</[DataType]>
<[DataType]>[Data]</[DataType]>
<[DataType]>[Data]</[DataType]>
<[DataType]>[Data]</[DataType]>
</Response>
</Responses>

```

Connection reaction follow a similar format, although they contain different data. This connection response will return the token of the API, this is the requirement that command validation, and a series of available target analysis, can to the target on the PIM Web engine[8].

```

<Connection>
<Token>[HexidecimalToken]</Token>
<!-- The following analyzers were detected on your system
-->
<Analyzer Name="[AnalyzerModel]"
Legacy="[TRUE/FALSE]" BandIndex="[index]" />
<Analyzer Name="[AnalyzerModel]"
Legacy="[TRUE/FALSE]" BandIndex="[index]" />
...
</Connection>

```

To allow generic data types in engine and transmission network between different PIM other programming language is used, the PIM XML defines the data type, various applicable to each sending and responding to commands. Data types using API commands and responses between the numerical value of the communication.

E. XML data type

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The following data-types are based on XML Schema defined data types, therefore performing validation of a command-set against the PIMXMLSchema.xsd will ensure that data entered in the corresponding data fields is valid according to their data-type definition.

Double

Double-precision floating point number. This data type is used to set and retrieve floating point values used throughout the PIM API (i.e. frequencies, powers, etc.)

Integer

Signed 32-bit integer. This data type is used to set and retrieve integer and enumeration values used throughout the PIM API (i.e.

indices, enumeration values, etc.)

Boolean

true/false OR 0/1. This data type is used to set and retrieve boolean values used throughout the PIM API (i.e. TX on, ALC on, VAhold on, etc.)

String

UTF-8. This data type is used to set and retrieve string values used throughout the PIM API. String values may represent single values (i.e. Messages, Enumeration Descriptions, etc.), though some String responses will contain XML encoded data (i.e.

getTestSetDef, or getAnalyzers).

Status

A complex data-type consisting of two attributes (Error, and Code) and a Message. The Error attribute is a Boolean value indicating

whether the status returned represents an error state

(TRUE) or just a warning (FALSE). The Code attribute is an Integer value

which holds the error code representative of the error or warning that has occurred. The Message returned is simply a string value

which provides a human readable description of the error which has occurred. The Status data-type is returned with each response

which has encountered an error or warning in performing the desired action.

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IV. WRITE A C # PROGRAM

C# is a kind of new modern object-oriented programming language, it enables the programmer to the .NET platform to quickly develop a variety of applications. .net platform. Offers a wide range of tools and services, to maximize the discover and use of computing and communication skills. Due to its legacy of object-oriented design, from the building component in the form of a high-level business object to build the system application, c # will be the most appropriate choice. Using c # language design components can be used for Web services, so that through the Internet, and can be run on any operating system calls for any programming language. C # in brings to the application at the same time, the rapid development of ability is not sacrifice the various features of C and C ++ programmers care about[9].

Specifically for c #.net runtime. The c # compiler can generate code, subject to the control of can also be used. The.net base classes. The importance of c # is embodied in two aspects: first, it is specifically for with. Highly compatible with.net runtime. Second, it is a modern object-oriented languages, in the design of it, Microsoft also learned the experience of other languages, the language is object-oriented rules is widely used in the past 20 years after the development. In and of itself is a kind of c # language, although it is used to generate the. Net environment code, it is not in itself. The.net part of it. Some features of the.net support, but c # does not support; And some features of c # support, but the.net does not support.

In practice, many companies test automation tools are developed using some ready-made software tools and write their own procedures, form based on no. Net characteristic of test automation framework. System according to the characteristics of the c # development, this paper on the unit test, usability is very strong. At the same time, the use of XML has the characteristics of good exchange data, can also according to the need to improve the test data at any time, with good elasticity. Test automation framework is discussed in this paper, therefore, based on the c # development[10].

The article written by the antenna hand in the test system based on c # and XML application interface are shown in fig.3 below.

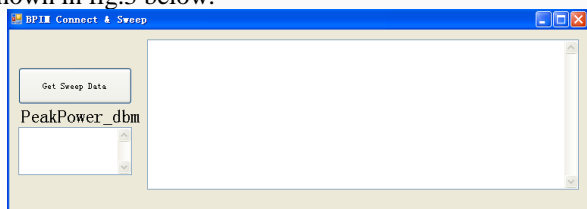


Figure 3.

Thus, we can realize the antenna tuning of automated testing, can deliver system collected tone contours can be automatically displayed in the window, lay the foundation for the next formal application.

V. THE ANTENNA IN THE AUTOMATIC TESTING IN THE TRACEABILITY SYSTEM APPLICATION

We have set up an antenna for us in the automatic test software, now, we can use this feature in an antenna in the traceability system, to realize the automation of test data, the information one step further.

Antenna traceability system, is one of my latest development is used to trace the antenna of various performance parameters of the database system, data input, query, have antenna products export, editing functions such as bar code, now the system has stable operation, the only data collection is the still need to artificially, data entry accuracy problems. My hand in front of the antenna

automatic test is applied to the traceability system. In the data entry window to add a button, the function of the above to join, pay the tone value can be displayed in the window, and the data can also be stored in the original database, the entire process, does not require people to read the data manually, automatic testing process. The realization of the above functions, accuracy and reliability of the data after repeated tests, with conditions in field application.

At this point, in this paper, the development of the work is complete, can be the same type of test for the future development to provide certain theoretical basis, further improve the automation level of the company.

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