Test Report

Telecommunications Technology Association Address : 267-2, Seohyeon-dong, Bundang-gu, Seongnam-City, Kyonggi-do, 463-824, KOREA Tel:+82 31 724-0114 Fax: +82 31 724-0169	**Report No.:** TTA-N-17-0214	

1. Client

o Name : TIS Co., Ltd.

o Address : 1, Daeam-ro 105beon-gil, Seongsan-gu, Changwon-si Gyeongsangnam-do, Republic of Korea

2. Test Sample : SmartEMS 1.0

3. Date of Test : 13th April 2017

4. Test Method Used : QualityLogic IEEE 2030.5 (SEP 2) Conformance Test Program

5. Test Results : Refer to Item 3.3 below

The results of this test is for the test item only provided by client and prohibited to use for any other purpose

Affirmation	Written by Name: Song I Kim	Approved by Name : Sanghoon Chae

2017. 04. 25.

President

Telecommunications Technology Association (Signature)

TPG-0024-1(01)

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Test Result

Report No.: TTA-N-17-0214

Test Name	:	**IEEE 2030.5 (Smart Energy Profile 2) Conformance Test**
Report for	:	**TIS Co., Ltd.**
Tested by	:	**TTA with QualityLogic IEEE 2030.5 (SEP 2) Conformance Test Program**
Product	:	**Smart EMS**
Signature	:	**TTA** / **Quality Logic, Inc**
Sign		
Signed by		Chae Sang Hoon
Date		4-25-17 / 4-24-17

※ You can verify the forgery and authenticity by the barcode at the end of this document.

Contents

1. Report Information

This section contains information on the apparatus around the test.

1.1. Testing Laboratory

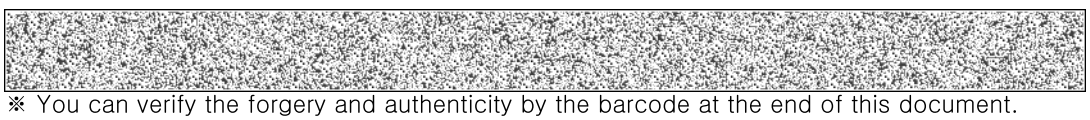
Company Name	TTA
City	Seongnam-City, Gyeonggi-do
Address	47, Bundang-ro, Bundang-gu
Postal code	463-824
Country	Republic of Korea
Telephone	+82-31-724-4932
Fax	+82-31-724-0169
URL	www.tta.or.kr
Responsible person	Song-I Kim
e-mail	sikim@tta.or.kr

1.2. Conformance Test Program Supplier

Company Name	QualityLogic
City	Simi Valley, CA
Address	2245 First St. #103
Postal code	93065
Country	USA
Telephone	+1-805-531-9030
Fax	+1-805-531-9045
URL	www.qualitylogic.com

1.3. Product Vendor

Company Name	TIS Co., Ltd.
City	Changwon-si Gyeongsangnam-do
Address	1, Daeam-ro 105beon-gil, Seongsan-gu
Postal code	51461
Country	Republic of Korea
Telephone	0+82-10-9123-4767
Contact person	Kim Ki Man
e-mail	kimgm@tisys.co.kr



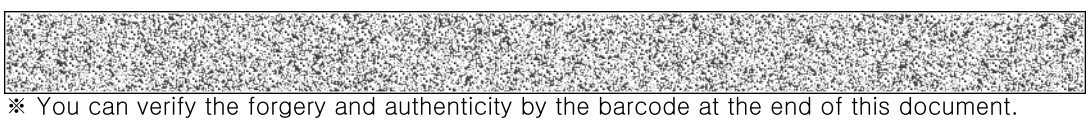
1.4. Test Summary

The test was conducted using the test tool approved by CSEP(Consortium for Smart Energy Profile) who established standard test specification of SEP2(IEEE 2030.5). CSEP approved the 'SEP2 Functional Test Suite' and 'Ad Hoc Tester' of Qualitylogic Inc. as certification testers in February 2015. TTA followed QualityLogic's approach to testing and evaluating and the SEP2 conformance test program using CSEP approved testers before official Certification program.

TIS Co., Ltd. required software to be tested using the tests described in the "Development and 100kW System Demonstration for Economic Dispatch Microgrid PV System based on 1000V DC BUS-Government project".

TIS Co., Ltd. provided N sample(S) of the client to be tested. This report contains the results for the following client Smart EMS Testing was conducted to determine the software's ability to comply with the requirements and its ability to communicate with IEEE 2030.5. No certification mark or certificate of compliance was issued as a result of this testing. The Smart EMS obtained compliant results for all of the IEEE 2030.5 Function Sets that were tested.

The conformance testing was focused on basic IEEE 2030.5 application protocol and required optional function sets, EDEV and TP. The testing provides confidence that the software tested can communicate correctly with other IEEE 2030.5 devices/software.



1.5. Device(s) Under Test Identification

1.5.1. General Information

Product Type	Client
Product Name	Smart EMS
Product Version	1.0
IP Version	IPv6/IPv4
Interface	Ethernet/Wifi
Encoding	XML
Picture	

2. Test Configuration

2.1. Test Scope

The test have been run only checked below between server and client. The list must be filled and submitted to TTA before the test begins.

