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Information technology — Home Electronic Systems (HES) Architecture —

Part 5-4:
Intelligent grouping and resource sharing for HES Class 2 & Class 3 — Device Validation

Technologies de l'information — Architecture des systèmes électroniques domestiques (HES) —

Partie 5-4: Groupement intelligent et partage de ressources pour HES classe 2 & classe 3 — Validation du dispositif

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Reference number
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FINAL DRAFT INTERNATIONAL STANDARD

ISO/IEC 14543-5-4

INFORMATION TECHNOLOGY – Home Electronic System (HES) Architecture – Intelligent grouping and resource sharing for HES Class 2 & Class 3 – Part 5-4: Device validation

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INFORMATION TECHNOLOGY – Home Electronic System (HES) Architecture - Intelligent grouping and resource sharing for HES Class 2 & Class 3 – Part 5-4: Device validation

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Foreword

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ISO/IEC 14543-5-4 was prepared by Joint Technical Committee 1 of ISO/IEC, Information technology, Subcommittee SC 25, Interconnection of Information Technology Equipment.

This International Standard has been approved by vote of the member bodies, and the voting results may be obtained from the address given on the second title page.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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Introduction

ISO/IEC 14543: Information technology – Home electronic systems (HES) architecture - Intelligent Grouping and Resource Sharing (IGRS) presently is divided in seven parts:

- **Part 5-1: Core Protocol** (under consideration)
  - Specifies the TCP/IP protocol stack as the basis and the HTTP protocol as the message-exchanging framework among devices.
  - Defines a series of device and service interaction/invocation standards, including device and service discovery protocol, device and service description, service invocation, security mechanisms, etc.
  - Specifies core protocols for a type of home network that supports streaming media and other high-speed data transport within a home.
- **Part 5-2: Application Profiles**
  - Based on the IGRS Core Protocol.
  - Defines a device and service interaction mechanism, as well as application interfaces used in IGRS Basic Applications.
  - Multiple application profiles have been developed, including:
    - Part 5-21: AV Profile (under consideration)
    - **Part 5-22: File Profile** (under consideration)
  - Additional application profiles are planned (part numbers to be assigned)
    - **Part 5-2w: DVD Profile**
    - **Part 5-2x: QoS Profile**
    - **Part 5-2y: DMCP Profile**
    - **Part 5-2z: Universal Control Profile**
- **Part 5-3: Basic Application** (under consideration)
  - Includes an IGRS basic application list.
  - Defines a basic application framework.
  - Addresses operation specifics (device grouping, service description template, etc.), function definitions, and service invocation interfaces.
- **Part 5-4: Device Validation**
  - Defines a standard method to validate an IGRS-compliant device.
- **Part 5-5: Device Types** (under consideration)
  - Defines IGRS Device types used in IGRS applications.
- **Part 5-6: Service Types** (under consideration)
  - Defines basic service types used in IGRS applications.

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INFORMATION TECHNOLOGY – Home Electronic System (HES) Architecture - Intelligent grouping and resource sharing for HES Class 2 & Class 3 – Part 5-4: Device validation

1 Scope

ISO/IEC 14543-5-4 specifies device validation methods for information devices that implement ISO/IEC 14543-5-1. This international Standard defines a framework architecture for a device validation system used by test devices and devices under test. Also, it describes and specifies the device interaction process, message exchange requirements, and conformance rules.

This document is applicable to resource sharing and service collaboration among computers, consumer electronics, and communication devices in a Local Area Network (LAN) or Personal Area Network (PAN) environment, especially in a wireless dynamic network.

2 Normative reference

The following standards and specifications contain provisions that, through reference in this text, constitute normative provisions of this standard. For all referenced articles with dates, the revised edition after that date shall not be applicable to this document. However, the reader is encouraged to consider whether to use the latest edition of such articles. For all referenced articles without dates, the latest edition of such articles shall be applicable to this document.

ISO/IEC 14543-5-1 Information Technology - Information Device Intelligent Grouping and Resource Sharing Specification Part 1: Core Protocol

3 Definitions and abbreviations

3.1 Definitions

The following terms are used in this standard and commonly used in other industry publications. As used in this standard, they have the following meanings:

3.1.1
centralised device group
set of IGRS Devices with one IGRS Device acting as the master. The master is responsible for managing the setup, for dismissing a Device Group, and for processing a “join request” from another device. The master device and other IGRS Devices in such a Device Group form a centralised or master-slave relationship.

3.1.2
client identifier
unique identifier associated with a Client on an IGRS Device to which that Client belongs.

3.1.3
device group
multiple IGRS Devices that are organised into a logical group through the device group management mechanism specified ISO/IEC 14543-5-1. Each IGRS Device in a Device Group follows common interaction rules. Two types of Device Groups are defined: peer-to-peer Device Group and centralised (master-slave) Device Group.

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3.1.4
device identifier
globally unique device identifier associated with one IGRS Device.

3.1.5
device pipe
channel used to transfer device interaction messages. This channel is set up through the pipe setup mechanism specified in ISO/IEC 14543-5-1.

3.1.6
IGRS client
application that draws upon the services of one or more connected IGRS Devices. Multiple client instances can exist on a network at the same time.

3.1.7
IGRS device
information device that conforms to ISO/IEC 14543-5-1.

3.1.8
IGRS protocol
communications protocol that conforms to ISO/IEC 14543-5-1

3.1.9
IGRS service
sharable resource encapsulated in an IGRS Device by implementing application interfaces and providing services for other IGRS Devices. An IGRS Service has an invocation interface that meets the requirements of ISO/IEC 14543-5-1. These invocation interfaces are described and announced on the network through the IGRS Service Description Specification.

3.1.10
IGRS user
owner of an IGRS Device and Client.

3.1.11
Peer-to-Peer device group
set of IGRS Devices where each IGRS Device in this set has a peer-to-peer relationship with each other.

3.1.12
service identifier
unique identifier assigned to a service provided by a specific IGRS Device. Note that the same type of service may be provided by multiple IGRS Devices within the same network. Each instance of a service has a unique service identifier on the IGRS Device providing that service.

3.1.13
service type
category of IGRS Service defined according to the set of resources encapsulated. The Service Type enables service applications in the same category to have common invocation interfaces.

3.1.14
test device
physical entity that can send, receive, and validate network messages that conform to ISO/IEC 14543-5-1.

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190 **3.1.15**
191 **user identifier**
192 identifier of an IGRS user.

193 ### 3.2 Abbreviations

HTTP	Hypertext Transport Protocol
IGRS	Intelligent Grouping and Resource Sharing
IP	Internet Protocol
PAN	Personal Area Network
TCP	Transmission Control Protocol
UDP	User Datagram Protocol

194 ## 4 Conformance: IGRS device validation

195 ### 4.1 Purpose

196 The IGRS Core Protocol (ISO/IEC 14543-5-1) shall be supported and implemented by all
197 IGRS-compliant devices. Although different manufacturers may have different
198 implementations, all implementations shall conform to the requirements defined in
199 ISO/IEC 14543-5-1 in order to guarantee that all networked devices using the IGRS protocol
200 can communicate properly with one another. Therefore, in order to ensure successful
201 interoperability among devices manufactured by different vendors, IGRS protocol
202 conformance tests specified in this International Standard shall be met.

203 IGRS Device Validation is a type of black-box test that defines a series of conformance test
204 suites to analyze and determine whether required and optional interaction messages
205 supported by IGRS devices, as well as response messages returned, have passed
206 conformance rules.

207 ### 4.2 Conformance requirements

208 To be considered compliant with ISO/IEC 14543-5-1, each device shall meet the criteria
209 defined by the IGRS device validation conformance test suite in Clause 6.

210 In addition, to be considered in compliance with this International Standard, the test methods
211 used shall meet all the mandatory requirements defined by the IGRS Device Grouping
212 Conformance Test Suites specified in Clauses 6.1 to 6.7, and the IGRS Resource Sharing
213 Conformance Test Suites specified in Clauses 6.8 to 6.13.

214 ### 4.3 Test setup and method

215 In Figure 1, a device under test and one or more test devices are located in the same LAN IP
216 broadcast domain.

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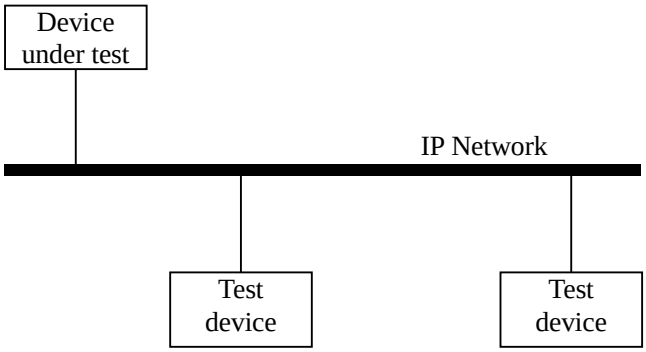


Figure 1 – IGRS conformance test setup

For each test case, the test devices shall send appropriate IGRS messages to the device under test, receive response messages, and determine the correctness of the response messages.

IGRS Device Validation shall not consider the following test scenarios: lost message sent by test devices and the device under test due to network link layer transport issues, multicast message across subnets, and conformance testing of IGRS devices over non-IP network.

4.4 Device validation requirements

The test cases that comprise a test suite test the various implementation requirements of the IGRS Core Protocol feature specifications (see Clause 5, 6, 7, 8, 9 and 10 of ISO/IEC 14543-5-1). The test suite is divided into two categories: mandatory and optional. Every IGRS device shall pass all mandatory reference test cases. If an IGRS device implements one or more optional features defined in ISO/IEC 14543-5-1, that device shall also pass relevant reference test cases of the test suite.

5 IGRS test suite overview

5.1 Test suite structure

As shown in **Fehler! Verweisquelle konnte nicht gefunden werden.**, the IGRS conformance test suite structure is divided into two categories: Device Grouping and Resource Sharing. The Device Grouping Test Suite is further divided according to the primary functions of the IGRS Core Protocol (see Clause 9 and 10 of ISO/IEC 14543-5-1). The Resource Sharing Test Suite specifies each primary function of IGRS Core Protocol in detailed sub-function test suites.

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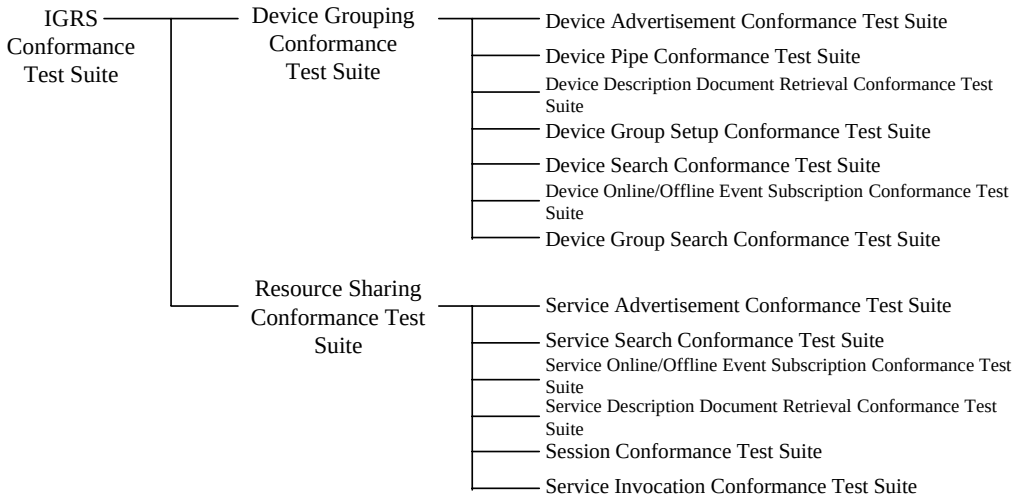


Figure 2 – IGRS conformance test suite structure

5.2 Test suite description

5.2.1 IGRS device grouping test suite

This test suite focuses on the device grouping capabilities of IGRS devices. It is divided into seven sub-function test suites, each of which is specified in the subclause listed:

a) Device Advertisement Conformance Test Suite(see 6.1)
b) Device Pipe Conformance Test Suite(see 6.2)
c) Device Description Document Retrieval Conformance Test Suite(see 6.3)
d) Device Group Setup Conformance Test Suite(see 6.4)
e) Device Search Conformance Test Suite(see 6.5)
f) Device Online/Offline Event Subscription Conformance Test Suite(see 6.6)
g) Device Group Search Conformance Test Suite (see 6.7).

5.2.2 IGRS resource sharing test suite

This test suite focuses on resource sharing capabilities of IGRS services. It is divided into six sub-function test suites, each of which is specified in the clause listed:

a) Service Advertisement Conformance Test Suite(see 6.8)
b) Service Search Conformance Test Suite(see 6.9)
c) Service Online/Offline Event Subscription Conformance Test Suite(see 6.10)
d) Service Description Document Retrieval Conformance Test Suite(see 6.11)
e) Session Conformance Test Suite (see 6.12)
f) Service Invocation Conformance Test Suite (see 6.13).

5.2.3 Test suite description rules

The description of each IGRS sub-function test suite is divided into two parts:

1) Reference messages related to the test suite;

2) Test case suite: includes pre-conditions and test cases. The pre-condition lists prerequisite test conditions used by each test case of that test suite. The test case consists of the test purpose, reference, test procedure, conformance category, and the pass criteria, called the "pass verdict condition."

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6 IGRS conformance test suite

6.1 Device advertisement conformance test suite

6.1.1 Reference messages

Device online advertisement, refers to Table 7 of ISO/IEC 14543-5-1

Device offline advertisement, refers to Table 8 of ISO/IEC 14543-5-1

6.1.2 Test case suite

6.1.2.1 Pre-condition

Pre-condition 1: applicable to test case 1

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— Test device is listening on multicast port 239.255.255.250:3880.

Pre-condition 2: applicable to test case 2 through 5

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— Test device is listening on multicast port 239.255.255.250:3880;

—— IGRS protocol on the device under test is initiated and running normally.

6.1.2.2 Test case 1

—— Test Purpose

To validate that the device under test can automatically send a correct Device Online Advertisement message to the multicast address port 239.255.255.250:3880 when the IGRS protocol is initiated.

—— Reference

9.1.1 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Initiate IGRS protocol on device under test.

—— Pass Verdict Condition

1) Test device can listen to Device Online Advertisement message sent from device under test on multicast address port;

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2) The Device Online Advertisement message received by test device shall conform to definitions in Table 7 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.1.2.3 Test case 2

—— Test Purpose

To validate that the device under test can resend a Device Online Advertisement message to multicast address 239.255.255.250:3880 before the max advertising valid time defined in Cache-control: max-age field is reached.

—— Reference

9.1.1 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device receives the Device Online Advertisement message sent by device under test at the multicast address, and retrieve Cache-control: max-age field value to be n (max advertising valid time in seconds); at the same time, test device listens on multicast address 239.255.255.250:3880 for n seconds.

—— Pass Verdict Condition

1) Test device can receive another Device Online Advertisement message less than n seconds after receiving the first Device Online Advertisement message from device under test.

2) The Device Online Advertisement message received by test device shall conform to definitions in Table 7 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.1.2.4 Test case 3

—— Test Purpose

To validate when there is configuration data change on the device under test, a new Device Online Advertisement will be sent to multicast address 239.255.255.250:3880. If 01-ConfigId field value is at max value (see Table 7 of ISO/IEC 14543-5-1), then 01-ConfigId will be reset to 1, else 01-ConfigId will be incremented by 1.

—— Reference

9.1.1 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

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—— Test Procedure

1) Test device receives Device Online Advertisement sent from device under test at multicast address 239.255.255.250:3880. The value in 01-ConfigId field is c1;

2) A new service is added or a service is terminated on device under test;

3) Test device receives another Device Online Advertisement sent from device under test at multicast address 239.255.255.250:3880. The value in 01-ConfigId field is c2.

—— Pass Verdict Condition

1) In step 3 of test procedure, the Device Online Advertisement message received by test device shall conform to definitions in Table 7 of ISO/IEC 14543-5-1;

2) If c1 is not max value, then c2 = c1+1, else c2 = 1.

6.1.2.5 Test case 4

—— Test Purpose

To validate when device under test resets, a Device Online Advertisement will be sent to multicast address 239.255.255.250:3880. If 01-BootId field value is at max value (see Table 7 of ISO/IEC 14543-5-1), then 01-BootId will be reset to 1, else 01-BootId will be incremented by 1.

—— Reference

9.1.1 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

1) Test device receives Device Online Advertisement sent from device under test at multicast address 239.255.255.250:3880. The value in 01-BootId field is b1;

2) Device under test is rebooted;

3) Test device receives another Device Online Advertisement sent from device under test at multicast address 239.255.255.250:3880. The value in 01-BootId field is b2.

—— Pass Verdict Condition

1) In step 3 of test procedure, the Device Online Advertisement message received by test device shall conform to definitions in Table 7 of ISO/IEC 14543-5-1;

2) If b1 is not max value, then b2 = b1+1, else b2 = 1

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6.1.2.6 Test case 5

—— Test Purpose

To validate device under test can send Device Offline Advertisement message to multicast address 239.255.255.250:3880 under normal offline operation.

—— Reference

9.1.2 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Online device under test goes offline normally.

—— Pass Verdict Condition

1) Test device can receive Device Offline Advertisement message from device under test at multicast address 239.255.255.250:3880;

2) The Device Offline Advertisement message received by test device shall conform to definitions in Table 8 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.2 Device pipe conformance test suite

6.2.1 Reference messages

Pipe Setup Request Based on Symmetric-Key Cryptosystem, refers to Table 9 of ISO/IEC 14543-5-1

Pipe Setup Response Based on Symmetric-Key Cryptosystem, refers to Table 10 of ISO/IEC 14543-5-1

Authentication Request Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem, refers to Table 17 of ISO/IEC 14543-5-1

Authentication Response Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem, refers to Table 18 of ISO/IEC 14543-5-1

Authentication Result Request Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem, refers to Table 19 of ISO/IEC 14543-5-1

Authentication Result Response Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem, refers to Table 20 of ISO/IEC 14543-5-1

Pipe Setup Request Based on Symmetric-Key Authentication, Encrypted Message Transmission and Authentication Mechanism, refers to Table 11 of ISO/IEC 14543-5-1

Pipe Setup Response Based on Symmetric-Key Authentication, Encrypted Message Transmission and Authentication Mechanism, refers to Table 12 of ISO/IEC 14543-5-1

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Authentication Request Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem, refers to Table 21 of ISO/IEC 14543-5-1

Authentication Response Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem, refers to Table 22 of ISO/IEC 14543-5-1

Authentication Result Request Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem, refers to Table 23 of ISO/IEC 14543-5-1

Authentication Result Response Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem, refers to Table 24 of ISO/IEC 14543-5-1

Pipe Setup Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem, refers to Table 13 of ISO/IEC 14543-5-1

Pipe Setup Response Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem, refers to Table 14 of ISO/IEC 14543-5-1

Authentication Request Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem, refers to Table 25 of ISO/IEC 14543-5-1

Authentication Response Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem, refers to Table 26 of ISO/IEC 14543-5-1

Authentication Result Request Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem, refers to Table 27 of ISO/IEC 14543-5-1

Authentication Result Response Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem, refers to Table 28 of ISO/IEC 14543-5-1

Pipe Setup Request Based on Trusted 3rd Party's Authentication, Encrypted Message Transmission and Authentication Mechanism, refers to Table 15 of ISO/IEC 14543-5-1

Pipe Setup Response Based on Trusted 3rd Party's Authentication, Encrypted Message Transmission and Authentication Mechanism, refers to Table 16 of ISO/IEC 14543-5-1

Authentication Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Trusted 3rd Party, refers to Table 29 of ISO/IEC 14543-5-1

Authentication Response Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Trusted 3rd Party, refers to Table 30 of ISO/IEC 14543-5-1

Authentication Result Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Trusted 3rd Party, refers to Table 31 of ISO/IEC 14543-5-1

Authentication Result Response Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Trusted 3rd Party, refers to Table 32 of ISO/IEC 14543-5-1

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Secure Device Pipe Setup Confirmation Request, refers to Table 33 of ISO/IEC 14543-5-1

Secure Device Pipe Setup Confirmation Response, refers to Table 34 of ISO/IEC 14543-5-1

Secure Device Pipe Teardown Notification Message, refers to Table 35 of ISO/IEC 14543-5-1

Device Online Detection Request Message, refers to Table 37 of ISO/IEC 14543-5-1

Device Online Detection Response Message, refers to Table 38 of ISO/IEC 14543-5-1

6.2.2 Unsecure device pipe conformance test suite

6.2.2.1 Pre-condition

Pre-condition 1: applicable to test case 1

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-ListenerList field is retrieved;

—— Test device sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-ListenerList field contains IP address to setup unsecure device pipe;

—— Both test device and device under test use IGRS: DeviceSecurity:NULL security mechanism.

Pre-condition 2: applicable to test case 2

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-ListenerList field is retrieved;

—— Test device sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-ListenerList field contains IP address to setup unsecure device pipe;

—— Both test device and device under test use IGRS: DeviceSecurity:NULL security mechanism;

—— Device under test is equipped with control interface that can be used to initiate unsecure device pipe setup with other devices.

Pre-condition 3: applicable to test case 3

—— Test device and device under test are located in the same LAN IP broadcast domain;

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—— IGRS protocol on the device under test is initiated and running normally;

—— Test device is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-ListenerList field is retrieved;

—— Test device sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-ListenerList field contains IP address to setup unsecure device pipe;

—— Both test device and device under test use IGRS: DeviceSecurity:NULL security mechanism;

—— Device under test is equipped with control interface that can be used to initiate unsecure device pipe teardown.

6.2.2.2 Test case 1

—— Test Purpose

To validate that device under test allows other devices to setup unsecure device pipe (TCP connection) with itself using 01-ListenerList field address retrieved from Device Online Advertisement.

—— Reference

9.2.1 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device uses 01-ListenerList field address retrieved from Device Online Advertisement sent by device under test to setup TCP connection

—— Pass Verdict Condition

Test device and device under test setup TCP connection successfully.

6.2.2.3 Test case 2

—— Test Purpose

To validate that device under test can setup unsecure device pipe (TCP connection) using 01-ListenerList field address retrieved from Device Online Advertisement sent by other devices.

—— Reference

9.2.1 of ISO/IEC 14543-5-1

—— Conformance Category

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Optional

—— Test Procedure

Test device listens on 01-ListenerList field address given by its own Device Online Advertisement. Device under test initiates unsecure device pipe setup with test device.

—— Pass Verdict Condition

Test device and device under test setup TCP connection successfully.

6.2.2.4 Test case 3

—— Test Purpose

To validate that device under test can teardown unsecure device pipe normally with other devices.

—— Reference

9.2.2 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Test device uses 01-ListenerList field address retrieved from Device Online Advertisement sent by device under test to setup TCP connection;

2) Device under test tears down TCP connection with test device.

—— Pass Verdict Condition

1) In step 1 of test procedure, test device and device under test setup TCP connection successfully;

2) In step 2 of test procedure, device under test tears down TCP connection with test device successfully;

6.2.3 Secure device pipe setup based on symmetric-key authentication and message authentication mechanism conformance test suite

6.2.3.1 Pre-condition:

Pre-condition 1: applicable to test case 1

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

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—— Test device is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-SecureListenerList field is retrieved;

—— Test device sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-SecureListenerList field contains IP address to setup secure device pipe;

—— Both test device and device under test use Device Security Mechanism Based on Symmetric-Key Authentication and Message Authentication Mechanism.

Pre-condition 2: applicable to test case 2 through test case 4

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-SecureListenerList field is retrieved;

—— Test device sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-SecureListenerList field contains IP address to setup secure device pipe;

—— Both test device and device under test use Device Security Mechanism Based on Symmetric-Key Authentication and Message Authentication Mechanism.

—— Test device setups secure device pipe with device under test, and completes pipe setup request/response message interaction process required by Device Security Mechanism Based on Symmetric-Key Authentication and Message Authentication Mechanism.

Pre-condition 3: applicable to test case 5 and test case 6

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-SecureListenerList field is retrieved;

—— Test device sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-SecureListenerList field contains IP address to setup secure device pipe;

—— Both test device and device under test use Device Security Mechanism Based on Symmetric-Key Authentication and Message Authentication Mechanism;

—— Device under test is equipped with control interface that can be used to initiate secure device pipe setup with other devices.

Pre-condition 4: applicable to test case 7 and test case 8

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—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-SecureListenerList field is retrieved;

—— Test device sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-SecureListenerList field contains IP address to setup secure device pipe;

—— Both test device and device under test use Device Security Mechanism Based on Symmetric-Key Authentication and Message Authentication Mechanism.

—— Device under test setups secure device pipe with test device, and completes pipe setup request/response message interaction process required by Device Security Mechanism Based on Symmetric-Key Authentication and Message Authentication Mechanism.

6.2.3.2 Test case 1

—— Test Purpose

To validate that when device under test receives Pipe Setup Request Based on Symmetric-Key Cryptosystem, it will return proper secure device pipe setup response.

—— Reference

9.2.3.1 and 9.2.3.1.1 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Test device uses the field: 01-SecureListenerList addresses retrieved from Device Online Advertisement sent by device under test to setup TCP connection;

2) Test device uses the existing TCP connection to send Pipe Setup Request Based on Symmetric-Key Cryptosystem to device under test. This message format conforms to the requirement definitions in Table 9 of ISO/IEC 14543-5-1. Test device is also listening to any response message on the TCP connection.

—— Pass Verdict Condition

1) In step 1 of test procedure, test device and device under test setup TCP connection successfully;

2) In step 2 of test procedure, test device receives Pipe Setup Response Based on Symmetric-Key Cryptosystem returned by device under test;

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3) In step 2 of test procedure, the pipe setup response received by test device shall conform to definitions in Table 10 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.2.3.3 Test case 2

—— Test Purpose

To validate that when device under test receives Authentication Request Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem (includes Challenge 1), it sends out the correct Authentication response (includes the correct response value to Challenge 1) within 30 s.

—— Reference

9.2.3.1 and 9.2.3.1.1 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Test device uses the existing TCP connection to send Authentication Request Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem to device under test. This message format conforms to the requirement definitions in Table 17 of ISO/IEC 14543-5-1 (includes a random number as Challenge 1). Test device is also listening to any response message on the TCP connection.

—— Pass Verdict Condition

1) After sending out an authentication request, test device receives an Authentication Response Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem from device under test within 30 s;

2) The response received by test device shall conform to definitions in Table 18 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

3) The response received by test device shall include the correct response value to Challenge 1.

6.2.3.4 Test case 3

—— Test Purpose

To validate when device under test receives Authentication Result Request Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem, and its response value matches the calculated result, it will send out the correct authentication result response to validate successful authentication (01-ReturnCode field value = 100 (success)).

—— Reference

9.2.3.1, 9.2.3.1.1 and Clause 11 of ISO/IEC 14543-5-1

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Request/Response Status Codes, see Table 85 and 86 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Test device uses the existing TCP connection to send Authentication Request Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem to device under test, and receives the correct authentication response from device under test;

2) Test device uses the existing TCP connection to send Authentication Result Request Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem to device under test. This message format conforms to the requirement definitions in Table 19 of ISO/IEC 14543-5-1 (includes the correct response value). Test device is also listening to any response message on the TCP connection.

—— Pass Verdict Condition

1) In step 2 of the test procedure, after sending out a request, test device receives an Authentication Result Response Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem from device under test within 30 s;

2) In step 2 of the test procedure, the response received by test device shall conform to definitions in Table 20 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

3) In step 2 of the test procedure, 01-ReturnCode field in the response received by test device shall be 100.

6.2.3.5 Test case 4

—— Test Purpose

To validate when device under test receives Authentication Result Request Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem, and its response value does not match the calculated result, it will send out the correct Secure Device Pipe Setup Confirmation Response within 30 s to indicate failure to setup secure device pipe (01-ReturnCode field value = 405 (device setup failed)).