Segment	Function Set	Client
Core	CERT	O
	DCAP	O
	DNS	O
	TLS	O
	TM	O
Optional	APPS	-
	COM	-
	DSGN	-
	DRLC	-
	EDEV	O
	RSPS	-
	TP	O
	UPT	-

2.2. Test Environment

The test has been run with the following external conditions throughout the session.

	Nominal
Temperature in the range 15ºC to 35 ºC	Yes
Relative humidity in the range 20% to 75 %	Yes

2.3. Test Procedures

The test has been run on 13th April 2017 with QualityLogic Inc. IEEE 2030.5Conformance Test Program. The CSEP approved QualityLogic Test Tools used were the Version V1.11 Release of the Functional Test Suite (FTS) Client Tester and Ad Hoc Client Tester.

3. Test Results

3.1. Summary Convention

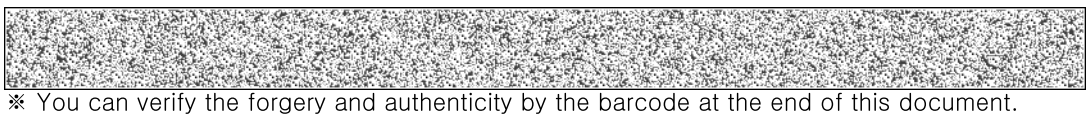
The following "Result" convention is used in this summary

Result Items	Description
PASS	All test cases that have been executed have passed.
FAIL	At least one test case has failed.
WARN	At least one test case generated a WARN result, while all others have passed.
VOID	At least one test case generated a VOID result, while all others have passed.
WAIVED	Not supported by test tool yet.

3.2. Summary of Test Results

Type	Test Code	Description	Results	Comment
Core	CERT	Support Certificate	WAIVED	
	DCAP	Support Device Capabilities	PASS	None
	DNS	Support Discovery	PASS	
	TLS	Support Security	PASS	
	TM	Support Time	PASS	
Optional	EDEV	Support End Device	PASS	
	TP	Support Pricing	PASS	

Detailed testing and results are contained below.



3.3. Test Items Results

3.3.1. Results Items convention

The following convention is used in this test report.

Result Items	Description
Compliant	The DUT met the requirements of the corresponding criteria
Non-compliant	The DUT did not meet the requirements of the corresponding criteria
NA	The criteria were Not Applicable to Equipment Under Test {Explanation Required}
ENS	The specific feature was Not Supported by the customer
Unable to Test	the test case could not be completed due to a QualityLogic Test Tool issue

3.3.2. Client Functional Test cases

CERT

Test Item	Description	Results	Comments
CERT2	Support for Device certificates	Unable to Test	

DNS

Test Item	Description	Results	Comments
DNS01	xmDNS requests and multicast responses SHALL be transmitted (and received) on site-local multicast address FF05::FB (if IPv6) or 239.255.255.251 (if IPv4), using destination port 5353 and domain name ".site."	Compliant	

TLS

Test Item	Description	Results	Comments
TLS14	SFDI is the SHA256 of the entire certificate truncated from the left to 36 bits	Compliant	
TLS18	Support 6 Digit PIN [5 decimal digits + checksum]	Compliant	
TLS28	Authentication of TLS Server Device Certificate is done using the inherent PKI RFC5246-Section7	Compliant	
TLS30	If client has a device certificate, authentication of TLS client Device Certificate is done using the inherent PKI RFC5246-Section7	Compliant	

TLS32	If client has a self signed certificate, server checks for correctness.	ENS	Optional test
TLS38	CipherSuite : TLS_ECDHE_ECDSA_WITH_AES_128_CCM_8	Compliant	

TM(FTS Test)

Test Item	Description	Results	Comments
APPS1	Support for HTTP header fields marked "Mandatory" with "SEP2 Use"	Compliant	
DSGN17	Clients must ignore query strings in hrefs but must not remove them	Compliant	
TM2	Devices with user displays SHALL support local time and daylight savings time offsets.	Compliant	

EDEV(FTS Test)

Test Item	Description	Results	Comments
EDEV16	Clients SHALL NOT POST a new EndDevice instance to a server's EndDeviceList if that EndDeviceList already contains an EndDevice instance for the client.	Compliant	

TP(FTS Test)

Test Item	Description	Results	Comments
TP5	Pricing clients SHALL be capable of internally storing and supporting one TariffProfile instance.	Compliant	
TP26	Pricing clients SHALL observe the absolute value of the randomizeDuration or randomizeStart value for the randomization range when calculating the randomization value. This allows more capable price clients to look ahead at scheduled prices (if available) and, using knowledge of the client's operating characteristics, determine if it is in the customer's best interest to react to the event earlier or later.	Compliant	
TP27	If, while a price-responsive client is acting upon a TimeTariffInterval, that TimeTariffInterval is cancelled, the client SHALL observe the randomizeDuration value when ceasing action.	Compliant	

TP77	Pricing clients, upon detecting multiple active TimeTariffIntervals, SHALL ignore all but the TimeTariffInterval with the highest creation time.	Compliant	
TP93	If a pricing client reads a PriceResponseCfg instance where the ConsumeThreshold is greater than or equal to the MaxReductionThreshold, the client SHALL ignore the erroneous PriceResponseCfg instance	Compliant