—— Reference

9.2.3.1, 9.2.3.1.1 and Clause 11 of ISO/IEC 14543-5-1

Request/Response Status Codes, see Table 85 and 86 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

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1) Test device uses the existing TCP connection to send Authentication Request Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem to device under test, and receives the correct authentication response from device under test;

2) Test device uses the existing TCP connection to send Authentication Result Request Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem to device under test. This message format conforms to the requirement definitions in Table 19 of ISO/IEC 14543-5-1 (includes the wrong response value). Test device is also listening to any response message on the TCP connection.

—— Pass Verdict Condition

1) In step 2 of the test procedure, after sending out a request, test device receives a Secure Device Pipe Setup Confirmation Response from device under test within 30 s;

2) In step 2 of the test procedure, the response received by test device shall conform to definitions in Table 34 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

3) In step 2 of the test procedure, 01-ReturnCode field in the response received by test device shall be 405.

6.2.3.6 Test case 5

—— Test Purpose

To validate that device under test can setup TCP connection with other devices by using the 01-SecureListenerList field address in the Device Online Advertisement. When Device Security Mechanism Based on Symmetric-Key Authentication and Message Authentication Mechanism is selected, the device under test can send out the correct Pipe Setup Request Based on Symmetric-Key Cryptosystem.

—— Reference

9.2.3.1 and 9.2.3.1.1 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Device under test to initiate secure device pipe setup with test device; at the same time, test device is listening to the 01-SecureListenerList field address included in its own Device Online Advertisement, to setup TCP connection with device under test;

2) Test device is listening on the setup TCP connection with device under test.

—— Pass Verdict Condition

1) In step 1 of the test procedure, device under test and test device setup TCP connection successfully;

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2) In step 2 of the test procedure, test device receives Pipe Setup Request Based on Symmetric-Key Cryptosystem sent by device under test;

3) In step 2 of the test procedure, the pipe setup request received by test device shall conform to definitions in Table 9 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.2.3.7 Test case 6

—— Test Purpose

To validate that after device under test receives Pipe Setup Response Based on Symmetric-Key Cryptosystem, it can send out the correct Authentication Request Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem.

—— Reference

9.2.3.1 and 9.2.3.1.1 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Device under test to initiate secure device pipe setup with test device; at the same time, test device is listening to the 01-SecureListenerList field address included in its own Device Online Advertisement, to setup TCP connection with device under test;

2) After test device receives Pipe Setup Request Based on Symmetric-Key Cryptosystem, it will send out secure device pipe setup response to confirm security mechanism selected. This message format conforms to the requirement definitions in Table 10 of ISO/IEC 14543-5-1. At the same time, test device is listening on the setup TCP connection with device under test.

—— Pass Verdict Condition

1) In step 2 of the test procedure, test device receives Authentication Request Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem sent by device under test;

2) In step 2 of the test procedure, the request received by test device shall conform to the requirement definitions in Table 17 of ISO/IEC 14543-5-1.

6.2.3.8 Test case 7

—— Test Purpose

To validate when device under test receives Authentication Response Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem, and its response value matches the calculated result, it will send out the correct authentication result request (includes the correct response value).

—— Reference

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9.2.3.1 and 9.2.3.1.1 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

After test device receives Authentication Request Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem sent by device under test, it will send out the correct authentication response (includes the correct response value). This message format conforms to the requirement definitions in Table 18 of ISO/IEC 14543-5-1. At the same time, test device is listening on the setup TCP connection with device under test.

—— Pass Verdict Condition

1) Test device receives Authentication Result Request Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem sent from device under test;

2) The request message received by test device shall conform to the requirement definitions in Table 19 of ISO/IEC 14543-5-1.

6.2.3.9 Test case 8

—— Test Purpose

To validate when device under test receives Authentication Response Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem, and its response value does not match the calculated result, it will send out the correct Secure Device Pipe Setup Confirmation Response to indicate failure to setup secure device pipe (01-ReturnCode field value = 405 (device setup failed)).

—— Reference

9.2.3.1, 9.2.3.1.1 and Clause 11 of ISO/IEC 14543-5-1

Request/Response Status Codes, see Table 85 and 86 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

After test device receives Authentication Request Based on Identity Authentication and Message Authentication Mechanism of Symmetric-Key Cryptosystem sent by device under test, it will send out the authentication response with wrong response value. This message format conforms to the requirement definitions in Table 18 of ISO/IEC 14543-5-1. At the same time, test device is listening on the setup TCP connection with device under test.

—— Pass Verdict Condition

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1) Test device receives a Secure Device Pipe Setup Confirmation Response from device under test;

2) The response received by test device shall conform to definitions in Table 34 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification);

3) 01-ReturnCode field in the response received by test device shall be 405.

6.2.4 Secure device pipe setup based on symmetric-key authentication, encrypted message transmission and authentication mechanism conformance test suite

6.2.4.1 Pre-condition

Pre-condition 1: applicable to test case 1

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-SecureListenerList field is retrieved;

—— Test device sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-SecureListenerList field contains IP address to setup secure device pipe;

—— Both test device and device under test use Device Security Mechanism Based on Symmetric-Key Authentication, Encrypted Message Transmission and Authentication Mechanism.

Pre-condition 2: applicable to test case 2 through test case 4

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-SecureListenerList field is retrieved;

—— Test device sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-SecureListenerList field contains IP address to setup secure device pipe;

—— Both test device and device under test use Device Security Mechanism Based on Symmetric-Key Authentication, Encrypted Message Transmission and Authentication Mechanism.

—— Test device setups secure device pipe with device under test, and completes pipe setup request/response message interaction process required by Device Security Mechanism Based on Symmetric-Key Authentication, Encrypted Message Transmission and Authentication Mechanism.

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Pre-condition 3: applicable to test case 5 and test case 6

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-SecureListenerList field is retrieved;

—— Test device sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-SecureListenerList field contains IP address to setup secure device pipe;

—— Both test device and device under test use Device Security Mechanism Based on Symmetric-Key Authentication, Encrypted Message Transmission and Authentication Mechanism;

—— Device under test is equipped with control interface that can be used to initiate secure device pipe setup with other devices.

Pre-condition 4: applicable to test case 7 and test case 8

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-SecureListenerList field is retrieved;

—— Test device sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-SecureListenerList field contains IP address to setup secure device pipe;

—— Both test device and device under test use Device Security Mechanism Based on Symmetric-Key Authentication, Encrypted Message Transmission and Authentication Mechanism;

—— Device under test setups secure device pipe with test device, and completes pipe setup request/response message interaction process required by Device Security Mechanism Based on Symmetric-Key Authentication, Encrypted Message Transmission and Authentication Mechanism.

6.2.4.2 Test case 1

—— Test Purpose

To validate that when device under test receives Pipe Setup Request Based on Symmetric-Key Authentication, Encrypted Message Transmission and Authentication Mechanism, it will return proper secure device pipe setup response.

—— Reference

9.2.3.1 and 9.2.3.1.2 of ISO/IEC 14543-5-1

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—— Conformance Category

Optional

—— Test Procedure

1) Test device uses the field: 01-SecureListenerList addresses retrieved from Device Online Advertisement sent by device under test to setup TCP connection;

2) Test device uses the existing TCP connection to send Pipe Setup Request Based on Symmetric-Key Authentication, Encrypted Message Transmission and Authentication Mechanism to device under test. This message format conforms to the requirement definitions in Table 11 of ISO/IEC 14543-5-1. Test device is also listening to any response message on the TCP connection.

—— Pass Verdict Condition

1) In step 1 of test procedure, test device and device under test setup TCP connection successfully;

2) In step 2 of test procedure, test device receives Pipe Setup Response Based on Symmetric-Key Authentication, Encrypted Message Transmission and Authentication Mechanism returned by device under test;

3) In step 2 of test procedure, the pipe setup response received by test device shall conform to definitions in Table 12 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.2.4.3 Test case 2

—— Test Purpose

To validate that when device under test receives Authentication Request Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem (includes Challenge 1), it sends out the correct Authentication response (includes the correct response value to Challenge 1) within 30 s.

—— Reference

9.2.3.1 and 9.2.3.1.2 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Test device uses the existing TCP connection to send Authentication Request Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem to device under test. This message format conforms to the requirement definitions in Table 21 of ISO/IEC 14543-5-1 (includes a random number as Challenge 1). Test device is also listening to any response message on the TCP connection.

—— Pass Verdict Condition

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1) After sending out a authentication request, test device receives an Authentication Response Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem from device under test within 30 s;

2) The response received by test device shall conform to definitions in Table 22 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

3) The response received by test device shall include the correct response value to Challenge 1.

6.2.4.4 Test case 3

—— Test Purpose

To validate when device under test receives Authentication Result Request Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem, and its response value matches the calculated result, it will send out the correct authentication result response to validate successful authentication (01-ReturnCode field value = 100 (success)).

—— Reference

9.2.3.1, 9.2.3.1.2 and Clause 11 of ISO/IEC 14543-5-1

Request/Response Status Codes, see Table 85 and 86 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Test device uses the existing TCP connection to send Authentication Request Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem to device under test, and receives the correct authentication response from device under test;

2) Test device uses the existing TCP connection to send Authentication Result Request Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem to device under test. This message format conforms to the requirement definitions in Table 23 of ISO/IEC 14543-5-1 (includes the correct response value). Test device is also listening to any response message on the TCP connection.

—— Pass Verdict Condition

1) In step 2 of the test procedure, after sending out a request, test device receives an Authentication Result Response Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem from device under test within 30 s;

2) In step 2 of the test procedure, the response received by test device shall conform to definitions in Table 24 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

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3) In step 2 of the test procedure, 01-ReturnCode field in the response received by test device shall be 100.

6.2.4.5 Test case 4

—— Test Purpose

To validate when device under test receives Authentication Result Request Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem, and its response value does not match the calculated result, it will send out the correct Secure Device Pipe Setup Confirmation Response within 30 s to indicate failure to setup secure device pipe (01-ReturnCode field value = 405 (device setup failed)).

—— Reference

9.2.3.1, 9.2.3.1.2 and Clause 11 of ISO/IEC 14543-5-1

Request/Response Status Codes, see Table 85 and 86 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Test device uses the existing TCP connection to send Authentication Request Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem to device under test, and receives the correct authentication response from device under test;

2) Test device uses the existing TCP connection to send Authentication Result Request Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem to device under test. This message format conforms to the requirement definitions in Table 23 of ISO/IEC 14543-5-1 (includes the wrong response value). Test device is also listening to any response message on the TCP connection.

—— Pass Verdict Condition

1) In step 2 of the test procedure, after sending out a request, test device receives an Secure Device Pipe Setup Confirmation Response from device under test within 30 s;

2) In step 2 of the test procedure, the response received by test device shall conform to definitions in Table 34 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

3) In step 2 of the test procedure, 01-ReturnCode field in the response received by test device shall be 405.

6.2.4.6 Test case 5

—— Test Purpose

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To validate that device under test can setup TCP connection with other devices by using the 01-SecureListenerList field address in the Device Online Advertisement. When Device Security Mechanism Based on Symmetric-Key Authentication, Encrypted Message Transmission and Authentication Mechanism is selected, the device under test can send out the correct Pipe Setup Request Based on Symmetric-Key Authentication, Encrypted Message Transmission and Authentication Mechanism.

—— Reference

9.2.3.1 and 9.2.3.1.2 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Device under test to initiate secure device pipe setup with test device; at the same time, test device is listening to the 01-SecureListenerList field address included in its own Device Online Advertisement, to setup TCP connection with device under test;

2) Test device is listening on the setup TCP connection with device under test.

—— Pass Verdict Condition

1) In step 1 of the test procedure, device under test and test device setup TCP connection successfully;

2) In step 2 of the test procedure, test device receives Pipe Setup Request Based on Symmetric-Key Authentication, Encrypted Message Transmission and Authentication Mechanism sent by device under test;

3) In step 2 of the test procedure, the pipe setup request received by test device shall conform to definitions in Table 11 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.2.4.7 Test case 6

—— Test Purpose

To validate that after device under test receives Pipe Setup Response Based on Symmetric-Key Authentication, Encrypted Message Transmission and Authentication Mechanism (confirm security mechanism selection), it can send out the correct Authentication Request Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem.

—— Reference

9.2.3.1 and 9.2.3.1.2 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

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—— Test Procedure

1) Device under test to initiate secure device pipe setup with test device; at the same time, test device is listening to the 01-SecureListenerList field address included in its own Device Online Advertisement, to setup TCP connection with device under test;

2) After test device receives Pipe Setup Request Based on Symmetric-Key Authentication, Encrypted Message Transmission and Authentication Mechanism, it will send out secure device pipe setup response to confirm security mechanism selected. This message format conforms to the requirement definitions in Table 12 of ISO/IEC 14543-5-1. At the same time, test device is listening on the setup TCP connection with device under test.

—— Pass Verdict Condition

1) In step 2 of the test procedure, test device receives Authentication Request Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem sent by device under test;

2) In step 2 of the test procedure, the request received by test device shall conform to the requirement definitions in Table 21 of ISO/IEC 14543-5-1.

6.2.4.8 Test case 7

—— Test Purpose

To validate when device under test receives Authentication Response Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem, and its response value matches the calculated result, it will send out the correct authentication result request (includes the correct response value).

—— Reference

9.2.3.1 and 9.2.3.1.2 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

After test device receives Authentication Request Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem sent by device under test, it will send out the correct authentication response (includes the correct response value). This message format conforms to the requirement definitions in Table 22 of ISO/IEC 14543-5-1. At the same time, test device is listening on the setup TCP connection with device under test.

—— Pass Verdict Condition

1) Test device receives Authentication Result Request Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem sent from device under test;

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2) The request message received by test device shall conform to the requirement definitions in Table 23 of ISO/IEC 14543-5-1.

6.2.4.9 Test case 8

—— Test Purpose

To validate when device under test receives Authentication Response Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem, and its response value does not match the calculated result, it will send out the correct Secure Device Pipe Setup Confirmation Response to indicate failure to setup secure device pipe (01-ReturnCode field value = 405 (device setup failed)).

—— Reference

9.2.3.1, 9.2.3.1.2 and Clause 11 of ISO/IEC 14543-5-1

Request/Response Status Codes, see Table 85 and 86 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

After test device receives Authentication Request Based on Identity Authentication and Encrypted Message Transmission and Authentication Mechanism of Symmetric-Key Cryptosystem sent by device under test, it will send out the authentication response with wrong response value. This message format conforms to the requirement definitions in Table 22 of ISO/IEC 14543-5-1. At the same time, test device is listening on the setup TCP connection with device under test.

—— Pass Verdict Condition

1) Test device receives a Secure Device Pipe Setup Confirmation Response from device under test;

2) The response received by test device shall conform to definitions in Table 34 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification);

3) 01-ReturnCode field in the response received by test device shall be 405.

6.2.5 Secure device pipe setup based on authentication, encrypted message transmission and authentication mechanism of public-key cryptosystem conformance test suite

6.2.5.1 Pre-condition

Pre-condition 1: applicable to test case 1

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

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—— Test device is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-SecureListenerList field is retrieved;

—— Test device sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-SecureListenerList field contains IP address to setup secure device pipe;

—— Both test device and device under test use Authentication, Encrypted Message Transmission and Authentication Mechanism Based on Public-Key Cryptosystem.

Pre-condition 2: applicable to test case 2 through test case 4

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-SecureListenerList field is retrieved;

—— Test device sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-SecureListenerList field contains IP address to setup secure device pipe;

—— Both test device and device under test use Authentication, Encrypted Message Transmission and Authentication Mechanism Based on Public-Key Cryptosystem;

—— Test device setups secure device pipe with device under test, and completes pipe setup request/response message interaction process required by Authentication, Encrypted Message Transmission and Authentication Mechanism Based on Public-Key Cryptosystem.

Pre-condition 3: applicable to test case 5 and test case 6

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-SecureListenerList field is retrieved;

—— Test device sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-SecureListenerList field contains IP address to setup secure device pipe;

—— Both test device and device under test use Authentication, Encrypted Message Transmission and Authentication Mechanism Based on Public-Key Cryptosystem;

—— Device under test is equipped with control interface that can be used to initiate secure device pipe setup with other devices.

Pre-condition 4: applicable to test case 7 and test case 8

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—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-SecureListenerList field is retrieved;

—— Test device sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-SecureListenerList field contains IP address to setup secure device pipe;

—— Both test device and device under test use Authentication, Encrypted Message Transmission and Authentication Mechanism Based on Public-Key Cryptosystem;

—— Device under test setups secure device pipe with test device, and completes pipe setup request/response message interaction process required by Authentication, Encrypted Message Transmission and Authentication Mechanism Based on Public-Key Cryptosystem.

6.2.5.2 Test case 1

—— Test Purpose

To validate that when device under test receives Pipe Setup Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem, it will return proper secure device pipe setup response.

—— Reference

9.2.3.1 and 9.2.3.1.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Test device uses the field: 01-SecureListenerList addresses retrieved from Device Online Advertisement sent by device under test to setup TCP connection;

2) Test device uses the existing TCP connection to send Pipe Setup Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem to device under test. This message format conforms to the requirement definitions in Table 13 of ISO/IEC 14543-5-1. Test device is also listening to any response message on the TCP connection.

—— Pass Verdict Condition

1) In step 1 of test procedure, test device and device under test setup TCP connection successfully;

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2) In step 2 of test procedure, test device receives Pipe Setup Response Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem returned by device under test;

3) In step 2 of test procedure, the pipe setup response received by test device shall conform to definitions in Table 14 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.2.5.3 Test case 2

—— Test Purpose

To validate that when device under test receives Authentication Request Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem (includes Challenge 1), it sends out the correct Authentication response (includes the correct response value to Challenge 1) within 30 s.

—— Reference

9.2.3.1 and 9.2.3.1.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Test device uses the existing TCP connection to send Authentication Request Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem to device under test. This message format conforms to the requirement definitions in Table 25 of ISO/IEC 14543-5-1 (includes a random number as Challenge 1). Test device is also listening to any response message on the TCP connection.

—— Pass Verdict Condition

1) After sending out a authentication request, test device receives an Authentication Response Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem from device under test within 30 s;

2) The response received by test device shall conform to definitions in Table 26 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

3) The response received by test device shall include the correct response value to Challenge 1.

6.2.5.4 Test case 3

—— Test Purpose

To validate when device under test receives Authentication Result Request Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem, and its response value matches the calculated result, it will send out the correct authentication result response within 30 s to validate successful authentication (01-ReturnCode field value = 100 (success)).

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—— Reference

9.2.3.1, 9.2.3.1.3 and Clause 11 of ISO/IEC 14543-5-1

Request/Response Status Codes, see Table 85 and 86 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Test device uses the existing TCP connection to send Authentication Request Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem to device under test, and receives the correct authentication response from device under test;

2) Test device uses the existing TCP connection to send Authentication Result Request Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem to device under test. This message format conforms to the requirement definitions in Table 27 of ISO/IEC 14543-5-1 (includes the correct response value). Test device is also listening to any response message on the TCP connection.

—— Pass Verdict Condition

1) In step 2 of the test procedure, after sending out a request, test device receives an Authentication Result Response Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem from device under test within 30 s;

2) In step 2 of the test procedure, the response received by test device shall conform to definitions in Table 28 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification);

3) In step 2 of the test procedure, 01-ReturnCode field in the response received by test device shall be 100.

6.2.5.5 Test case 4

—— Test Purpose

To validate when device under test receives Authentication Result Request Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem, and its response value does not match the calculated result, it will send out the correct Secure Device Pipe Setup Confirmation Response within 30 s to indicate failure to setup secure device pipe (01-ReturnCode field value = 405 (device setup failed)).

—— Reference

9.2.3.1, 9.2.3.1.3 and Clause 11 of ISO/IEC 14543-5-1

Request/Response Status Codes, see Table 85 and 86 of ISO/IEC 14543-5-1

—— Conformance Category

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Optional

—— Test Procedure

1) Test device uses the existing TCP connection to send Authentication Request Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem to device under test, and receives the correct authentication response from device under test;

2) Test device uses the existing TCP connection to send Authentication Result Request Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem to device under test. This message format conforms to the requirement definitions in Table 27 of ISO/IEC 14543-5-1 (includes the wrong response value). Test device is also listening to any response message on the TCP connection.

—— Pass Verdict Condition

1) In step 2 of the test procedure, after sending out a request, test device receives a Secure Device Pipe Setup Confirmation Response from device under test within 30 s;

2) In step 2 of the test procedure, the response received by test device shall conform to definitions in Table 34 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

3) In step 2 of the test procedure, 01-ReturnCode field in the response received by test device shall be 405.

6.2.5.6 Test case 5

—— Test Purpose

To validate that device under test can setup TCP connection with other devices by using the 01-SecureListenerList field address in the Device Online Advertisement. When Security Mechanism between Devices is Authentication, Encrypted Message Transmission and Authentication Mechanism Based on Public-Key Cryptosystem, the device under test can send out the correct Pipe Setup Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem.

—— Reference

9.2.3.1 and 9.2.3.1.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Device under test to initiate secure device pipe setup with test device; at the same time, test device is listening to the 01-SecureListenerList field address included in its own Device Online Advertisement, to setup TCP connection with device under test;

2) Test device is listening on the setup TCP connection with device under test.

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—— Pass Verdict Condition

1) In step 1 of the test procedure, device under test and test device setup TCP connection successfully;

2) In step 2 of the test procedure, test device receives Pipe Setup Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem sent by device under test;

3) In step 2 of the test procedure, the pipe setup request received by test device shall conform to definitions in Table 13 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.2.5.7 Test case 6

—— Test Purpose

To validate that after device under test receives Pipe Setup Response Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem (confirm security mechanism selection), it can send out the correct Authentication Request Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem.

—— Reference

9.2.3.1 and 9.2.3.1.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Device under test to initiate secure device pipe setup with test device; at the same time, test device is listening to the 01-SecureListenerList field address included in its own Device Online Advertisement, to setup TCP connection with device under test;

2) After test device receives Pipe Setup Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem, it will send out secure device pipe setup response to confirm security mechanism selected. This message format conforms to the requirement definitions in Table 14 of ISO/IEC 14543-5-1. At the same time, test device is listening on the setup TCP connection with device under test.

—— Pass Verdict Condition

1) In step 2 of the test procedure, test device receives Authentication Request Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem sent by device under test;

2) In step 2 of the test procedure, the request received by test device shall conform to the requirement definitions in Table 25 of ISO/IEC 14543-5-1.

6.2.5.8 Test case 7

—— Test Purpose

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To validate when device under test receives Authentication Response Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem, and its response value matches the calculated result, it will send out the correct authentication result request (includes the correct response value).

—— Reference

9.2.3.1 and 9.2.3.1.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

After test device receives Authentication Request Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem sent by device under test, it will send out the correct authentication response (includes the correct response value). This message format conforms to the requirement definitions in Table 26 of ISO/IEC 14543-5-1. At the same time, test device is listening on the setup TCP connection with device under test.

—— Pass Verdict Condition

1) Test device receives Authentication Result Request Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem sent from device under test;

2) The request message received by test device shall conform to the requirement definitions in Table 27 of ISO/IEC 14543-5-1.

6.2.5.9 Test case 8

—— Test Purpose

To validate when device under test receives Authentication Response Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem, and its response value does not match the calculated result, it will send out the correct Secure Device Pipe Setup Confirmation Response to indicate failure to setup secure device pipe (01-ReturnCode field value = 405 (device setup failed)).

—— Reference

9.2.3.1, 9.2.3.1.3 and Clause 11 of ISO/IEC 14543-5-1

Request/Response Status Codes, see Table 85 and 86 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

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After test device receives Authentication Request Based on Authentication and Encrypted Message Transmission and Authentication Mechanism of Public-Key Cryptosystem sent by device under test, it will send out the authentication response with wrong response value. This message format conforms to the requirement definitions in Table 26 of ISO/IEC 14543-5-1. At the same time, test device is listening on the setup TCP connection with device under test.

—— Pass Verdict Condition

1) Test device receives a Secure Device Pipe Setup Confirmation Response from device under test;

2) The response received by test device shall conform to definitions in Table 34 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification);

3) 01-ReturnCode field in the response received by test device shall be 405.

6.2.6 Secure device pipe setup based on trusted 3rd party's authentication, encrypted message transmission and authentication mechanism conformance test suite

6.2.6.1 Pre-condition

Pre-condition 1: applicable to test case 1 and test case 6

—— Test device A, test device B and device under test are located in the same LAN IP broadcast domain. Test device B provides security identity authentication service for both test device A and device under test;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device A is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-SecureListenerList field is retrieved;

—— Test device A sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-SecureListenerList field contains IP address to setup secure device pipe;

—— Both test device A and device under test use Device Security Mechanism Based on Trusted 3rd Party's Authentication, Encrypted Message Transmission and Authentication Mechanism;

—— Device under test is equipped with control interface that can be used to initiate secure device pipe setup with other devices.

Pre-condition 2: applicable to test case 2

—— Test device A, test device B and device under test are located in the same LAN IP broadcast domain. Test device B provides security identity authentication service for both test device A and device under test;

—— IGRS protocol on the device under test is initiated and running normally;

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—— Test device A is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-SecureListenerList field is retrieved;

—— Test device A sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-SecureListenerList field contains IP address to setup secure device pipe;

—— Both test device A and device under test use Device Security Mechanism Based on Trusted 3rd Party's Authentication, Encrypted Message Transmission and Authentication Mechanism.

Pre-condition 3: applicable to test case 3

—— Test device A, test device B and device under test are located in the same LAN IP broadcast domain. Device under test provides security identity authentication service for both test device A and test device B;

—— IGRS protocol on the device under test is initiated and running normally.

Pre-condition 4: applicable to test case 4 and test case 5

—— Test device A, test device B and device under test are located in the same LAN IP broadcast domain. Test device B provides security identity authentication service for both test device A and device under test;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device A is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-SecureListenerList field is retrieved;

—— Test device A sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-SecureListenerList field contains IP address to setup secure device pipe;

—— Both test device A and device under test use Device Security Mechanism Based on Trusted 3rd Party's Authentication, Encrypted Message Transmission and Authentication Mechanism;

—— Test device A setups secure device pipe with device under test, and completes pipe setup request/response message interaction process required by Device Security Mechanism Based on Trusted 3rd Party's Authentication, Encrypted Message Transmission and Authentication Mechanism.

Pre-condition 5: applicable to test case 7

—— Test device A, test device B and device under test are located in the same LAN IP broadcast domain. Test device B provides security identity authentication service for both test device A and device under test;

—— IGRS protocol on the device under test is initiated and running normally;

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—— Test device A is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-SecureListenerList field is retrieved;

—— Test device A sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-SecureListenerList field contains IP address to setup secure device pipe;

—— Both test device A and device under test use Device Security Mechanism Based on Trusted 3rd Party's Authentication, Encrypted Message Transmission and Authentication Mechanism;

—— Device under test setups secure device pipe with test device A, and completes pipe setup request/response message interaction process required by Device Security Mechanism Based on Trusted 3rd Party's Authentication, Encrypted Message Transmission and Authentication Mechanism.

6.2.6.2 Test case 1

—— Test Purpose

To validate the correctness of Pipe Setup Request Based on Trusted 3rd Party's Authentication, Encrypted Message Transmission and Authentication Mechanism sent by device under test.

—— Reference

9.2.3.1 and 9.2.3.1.4 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Device under test to initiate secure device pipe setup with test device A; at the same time, test device A is listening to the 01-SecureListenerList field address included in its own Device Online Advertisement, to setup TCP connection with device under test;

2) Test device A is listening to any request message on the TCP connection

—— Pass Verdict Condition

1) In step 1 of test procedure, test device A and device under test setup TCP connection successfully;

2) In step 2 of test procedure, test device A receives Pipe Setup Request Based on Trusted 3rd Party's Authentication, Encrypted Message Transmission and Authentication Mechanism sent by device under test;

3) In step 2 of test procedure, the pipe setup request received by test device A shall conform to definitions in Table 15 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

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6.2.6.3 Test case 2

—— Test Purpose

To validate that when device under test receives Pipe Setup Request Based on Trusted 3rd Party's Authentication, Encrypted Message Transmission and Authentication Mechanism, it will return proper secure device pipe setup response.

—— Reference

9.2.3.1 and 9.2.3.1.4 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Test device A uses the field: 01-SecureListenerList addresses retrieved from Device Online Advertisement sent by device under test to setup TCP connection;

2) Test device A uses the existing TCP connection to send Pipe Setup Request Based on Trusted 3rd Party's Authentication, Encrypted Message Transmission and Authentication Mechanism to device under test. This message format conforms to the requirement definitions in Table 15 of ISO/IEC 14543-5-1. Test device A is also listening to any response message on the TCP connection

—— Pass Verdict Condition

1) In step 1 of test procedure, test device A and device under test setup TCP connection successfully;

2) In step 2 of test procedure, test device A receives Pipe Setup Response Based on Trusted 3rd Party's Authentication, Encrypted Message Transmission and Authentication Mechanism sent by device under test;

3) In step 2 of test procedure, the pipe setup response received by test device A shall conform to definitions in Table 16 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.2.6.4 Test case 3

—— Test Purpose

To validate that when device under test (as security identity service provider) receives Authentication Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Trusted 3rd Party, it will return proper authentication response within 30 s.

—— Reference

9.2.3.1 and 9.2.3.1.4 of ISO/IEC 14543-5-1

—— Conformance Category

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Optional

—— Test Procedure

Test device A uses the existing TCP connection to send Authentication Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Trusted 3rd Party to device under test. This message format conforms to the requirement definitions in Table 29 of ISO/IEC 14543-5-1. Test device A is also listening to any response message on the TCP connection.

—— Pass Verdict Condition

1) After sending out a authentication request, test device A receives an Authentication Response Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Trusted 3rd Party from device under test within 30 s;

2) The response received by test device A shall conform to definitions in Table 30 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.2.6.5 Test case 4

—— Test Purpose

To validate when device under test receives Authentication Result Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Trusted 3rd Party, and its content authentication passes, it will send out the correct authentication result response within 30 s to validate successful authentication (01-ReturnCode field value = 100 (success)).

—— Reference

9.2.3.1, 9.2.3.1.4 and Clause 11 of ISO/IEC 14543-5-1

Request/Response Status Codes, see Table 85 and 86 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Test device A sends Authentication Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Trusted 3rd Party through test device B to the device under test, and receives the correct authentication response from device under test through test device B;

2) Test device A uses the existing TCP connection to send Authentication Result Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Trusted 3rd Party to device under test. This message format conforms to the requirement definitions in Table 31 of ISO/IEC 14543-5-1 (includes the correct authentication in the response message from test device B in step 1). Test device A is also listening to any response message on the TCP connection.

—— Pass Verdict Condition

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1) In step 2 of the test procedure, after sending out a request, test device A receives an Authentication Result Response Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Trusted 3rd Party from device under test within 30 s;

2) In step 2 of the test procedure, the response received by test device A shall conform to definitions in Table 32 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification);

3) In step 2 of the test procedure, 01-ReturnCode field in the response received by test device A shall be 100.

6.2.6.6 Test case 5

—— Test Purpose

To validate when device under test receives Authentication Result Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Trusted 3rd Party, and its content authentication fails, it will send out the correct Secure Device Pipe Setup Confirmation Response within 30 s to indicate failure to setup secure device pipe (01-ReturnCode field value = 405 (device setup failed)).

—— Reference

9.2.3.1, 9.2.3.1.4 and Clause 11 of ISO/IEC 14543-5-1

Request/Response Status Codes, see Table 85 and 86 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Test device A sends Authentication Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Trusted 3rd Party through test device B to the device under test, and receives the correct authentication response from device under test through test device B;

2) Test device A uses the existing TCP connection to send Authentication Result Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Trusted 3rd Party to device under test. This message format conforms to the requirement definitions in Table 31 of ISO/IEC 14543-5-1 (includes the wrong authentication). Test device A is also listening to any response message on the TCP connection.

—— Pass Verdict Condition

1) In step 2 of the test procedure, after sending out a request, test device A receives an Secure Device Pipe Setup Confirmation Response from device under test within 30 s;

2) In step 2 of the test procedure, the response received by test device A shall conform to definitions in Table 34 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

3) In step 2 of the test procedure, 01-ReturnCode field in the response received by test device A shall be 405.

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6.2.6.7 Test case 6

—— Test Purpose

To validate that after device under test receives Pipe Setup Response Based on Trusted 3rd Party's Authentication, Encrypted Message Transmission and Authentication Mechanism (confirm security mechanism selection), it can send out the correct Authentication Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Trusted 3rd Party to security identity service provider.

—— Reference

9.2.3.1 and 9.2.3.1.4 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Device under test to initiate secure device pipe setup with test device A; at the same time, test device A is listening to the 01-SecureListenerList field address included in its own Device Online Advertisement, to setup TCP connection with device under test;

2) After test device A receives Pipe Setup Request Based on Trusted 3rd Party's Authentication, Encrypted Message Transmission and Authentication Mechanism, it will send out secure device pipe setup response to confirm security mechanism selected. This message format conforms to the requirement definitions in Table 16 of ISO/IEC 14543-5-1. At the same time, test device B is listening on the setup TCP connection with device under test.

—— Pass Verdict Condition

1) In step 2 of the test procedure, test device B receives Authentication Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Trusted 3rd Party sent by device under test;

2) In step 2 of the test procedure, the request received by test device B shall conform to the requirement definitions in Table 29 of ISO/IEC 14543-5-1.

6.2.6.8 Test case 7

—— Test Purpose

To validate when device under test receives Authentication Response Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Trusted 3rd Party, it will send out the correct Authentication Result Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Trusted 3rd Party.

—— Reference

9.2.3.1 and 9.2.3.1.4 of ISO/IEC 14543-5-1

—— Conformance Category

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Optional

—— Test Procedure

After test device B receives Authentication Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Trusted 3rd Party sent by device under test, it will send out the correct authentication response. This message format conforms to the requirement definitions in Table 30 of ISO/IEC 14543-5-1. At the same time, test device A is listening on the setup TCP connection with device under test.

—— Pass Verdict Condition

1) Test device A receives Authentication Result Request Based on Authentication, Encrypted Message Transmission and Authentication Mechanism of Trusted 3rd Party sent from device under test;

2) The request message received by test device A shall conform to the requirement definitions in Table 31 of ISO/IEC 14543-5-1.

6.2.7 Secure device pipe setup confirmation conformance test suite

6.2.7.1 Pre-condition

Pre-condition 1: applicable to test case 1

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-SecureListenerList field is retrieved;

—— Test device sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-SecureListenerList field contains IP address to setup secure device pipe;

—— Test device connects to device under test using 01-SecureListenerList field address retrieved from Device Online Advertisement sent by device under test to setup TCP connection.

Pre-condition 2: applicable to test case 2

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test. 01-SecureListenerList field is retrieved;

—— Test device sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880. The 01-SecureListenerList field contains IP address to setup secure device pipe;

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—— Device under test connects to test device using 01-SecureListenerList field address retrieved from Device Online Advertisement sent by test device to setup TCP connection.

6.2.7.2 Test case 1

—— Test Purpose

To validate that, in the case of device under test initiates the setup of secure device pipe, when device under test receives the response message which indicates initialization and identity authentication phases have been completely properly, it sends to test device the correct Secure Device Pipe Setup Confirmation Request.

—— Reference

9.2.3.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Test device and device under test complete secure device pipe setup initiation, security identity authentication and secure device pipe key negotiation between them normally;

2) Test device is listening on the TCP connection setup with the device under test.

—— Pass Verdict Condition

1) After the first two phases of device pipe setup are completed, test device receives Secure Device Pipe Setup Confirmation Request from device under test;

2) The request received by test device shall conform to definitions in Table 33 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification);

3) 01-CreatePipeResult field in the request received by test device shall be OK(success).

6.2.7.3 Test case 2

—— Test Purpose

To validate when device under test receives Secure Device Pipe Setup Confirmation Request from test device, it sends out the proper Secure Device Pipe Setup Confirmation Response.

—— Reference

9.2.3.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

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—— Test Procedure

1) Test device and device under test complete secure device pipe setup initiation, security identity authentication and secure device pipe key negotiation between them normally;

2) Test device sends Secure Device Pipe Setup Confirmation Request to device under test. This message format conforms to the requirement definitions in Table 33 of ISO/IEC 14543-5-1. At the same time, test device is listening on the TCP connection setup with device under test.

3) Test device is listening on the TCP connection setup with the device under test.

—— Pass Verdict Condition

1) In step 2 of the test procedure, after test device sends out Secure Device Pipe Setup Confirmation Request, it receives Secure Device Pipe Setup Confirmation Response sent by device under test;

2) In step 2 of the test procedure, the response received by test device shall conform to definitions in Table 34 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.2.8 Secure device pipe teardown conformance test suite

6.2.8.1 Pre-condition

Pre-condition 1: applicable to test case 1

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device has setup a secure device pipe with device under test;

—— Device under test is equipped with control interface that can be used to teardown secure device pipe with other devices.

6.2.8.2 Test case 1

—— Test Purpose

To validate when device under test is tearing down secure device pipe, it can send out the proper Secure Device Pipe Teardown Notification Message.

—— Reference

9.2.4 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

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Device under test to initiate secure device pipe setup tear down with test device; at the same time, test device is listening on the secure device pipe setup with the device under test.

—— Pass Verdict Condition

1) Test device receives Secure Device Pipe Teardown Notification Message sent from device under test;

2) The notification message received by test device shall conform to definitions in Table 35 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.2.9 Device online detection conformance test suite

6.2.9.1 Pre-condition

Pre-condition 1: applicable to test case 1 and test case 2

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test;

—— Test device sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880;

—— Test device sets up unsecure device pipe with device under test

Pre-condition 2: applicable to test case 3

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device is listening on multicast port 239.255.255.250:3880 to receive Device Online Advertisement sent by device under test;

—— Test device sends Device Online Advertisement periodically to multicast address 239.255.255.250:3880;

—— Test device sets up unsecure device pipe with device under test;

—— Device under test is equipped with control interface that can be used to send out Device Online Detection Request Message.

6.2.9.2 Test case 1

—— Test Purpose

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To validate when device under test receives Device Online Detection Request Message, and 01-TargetDeviceId field in that request message matches device id of the device under test, it returns proper Device Online Detection Response Message within 30 s.

—— Reference

9.2.6 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends Device Online Detection Request Message to device under test through device pipe setup. This message format conforms to the requirement definitions in Table 37 of ISO/IEC 14543-5-1. In addition, 01-TargetDeviceId field value is configured to be the same as the NT field in the Device Online Advertisement sent by device under test. At the same time, test device is also listening on the device pipe between two devices for 30 s.

—— Pass Verdict Condition

1) Within 30 s after test device sends out the request message, it shall receive Device Online Detection Response Message sent by device under test on the device pipe;

2) The response message received by test device shall conform to definitions in Table 38 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

3) The response message received by test device shall satisfy:

- SourceDeviceId field in the response message shall match 01-TargetDeviceId field in the request message;
- 01-TargetDeviceId field in the response message shall match 01-SourceDeviceId field in the request message;
- 01-AcknowledgeId field in the response message shall match 01-SequenceId field in the request message.

6.2.9.3 Test case 2

—— Test Purpose

To validate when device under test receives Device Online Detection Request Message, but 01-TargetDeviceId field in that request message does not match device id of the device under test, it does not return Device Online Detection Response Message.

—— Reference

9.2.6 of ISO/IEC 14543-5-1

—— Conformance Category

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Mandatory

—— Test Procedure

Test device sends Device Online Detection Request Message to device under test through device pipe setup. This message format conforms to the requirement definitions in Table 37 of ISO/IEC 14543-5-1. In addition, 01-TargetDeviceId field value is configured to be different from the NT field in the Device Online Advertisement sent by device under test. At the same time, test device is also listening on the device pipe between two devices for 30 s.

—— Pass Verdict Condition

After test device sends out the request message, it shall not receive Device Online Detection Response Message sent by device under test.

6.2.9.4 Test case 3

—— Test Purpose

To validate that, after device under test sets up device pipe, and needs to detect whether the other device is online, it can send out proper Device Online Detection Request Message.

—— Reference

9.2.6 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Device under test to initiate a Device Online Detection Request Message through device pipe setup to test device; at the same time, test device is listening on the device pipe setup with the device under test.

—— Pass Verdict Condition

1) Test device receives Device Online Detection Request Message sent by device under test;

2) The request message received by test device shall conform to definitions in Table 37 of ISO/IEC 14543-5-1.

6.3 Device description document retrieval conformance test suite

6.3.1 Reference messages

Device Description Document Retrieval Request Message, refers to Table 39 of ISO/IEC 14543-5-1.

Device Description Document Retrieval Response Message, refers to Table 40 of ISO/IEC 14543-5-1.

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6.3.2 Test case suite

6.3.2.1 Pre-condition

Pre-condition 1: applicable to test case 1 through test case 4

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device sets up device pipe with device under test;

—— Detailed device description document is stored on the device under test.

Pre-condition 2: applicable to test case 5

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device sets up device pipe with device under test;

—— Device under test is equipped with control interface that can be used to access detailed device description documents of other devices.

6.3.2.2 Test case 1

—— Test Purpose

To validate when device under test receives Device Description Document Retrieval Request Message, it can send out the proper Device Description Document Retrieval Response Message within 30 s.

—— Reference

9.3.2 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends Device Description Document Retrieval Request Message to device under test. This message format conforms to the requirement definitions in Table 39 of ISO/IEC 14543-5-1. At the same time, test device is listening to any messages sent by device under test for 30 s.

—— Pass Verdict Condition

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1) After test device sends out Device Description Document Retrieval Request Message, it shall receive Device Description Document Retrieval Response Message from device under test within 30 s ;

2) The response message received by test device shall conform to definitions in Table 40 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification);

3) The response message received by test device shall satisfy:

- 01-AcknowledgeId field in the response message shall match 01-SequenceId field in the request message;
- <AcknowledgeId> field value in the response message body shall match <SequenceId> field value in the request message body;
- 01-SourceDeviceId field in the response message shall match 01-TargetDeviceId field in the request message;
- 01-TargetDeviceId field in the response message shall match 01-SourceDeviceId field in the request message;
- <ClientId> field value in the response message body shall match <ClientId> field value in the request message body.

6.3.2.3 Test case 2

—— Test Purpose

To validate when device under test receives Device Description Document Retrieval Request Message and it retrieves the proper Device Description Document, the <ReturnCode> field value in the response message body is 100 (success).

—— Reference

9.3.2 and Clause 11 of ISO/IEC 14543-5-1

Request/Response Status Codes, see Table 85 and 86 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends Device Description Document Retrieval Request Message to device under test. This message format conforms to the requirement definitions in Table 39 of ISO/IEC 14543-5-1. At the same time, test device is listening to any messages sent by device under test for 30 s.

—— Pass Verdict Condition

1) After test device sends out Device Description Document Retrieval Request Message, it shall receive Device Description Document Retrieval Response Message from device under test within 30 s;

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2) The response message received by test device shall conform to definitions in Table 40 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification);

3) <ReturnCode> field in the response message body received by test device shall be 100.

6.3.2.4 Test case 3

—— Test Purpose

To validate when device under test receives Device Description Document Retrieval Request Message and it cannot retrieve the proper Device Description Document, the <ReturnCode> field value in the response message body is 204 (device detailed description information access failed, device detailed description information does not exist or is blank).

—— Reference

9.3.2 and Clause 11 of ISO/IEC 14543-5-1

Request/Response Status Codes, see Table 85 and 86 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

1) Delete the detailed device description document stored in device under test;

2) Test device sends Device Description Document Retrieval Request Message to device under test. This message format conforms to the requirement definitions in Table 39 of ISO/IEC 14543-5-1. At the same time, test device is listening to any messages sent by device under test for 30 s.

—— Pass Verdict Condition

1) In step 2 of the test procedure, after test device sends out Device Description Document Retrieval Request Message, it shall receive Device Description Document Retrieval Response Message from device under test within 30 s ;

2) In step 2 of the test procedure, the response message received by test device shall conform to definitions in Table 40 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification);

3) In step 2 of the test procedure, <ReturnCode> field in the response message body received by test device shall be 204.

6.3.2.5 Test case 4

—— Test Purpose

To validate when device under test receives Device Description Document Retrieval Request Message and it retrieves the proper Device Description Document, the transmitted response message body contains the proper detailed device description document.

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—— Reference

9.3.2 and Clause 11 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends Device Description Document Retrieval Request Message to device under test. This message format conforms to the requirement definitions in Table 39 of ISO/IEC 14543-5-1. At the same time, test device is listening to any messages sent by device under test for 30 s.

—— Pass Verdict Condition

1) After test device sends out Device Description Document Retrieval Request Message, it shall receive Device Description Document Retrieval Response Message from device under test within 30 s;

2) The response message received by test device shall conform to definitions in Table 40 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification);

3) The device description document in the response message body received by test device shall match the device description document stored in the device.

6.3.2.6 Test case 5

—— Test Purpose

To validate when device under test needs to access detailed device description documents of other devices, it can send out the proper Device Description Document Retrieval Request Message.

—— Reference

9.3.1 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Device under test to initiate a request to access detailed device description document of test device. At the same time, test device is listening on the device pipe setup with device under test.

—— Pass Verdict Condition

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1) Test device shall receive Device Description Document Retrieval Request Message from device under test;

2) The request message received by test device shall conform to definitions in Table 39 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.4 Device group setup conformance test suite

6.4.1 Reference messages

Device Group Advertisement Message of Specified Peer-to-Peer Device Group, refers to Table 41 of ISO/IEC 14543-5-1.

Device Leaves a Specified Peer-to-peer Device Group Quit Group Message, refers to Table 42 of ISO/IEC 14543-5-1.

Device Group Advertisement Message of Master-Slave Device Group, refers to Table 43 of ISO/IEC 14543-5-1.

Request Message to Join a Master-Slave Device Group, refers to Table 44 of ISO/IEC 14543-5-1.

Response Message to Join a Master-Slave Device Group, refers to Table 45 of ISO/IEC 14543-5-1.

Device Group Dissolve Notification Message Sent by Master Device, refers to Table 46 of ISO/IEC 14543-5-1

Withdraw Notification Message Sent by Slave Device, refers to Table 47 of ISO/IEC 14543-5-1.

6.4.2 Test case suite

6.4.2.1 Pre-Condition

Pre-condition 1: applicable to test case 1

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device is listening on multicast port 239.255.255.250:3880;

—— Device under test is equipped with control interface that can be used to setup Specified Peer-to-Peer Device Group.

Pre-condition 2: applicable to test case 2

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

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—— Test device sets up Specified Peer-to-Peer Device Group, and sends Specified Peer-to-Peer Device Group advertisement periodically to multicast address 239.255.255.250:3880;

—— Test device is listening on multicast port 239.255.255.250:3880;

—— Device under test is equipped with control interface that can be used to join Specified Peer-to-Peer Device Group.

Pre-condition 3: applicable to test case 3

—— Test device A, test device B and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device A sets up Specified Peer-to-Peer Device Group. Test device B and device under test join this Specified Peer-to-Peer Device Group;

—— Test device A is listening on multicast port 239.255.255.250:3880.

Pre-condition 4: applicable to test case 4

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device sets up Specified Peer-to-Peer Device Group and device under test join this Specified Peer-to-Peer Device Group;

—— Test device is listening on multicast port 239.255.255.250:3880;

—— Device under test is equipped with control interface that can be used to leave Specified Peer-to-Peer Device Group.

Pre-condition 5: applicable to test case 5

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device is listening on multicast port 239.255.255.250:3880;

—— Device under test is equipped with control interface that can be used to setup Master-Slave Device Group.

Pre-condition 6: applicable to test case 6

—— Test device and device under test are located in the same LAN IP broadcast domain;

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1946 —— IGRS protocol on the device under test is initiated and running normally;

1947 —— Device under test sets up Master-Slave Device Group as the Master device;

1948 —— Test device sets up device pipe with device under test.

1949 Pre-condition 7: applicable to test case 7

1950 —— Test device and device under test are located in the same LAN IP broadcast domain;

1951 —— IGRS protocol on the device under test is initiated and running normally;

1952 —— Device under test sets up Master-Slave Device Group as the Master device;

1953 —— Test device sets up device pipe with device under test;

1954 —— Test device is listening on multicast port 239.255.255.250:3880;

1955 —— Device under test is equipped with control interface that can be used to dissolve
1956 Master-Slave Device Group.

1957 Pre-condition 8: applicable to test case 8

1958 —— Test device and device under test are located in the same LAN IP broadcast domain;

1959 —— IGRS protocol on the device under test is initiated and running normally;

1960 —— Test device sets up Master-Slave Device Group as the Master device, and sends out
1961 Master-Slave Device Group advertisement periodically;

1962 —— Test device sets up device pipe with device under test;

1963 —— Device under test is equipped with control interface that can be used to join Master-
1964 Slave Device Group.

1965 Pre-condition 9: applicable to test case 9

1966 —— Test device and device under test are located in the same LAN IP broadcast domain;

1967 —— IGRS protocol on the device under test is initiated and running normally;

1968 —— Test device sets up Master-Slave Device Group as the Master device, and sends out
1969 Master-Slave Device Group advertisement periodically;

1970 —— Device under test joins this Master-Slave device group as a Slave device;

1971 —— Test device sets up device pipe with device under test;

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—— Device under test is equipped with control interface that can be used to leave Master-Slave Device Group.

6.4.2.2 Test case 1

—— Test Purpose

To validate when device under test sets up Specified Peer-to-Peer Device Group, it can send out the proper Device Online Advertisement (includes its Specified Peer-to-Peer Device Group ID) and the Specified Peer-to-Peer Device Group advertisement.

—— Reference

9.5.2.1 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Device under test initiates a Specified Peer-to-Peer Device Group setup.

—— Pass Verdict Condition

1) Test device shall receive Device Online Advertisement Message from device under test at multicast address port. This message received by test device shall conform to definitions in Table 7 of ISO/IEC 14543-5-1;

2) Test device shall receive Device Group Advertisement Message of Specified Peer-to-Peer Device Group from device under test at multicast address port. The message received by test device shall conform to definitions in Table 41 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.4.2.3 Test case 2

—— Test Purpose

To validate when device under test joins Specified Peer-to-Peer Device Group, it can send out the proper Device Online Advertisement (includes its Specified Peer-to-Peer Device Group ID).

—— Reference

9.5.2.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

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Device under test initiates a request to join Specified Peer-to-Peer Device Group setup by test device.

—— Pass Verdict Condition

1) Test device shall receive Device Online Advertisement Message from device under test at multicast address port. This message received by test device shall conform to definitions in Table 7 of ISO/IEC 14543-5-1;

2) 01-DeviceGroupList field in the advertisement message received by test device shall include the Specified Peer-to-Peer Device Group ID used by test device.

6.4.2.4 Test case 3

—— Test Purpose

To validate, when device under test is selected to be responsible for sending device group advertisement in a Specified Peer-to-Peer Device Group that it belongs, it can send out the proper Specified Peer-to-Peer Device Group advertisement.

—— Reference

9.5.2.2 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Test device A sends a Device Offline Advertisement message through multicast address 239.255.255.250:3880;

2) Between test device B and device under test, device under test is selected to be responsible for device group advertisement.

—— Pass Verdict Condition

1) Test device A shall receive Device Group Advertisement Message of Specified Peer-to-Peer Device Group from device under test at multicast address port;

2) This advertisement message received by test device A shall conform to definitions in Table 41 of ISO/IEC 14543-5-1;

6.4.2.5 Test case 4

—— Test Purpose

To validate when device under test leaves Specified Peer-to-Peer Device Group, it can send out the proper Device Leaves a Specified Peer-to-peer Device Group Quit Group Message.

—— Reference

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9.5.2.4 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Device under test initiates a request to leave Specified Peer-to-Peer Device Group setup by test device.

—— Pass Verdict Condition

1) Test device shall receive Device Leaves a Specified Peer-to-peer Device Group Quit Group Message from device under test at multicast address port.

2) This message received by test device shall conform to definitions in Table 42 of ISO/IEC 14543-5-1;

6.4.2.6 Test case 5

—— Test Purpose

To validate when device under test sets up a Master-Slave (Centralized) Device Group, it can send out the proper Device Group Advertisement Message of Master-Slave Device Group periodically.

—— Reference

9.5.3.1 and 9.5.3.2 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Device under test initiates a Master-Slave (Centralized) Device Group setup.

—— Pass Verdict Condition

1) Test device shall receive Device Group Advertisement Message of Master-Slave Device Group periodically from device under test.

2) This message received by test device shall conform to definitions in Table 43 of ISO/IEC 14543-5-1.

6.4.2.7 Test case 6

—— Test Purpose

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To validate when device under test is the Master device and receives Request Message to Join a Master-Slave Device Group, it can send out the proper Response Message to Join a Master-Slave Device Group.

—— Reference

9.5.3.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Test device sends Request Message to Join a Master-Slave Device Group to device under test based on device pipe. This message format conforms to the requirement definitions in Table 44 of ISO/IEC 14543-5-1. At the same time, test device is listening on the device pipe setup with device under test.

—— Pass Verdict Condition

1) After test device sends out Request Message to Join a Master-Slave Device Group, it shall receive Response Message to Join a Master-Slave Device Group from device under test through device pipe within 30 s;

2) The response message received by test device shall conform to definitions in Table 45 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.4.2.8 Test case 7

—— Test Purpose

To validate when device under test is the Master device and needs to dissolve the Master-Slave (Centralized) Device Group, it can send out the proper Device Group Dissolve Notification Message Sent by Master Device.

—— Reference

9.5.3.4 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Device under test initiates a request to dissolve Master-Slave (Centralized) Device Group.

—— Pass Verdict Condition

1) Test device shall receive Device Group Dissolve Notification Message Sent by Master Device from device under test at multicast address 239.255.255.250:3880;

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2097 2) This message received by test device shall conform to definitions in Table 46 of
2098 ISO/IEC 14543-5-1.

2099 **6.4.2.9 Test case 8**

2100 —— Test Purpose

2101 To validate when device under test joins Master-Slave (Centralized) Device Group, it can
2102 send out the proper Request Message to Join a Master-Slave Device Group to the Master
2103 device.

2104 —— Reference

2105 9.5.3.3 of ISO/IEC 14543-5-1

2106 —— Conformance Category

2107 Optional

2108 —— Test Procedure

2109 Device under test initiates a request to join Master-Slave (Centralized) Device Group setup by
2110 test device. At the same time, test device is listening on the device pipe setup with device
2111 under test.

2112 —— Pass Verdict Condition

2113 1) Test device shall receive Request Message to Join a Master-Slave Device Group from
2114 device under test based on device pipe;

2115 2) This message received by test device shall conform to definitions in Table 44 of
2116 ISO/IEC 14543-5-1.

2117 **6.4.2.10 Test case 9**

2118 —— Test Purpose

2119 To validate when device under test leaves Master-Slave (Centralized) Device Group, it can
2120 send out the proper Withdraw Notification Message Sent by Slave Device to the Master
2121 device.

2122 —— Reference

2123 9.5.3.4 of ISO/IEC 14543-5-1

2124 —— Conformance Category

2125 Optional

2126 —— Test Procedure

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Device under test initiates a request to leave Master-Slave (Centralized) Device Group setup by test device. At the same time, test device is listening on the device pipe setup with device under test

—— Pass Verdict Condition

1) Test device shall receive Withdraw Notification Message Sent by Slave Device based on device pipe from device under test;

2) This message received by test device shall conform to definitions in Table 47 of ISO/IEC 14543-5-1.

6.5 Device search conformance test suite

6.5.1 Reference messages

Device Search Request Message, refers to Table 48 of ISO/IEC 14543-5-1.

Device Search Response Message, refers to Table 49 of ISO/IEC 14543-5-1.

Device Search Request Message by Proxy, refers to Table 50 of ISO/IEC 14543-5-1.

Device Search Response Message, refers to Table 51 of ISO/IEC 14543-5-1.

6.5.2 Test case suite

6.5.2.1 Pre-condition

Pre-condition 1: applicable to test case 1 through test case 7, test case 9 through test case 11

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device is listening on multicast address port 239.255.255.250:3880 to receive Device Online Advertisement message sent by device under test;

—— IGRS service on the device under test is running normally;

—— Test device is listening on multicast address port 239.255.255.250:3880 to receive Service Online Advertisement Message sent by device under test.

Pre-condition 2: applicable to test case 8

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device sets up Specified Peer-to-Peer Device Group or Master-Slave (Centralized) Device Group, and device under test joins that device group;

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—— Test device is listening on multicast address port 239.255.255.250:3880 to receive Device Online Advertisement message sent by device under test;

Pre-condition 3: applicable to test case 12

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device sets up device pipe with device under test;

—— Device under test is equipped with control interface that can be used to search for devices using multicast.

Pre-condition 4: applicable to test case 13

—— Test device and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Device under test is equipped with control interface that can be used to search by proxy.

Pre-condition 5: applicable to test case 14

—— Test device A, test device B and device under test are located in the same LAN IP broadcast domain;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device A sets up device pipe with device under test;

—— Test device B sets up device pipe with device under test;

—— Device under test sets up Master-Slave Device Group, test device A and test device B join this device group as Slave devices.

6.5.2.2 Test case 1

—— Test Purpose

To validate when device under test receives Device Search Request Message based on multicast and there is a match in search condition, it can send out the proper Device Search Response Message based on UDP to port 3880 of the requesting device.

—— Reference

9.6.1 of ISO/IEC 14543-5-1

—— Conformance Category

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Mandatory

—— Test Procedure

Test device sends Device Search Request Message based on multicast to address port 239.255.255.250:3880. This message format conforms to the requirement definitions in Table 48 of ISO/IEC 14543-5-1, and 01-SearchAll:TRUE field is included in the message. At the same time, test device is listening to any UDP messages on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Device Search Response Message based on UDP at port 3880 from device under test;

2) The response message received by test device shall conform to definitions in Table 49 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification);

3) The response message received by test device shall satisfy:

- USN field value, 01-SourceDeviceId field value in the response message shall match <DeviceId> value in the message body and NT field value in the Device Online Advertisement sent by device under test;
- 01-TargetDeviceId field in the response message shall match 01-SourceDeviceId field in the request message;
- <AcknowledgeId> field value in the response message body shall match 01-SequenceId field value in the request message;
- <ClientId> field value in the response message body shall match 01-ClientId field value in the request message.

6.5.2.3 Test case 2

—— Test Purpose

To validate when device under test receives Device Search Request Message based on multicast and the search condition is set to SearchAll, it can treat all other search conditions as invalid, and send out the proper Device Search Response Message based on UDP.

—— Reference

9.6.1 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends Device Search Request Message based on multicast to address port 239.255.255.250:3880. This message format conforms to the requirement definitions in Table 48 of ISO/IEC 14543-5-1. The message also includes the following:

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1) 01-SearchAll:TRUE field;

2) 01-SearchByDeviceName field, but this field value is different from 01-DeviceName value included in the Device Online Advertisement of the device under test

At the same time, test device is listening to any UDP messages on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Device Search Response Message based on UDP at port 3880 from device under test;

2) The response message received by test device shall conform to definitions in Table 49 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification);

6.5.2.4 Test case 3

—— Test Purpose

To validate, when device under test receives a Device Search Request Message based on multicast that contains a search condition of DeviceName, and there is a match in the search condition, it can then send out the proper Device Search Response Message based on UDP.

—— Reference

9.6.1 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends Device Search Request Message based on multicast to address port 239.255.255.250:3880. This message format conforms to the requirement definitions in Table 48 of ISO/IEC 14543-5-1. The message:

1) Includes 01-SearchByDeviceName field, and this field value is the same as 01-DeviceName value included in the Device Online Advertisement of the device under test;

2) And none of the other optional search conditions are included.

At the same time, test device is listening to any UDP messages on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Device Search Response Message based on UDP at port 3880 from device under test;

2) The response message received by test device shall conform to definitions in Table 49 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification);

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3) <DeviceName> field value in the response message body shall match 01-SearchByDeviceName field value in the request message.

6.5.2.5 Test case 4

—— Test Purpose

To validate, when device under test receives a Device Search Request Message based on multicast that contains a search condition of DeviceType, and there is a match in the search condition, it can then send out the proper Device Search Response Message based on UDP.

—— Reference

9.6.1 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends Device Search Request Message based on multicast to address port 239.255.255.250:3880. This message format conforms to the requirement definitions in Table 48 of ISO/IEC 14543-5-1. The message:

1) Includes 01-SearchByDeviceType field, and this field value is the same as 01-DeviceType value included in the Device Online Advertisement of the device under test;

2) And none of the other optional search conditions are included.

At the same time, test device is listening to any UDP messages on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Device Search Response Message based on UDP at port 3880 from device under test;

2) The response message received by test device shall conform to definitions in Table 49 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification);

3) <DeviceType> field value in the response message body shall match 01-SearchByDeviceType field value in the request message.

6.5.2.6 Test case 5

—— Test Purpose

To validate, when device under test receives a Device Search Request Message based on multicast that contains a search condition of ServiceType, and there is a match in the search condition, it can then send out the proper Device Search Response Message based on UDP.

—— Reference

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9.6.1 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends Device Search Request Message based on multicast to address port 239.255.255.250:3880. This message format conforms to the requirement definitions in Table 48 of ISO/IEC 14543-5-1. The message:

1) Includes 01-SearchByServiceType field, and this field value is the same as 01-ServiceType value included in the Device Online Advertisement of the device under test;

2) And none of the other optional search conditions are included.

At the same time, test device is listening to any UDP messages on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Device Search Response Message based on UDP at port 3880 from device under test;

2) The response message received by test device shall conform to definitions in Table 49 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.5.2.7 Test case 6

—— Test Purpose

To validate, when device under test receives a Device Search Request Message based on multicast that contains a search condition of ServiceName, and there is a match in the search condition, it can then send out the proper Device Search Response Message based on UDP.

—— Reference

9.6.1 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends Device Search Request Message based on multicast to address port 239.255.255.250:3880. This message format conforms to the requirement definitions in Table 48 of ISO/IEC 14543-5-1. The message:

1) Includes 01-SearchByServiceName field, and this field value is the same as 01-ServiceName value included in the Device Online Advertisement of the device under test;

2) And none of the other optional search conditions are included.

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At the same time, test device is listening to any UDP messages on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Device Search Response Message based on UDP at port 3880 from device under test;

2) The response message received by test device shall conform to definitions in Table 49 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.5.2.8 Test case 7

—— Test Purpose

To validate, when device under test receives a Device Search Request Message based on multicast that contains a search condition of DeviceId, and there is a match in the search condition, it can then send out the proper Device Search Response Message based on UDP.

—— Reference

9.6.1 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends Device Search Request Message based on multicast to address port 239.255.255.250:3880. This message format conforms to the requirement definitions in Table 48 of ISO/IEC 14543-5-1. The message:

1) Includes 01-SearchByDeviceId field, and this field value is the same as USN value included in the Device Online Advertisement of the device under test;

2) And none of the other optional search conditions are included.

At the same time, test device is listening to any UDP messages on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Device Search Response Message based on UDP at port 3880 from device under test;

2) The response message received by test device shall conform to definitions in Table 49 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.5.2.9 Test case 8

—— Test Purpose

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To validate, when device under test receives a Device Search Request Message based on multicast that contains a search condition of DeviceGroupId, and there is a match in the search condition, it can then send out the proper Device Search Response Message based on UDP.

—— Reference

9.6.1 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Test device sends Device Search Request Message based on multicast to address port 239.255.255.250:3880. This message format conforms to the requirement definitions in Table 48 of ISO/IEC 14543-5-1. The message:

1) Includes 01-SearchByDeviceGroupId field, and this field value is the same as one of the DeviceGroupId value in 01-DeviceGroupIdList field included in the Device Online Advertisement of the device under test;

2) And none of the other optional search conditions are included.

At the same time, test device is listening to any UDP messages on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Device Search Response Message based on UDP at port 3880 from device under test;

2) The response message received by test device shall conform to definitions in Table 49 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.5.2.10 Test case 9

—— Test Purpose

To validate, when device under test receives a Device Search Request Message based on multicast that contains a combination of several search conditions, and there is a match in the search condition, it can then send out the proper Device Search Response Message based on UDP.

—— Reference

9.6.1 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

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Test device sends Device Search Request Message based on multicast to address port 239.255.255.250:3880. This message format conforms to the requirement definitions in Table 48 of ISO/IEC 14543-5-1. The message:

1) Includes 01-SearchByDeviceId field, and this field value is the same as USN value included in the Device Online Advertisement of the device under test;

2) Includes 01-SearchByDeviceType field, and this field value is the same as 01-DeviceType value included in the Device Online Advertisement of the device under test;

3) Includes 01-SearchByServiceName field, and this field value is the same as 01-ServiceName value included in the service online advertisement of the device under test;

4) And none of the other optional search conditions are included.

At the same time, test device is listening to any UDP messages on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Device Search Response Message based on UDP at port 3880 from device under test;

2) The response message received by test device shall conform to definitions in Table 49 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.5.2.11 Test case 10

—— Test Purpose

To validate, when device under test receives a Device Search Request Message based on multicast and there is no match in the search condition, it does not send out Device Search Response Message based on UDP.

—— Reference

9.6.1 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends Device Search Request Message based on multicast to address port 239.255.255.250:3880. This message format conforms to the requirement definitions in Table 48 of ISO/IEC 14543-5-1. The message:

1) Does not include 01-SearchAll:TRUE field;

2) Includes 01-SearchByServiceName field, and this field value is different from 01-ServiceName value included in the service online advertisement of the device under test;

3) And none of the other optional search conditions are included.

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At the same time, test device is listening to any UDP messages on port 3880.

—— Pass Verdict Condition

1) Test device shall not receive Device Search Response Message based on UDP at port 3880 from device under test.

6.5.2.12 Test case 11

—— Test Purpose

To validate, under normal circumstances, when device under test receives a Device Search Request Message based on multicast and there is a match in the search condition, the <ReturnCode> value in the Device Search Response Message it sent based on UDP is 100 (success).

—— Reference

9.6.1 and Clause 11 of ISO/IEC 14543-5-1

Request/Response Status Codes, see Table 85 and 86 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends Device Search Request Message based on multicast to address port 239.255.255.250:3880. This message format conforms to the requirement definitions in Table 48 of ISO/IEC 14543-5-1, and the message also includes 01-SearchAll:TRUE field. At the same time, test device is listening to any UDP messages on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Device Search Response Message based on UDP at port 3880 from device under test;

2) The response message received by test device shall conform to definitions in Table 49 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification);

3) <ReturnCode> field value in the response message received by test device shall be 100.

6.5.2.13 Test case 12

—— Test Purpose

To validate when device under test needs to search for devices based on multicast, it can send out the proper Device Search Request Message based on multicast to address port 239.255.255.250:3880.

—— Reference

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9.6.1 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Device under test initiates device search based on multicast; at the same time, test device is listening to any messages on multicast address port 239.255.255.250:3880.

—— Pass Verdict Condition

1) Test device shall receive Device Search Request Message based on multicast at address port 239.255.255.250:3880 from device under test;

2) The request message received by test device shall conform to definitions in Table 48 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.5.2.14 Test case 13

—— Test Purpose

To validate when device under test needs to conduct device search by proxy, it can send out the proper Device Search Request Message by Proxy.

—— Reference

9.6.2 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Device under test initiates device search with test device; at the same time, test device is listening on device pipe set up with device under test.

—— Pass Verdict Condition

1) Test device shall receive Device Search Request Message by Proxy from device under test;

2) The request message received by test device shall conform to definitions in Table 50 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.5.2.15 Test case 14

—— Test purpose

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To validate that, after receiving Device Search Request Message by Proxy from its Slave device, the device under test, as the Master device, can search and acquire all device info to return proper response message.

—— Reference

9.6.2 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Test device A sends Device Search Request Message by Proxy to device under test through mutual device pipe. This message format conforms to the requirement definitions in Table 50 of ISO/IEC 14543-5-1, and the message also includes 01-SearchAll:TRUE field. At the same time, test device A is listening on device pipe set up with device under test.

—— Pass Verdict Condition

1) Test device A shall receive Device Search Response Message by Proxy from device under test through mutual device pipe;

2) The response message received by test device A shall conform to definitions in Table 51 of ISO/IEC 14543-5-1 (every HTTP command line and required field shall conform to the specification).

6.6 Device online/offline event subscription conformance test suite

6.6.1 Reference messages

Device Online/Offline Event Subscription Request Message (Table 52 in ISO/IEC 14543-5-1)

Device Online/Offline Event Subscription Renewal Request Message (Table 53 in ISO/IEC 14543-5-1)

Device Online/Offline Event Subscription Response Message (Table 54 in ISO/IEC 14543-5-1)

Device Online/Offline Event Unsubscription Message (Table 55 in ISO/IEC 14543-5-1)

Device Online/Offline Event Notification Message (Table 56 in ISO/IEC 14543-5-1)

6.6.2 Test case suite

6.6.2.1 Pre-condition

Pre-condition 1: applicable to test case 1.

—— Test device and device under test are in the same IP broadcast domain of Local Area Networks (LAN);

—— IGRS protocol on the device under test is initiated and running normally;

—— Device pipe is successfully set up between test device and device under test;

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—— Device under test has control interface through which device under test can be controlled to initiate the device online/offline event subscription.

Pre-condition 2: applicable to test case 2

—— Test device and device under test are in the same IP broadcast domain of LAN;

—— IGRS protocol on the device under test is initiated and running normally;

—— Device pipe is successfully set up between test device and device under test;

—— Device under test successfully subscribes device online/offline event through test device;

—— Device under test has control interface through which device under test can be controlled to initiate the device online/offline event subscription renewal.

Pre-condition 3: applicable to test case 3

—— Test device and device under test are in the same IP broadcast domain of LAN;

—— Test device is listening for message on multicast port 239.255.255.250:3880

—— IGRS protocol on the device under test is initiated and running normally;

—— Device pipe is successfully set up between test device and device under test;

—— Device under test successfully subscribes device online/offline event on test device;

—— Device under test has control interface through which device under test can be controlled to initiate the device online/offline event unsubscription.

Pre-condition 4: applicable to test case 4

—— Test device and device under test are in the same IP broadcast domain of LAN;

—— IGRS protocol on the device under test is initiated and running normally;

—— Device pipe is successfully set up between test device and device under test;

—— Test device and device under test belongs to the same master-slave group in which test device is slave device and device under test is master device.

Pre-condition 5: applicable to test case 5

—— Test device and device under test are in the same IP broadcast domain of LAN;

—— IGRS protocol on the device under test is initiated and running normally;

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—— Device pipe is successfully set up between test device and device under test;

—— Test device and device under test belongs to the same master-slave group in which test device is slave device and device under test is master device;

—— Test device successfully subscribes device online/offline event on device under test.

Pre-condition 6: applicable to test case 6.

—— Test device A, test device B and device under test are in the same IP broadcast domain of LAN;

—— IGRS protocol on the device under test is initiated and running normally;

—— Device pipe is successfully set up between test device A and device under test;

—— Device pipe is successfully set up between test device B and device under test;

—— Device under test sets up centralized group and test device A and B join the group as slave devices;

—— Test device A successfully subscribes device online/offline event on device under test.

6.6.2.2 Test case 1

—— Test Purpose

To validate whether device under test can send correct Device Online/Offline Event Subscription Request Message when it needs to subscribes device online/offline event.

—— Reference

9.7.1 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Device under test initiates a request to subscribe online/offline event on test device and simultaneously test device listens to on the device pipe between test device and device under test.

—— Pass Verdict Condition

1) Test device shall receive Device Online/Offline Event Subscription Request Message from device under test;

2) The request message shall conform to definitions and requirements of Table 52 in ISO/IEC 14543-5-1, that is, the message includes corresponding HTTP command lines and

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required field. And the content of each field shall also conform to requirements in ISO/IEC 14543-5-1.

6.6.2.3 Test case 2

—— Test Purpose

To validate whether device under test can send correct Device Online/Offline Event Subscription Renewal Request Message if it needs renewal subscription after successfully subscribing device online/offline event.

—— Reference

9.7.2 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Device under test initiates a request to renew the online/offline event subscription through test device and simultaneously test device listens to on the device pipe between test device and device under test.

—— Pass Verdict Condition

1) Test device shall receive Device Online/Offline Event Subscription Renewal Request Message from device under test;

2) The request message shall conform to definitions and requirements of Table 53 in ISO/IEC 14543-5-1, that is, the message includes corresponding HTTP command lines and required field. And the content of each field shall also conform to requirements in ISO/IEC 14543-5-1.

6.6.2.4 Test case 3

—— Test Purpose

To validate whether device under test can send correct Device Online/Offline Event Unsubscription Message if it needs to cancel the subscription after successfully subscribing device online/offline event.

—— Reference

9.7.4 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

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Device under test initiates a request to cancel the device online/offline event subscription on test device and simultaneously test device listens to through the device pipe between test device and device under test.

—— Pass Verdict Condition

1) Test device shall receive Device Online/Offline Event Unsubscription Message from device under test;

2) The message shall conform to definition and requirements of Table 55 in ISO/IEC 14543-5-1, that is, the message includes corresponding HTTP command lines and required field. And the content of each field shall also conform to requirements in ISO/IEC 14543-5-1.

6.6.2.5 Test case 4

—— Test Purpose

To validate whether device under test can send correct Device Online/Offline Event Subscription Response Message within 30 s when device under test (master device) receives Device Online/Offline Event Subscription Request Message.

—— Reference

9.7.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Test device sends Device Online/Offline Event Subscription Request Message to device under test through device pipe between test device and device under test, and this message conforms to definitions and requirements of Table 52 in ISO/IEC 14543-5-1; simultaneously test device listens to through the device pipe.

—— Pass Verdict Condition

1) After sending its request, test device shall receive Device Online/Offline Event Subscription Response Message from device under test within 30 s;

2) The response message shall conforms to definitions and requirements of Table 54 in ISO/IEC 14543-5-1, that is, the message includes corresponding HTTP command lines and required field. And the content of each field shall also conform to requirements in ISO/IEC 14543-5-1.

6.6.2.6 Test case 5

—— Test Purpose

To validate whether device under test can send correct Device Online/Offline Event Subscription Response Message within 30 s when device under test (master device) receives Device Online/Offline Event Subscription Renewal Request Message.

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—— Reference

9.7.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Test device send a Device Online/Offline Event Subscription Renewal Request Message to device under test through device pipe between test device and device under test, and this message conforms to definitions and requirements of Table 53 in ISO/IEC 14543-5-1; simultaneously test device listens to through the device pipe.

—— Pass Verdict Condition

1) After sending its request, test device shall receive Device Online/Offline Event Subscription Response Message from device under test within 30 s;

2) The response message shall conform to definitions and requirements of Table 54 in ISO/IEC 14543-5-1, that is, the message includes corresponding HTTP command lines and required field. And the content of each field shall also conform to requirements in ISO/IEC 14543-5-1.

6.6.2.7 Test case 6

—— Test Purpose

To validate, after receiving device online/offline event subscription, whether the device under test (master device) can send correct Device Online/Offline Event Notification Message if a device event is triggered.

—— Reference

9.7.5 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Test device B triggers a device event; simultaneously test device A listens to through the device pipe between test device A and device under test.

—— Pass Verdict Condition

1) Test device A shall receive Device Online/Offline Event Notification Message from device under test;

2) The notification message shall conform to definitions and requirements of Table 56 in ISO/IEC 14543-5-1, that is, the message includes corresponding HTTP command lines and

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required field. And the content of each field shall also conform to requirements in ISO/IEC 14543-5-1.

6.7 Device group search conformance test suite

6.7.1 Reference messages

Device Group Search Request Message (Table 57 in ISO/IEC 14543-5-1)

Device Group Search Response Message (Table 58 in ISO/IEC 14543-5-1)

6.7.2 Test case suite

6.7.2.1 Pre-condition

Pre-condition 1: applicable to test case 1

—— Test device and device under test are in the same IP broadcast domain of Local Area Networks (LAN);

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device can detect and listen to Device Online Advertisement message of device under test and get its device information on multicast port 239.255.255.250:3880;

—— Device under test has control interface through which device under test can be controlled to initiate device group search.

Pre-condition 2: applicable in test case 2 through test case 8

—— Test device and device under test are in the same IP broadcast domain of Local Area Networks (LAN);

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device can detect and listen to Device Online Advertisement message of device under test and get its device information on multicast port 239.255.255.250:3880;

—— Device under test belongs to a certain device group, and it is responsible for device group advertisement of this device group (selected in the specified peer-to-peer device groups or it is the master device in a centralized device group);

—— Test device can detect and listen to device group online advertisement message sent by device under test and get the information of its device group on multicast port 239.255.255.250:3880.

6.7.2.2 Test case 1

—— Test Purpose

To validate whether the device under test can send correct Device Group Search Request Message to multicast port 239.255.255.250:3880 when device under test is searching device group.

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—— Reference

9.8.1 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Device under test initiates searches for a device group; simultaneously test device listens to on multicast port 239.255.255.250:3880.

—— Pass Verdict Condition

1) Test device shall receive Device Group Search Request Message based on multicast from device under test multicast;

2) The request message shall conform to definitions and requirements of Table 57 in ISO/IEC 14543-5-1, that is, the message includes corresponding HTTP command lines and required field. And the content of each field shall also conform to requirements in ISO/IEC 14543-5-1.

6.7.2.3 Test case 2

—— Test Purpose

To validate whether device under test can send correct UDP-based unicast Device Group Search Response Message to port 3880 of the requesting device.

—— Reference

9.8.1 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Test device sends Device Group Search Request Message to multicast port 239.255.255.250:3880. This message conforms to definitions and requirements of Table 57 in ISO/IEC 14543-5-1 and it includes field: 01-SearchAll:TRUE. Simultaneously test device listens to UDP-based unicast message on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Device Group Search Response Message from device under test;

2) The response message shall conform to definitions and requirements of Table 58 in ISO/IEC 14543-5-1, that is, the message includes corresponding HTTP command lines and required field. And the content of each field shall also conform to requirements in ISO/IEC 14543-5-1.

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6.7.2.4 Test case 3

—— Test Purpose

To validate whether device under test can ignore other search conditions and send correct UDP-based unicast Device Group Search Response Message to port 3880 of the requesting device when device under test receives Device Group Search Request Message and the message includes field: 01-SearchAll:TRUE.

—— Reference

9.8.1 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Test device sends Device Group Search Request Message to multicast port 239.255.255.250:3880.

This message conforms to definitions and requirements of Table 57 in ISO/IEC 14543-5-1 and it includes:

1) Field: 01-SearchAll:TRUE;

2) Field: 01-SearchByDeviceGroupName whose value is different from field: <DeviceGroupName> in the device group notification message sent by device under test.

Simultaneously test device listens to UDP-based unicast message on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Device Group Search Response Message from device under test;

2) The response message shall conform to definitions and requirements of Table 58 in ISO/IEC 14543-5-1, that is, the message includes corresponding HTTP command lines and required field. And the content of each field shall also conform to requirements in ISO/IEC 14543-5-1.

6.7.2.5 Test case 4

—— Test Purpose

To validate whether device under test can send correct UDP-based unicast Device Group Search Response Message to port 3880 of the requesting device when device under test receives Device Group Search Request Message with a test device group name condition match.

—— Reference

9.8.2 of ISO/IEC 14543-5-1

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—— Conformance Category

Optional

—— Test Procedure

Test device sends Device Group Search Request Message to multicast port 239.255.255.250:3880.

This message conforms to definitions and requirements of Table 57 in ISO/IEC 14543-5-1 and:

1) It includes field: 01-SearchByDeviceGroupName whose value is the same as field: <DeviceGroupName> in the device group notification message sent by device under test;

2) It does not include other optional search fields.

Simultaneously test device listens to UDP-based unicast message on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Device Group Search Response Message from device under test;

2) The response message shall conform to definitions and requirements of Table 58 in ISO/IEC 14543-5-1, that is, the message includes corresponding HTTP command lines and required field. And the content of each field shall also conform to requirements in ISO/IEC 14543-5-1.

6.7.2.6 Test case 5

—— Test Purpose

To validate whether device under test can send correct UDP-based unicast Device Group Search Response Message to port 3880 of the requesting device when device under test receives Device Group Search Request Message with a test device group ID condition match.

—— Reference

9.8.2 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Test device sends Device Group Search Request Message to multicast port 239.255.255.250:3880.

This message conforms to definitions and requirements of Table 57 in ISO/IEC 14543-5-1 and:

1) It includes field: 01-SearchByDeviceGroupID whose value is the same as field: <DeviceGroupID> in the device group notification message sent by device under test;

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2) It does not include other fields of optional search precondition.

Simultaneously test device listens to UDP-based unicast message on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Device Group Search Response Message from device under test;

2) The response message shall conform to definitions and requirements of Table 58 in ISO/IEC 14543-5-1, that is, the message includes corresponding HTTP command lines and required field. And the content of each field shall also conform to requirements in ISO/IEC 14543-5-1.

6.7.2.7 Test case 6

—— Test Purpose

To validate whether device under test can send correct UDP-based unicast Device Group Search Response Message to port 3880 of the requesting device when device under test receives Device Group Search Request Message with a test device group type condition match.

—— Reference

9.8.2 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Test device sends Device Group Search Request Message to multicast port 239.255.255.250:3880.

This message conforms to definitions and requirements of Table 57 in ISO/IEC 14543-5-1 and:

1) It includes field: 01-SearchByDeviceGroupType whose type is the same as the type of the device group which includes device under test;

2) It does not include other fields of optional search precondition.

Simultaneously test device listens to UDP-based unicast message on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Device Group Search Response Message from device under test;

2) The response message shall conform to definitions and requirements of Table 58 in ISO/IEC 14543-5-1, that is, the message includes corresponding HTTP command lines and required field. And the content of each field shall also conform to requirements in ISO/IEC 14543-5-1.

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6.7.2.8 Test case 7

—— Test Purpose

To validate whether a device under test can send correct UDP-based unicast Device Group Search Response Message to port 3880 of the requesting device when device under test receives Device Group Search Request Message with multi-condition match.

—— Reference

9.8.2 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Test device sends Device Group Search Request Message to multicast port 239.255.255.250:3880.

This message conforms to definitions and requirements of Table 57 in ISO/IEC 14543-5-1 and:

1) It includes field: 01-SearchByDeviceGroupName whose value is the same as field: <DeviceGroupName> in the device group notification message sent by device under test;

2) It includes field: 01-SearchByDeviceGroupId whose value is the same as field: <DeviceGroupID> in the device group notification message sent by device under test;

3) It does not include other fields of optional search precondition.

Simultaneously test device listens to UDP-based unicast message on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Device Group Search Response Message from device under test;

2) The response message shall conform to definitions and requirements of Table 58 in ISO/IEC 14543-5-1, that is, the message includes corresponding HTTP command lines and required field. And the content of each field shall also conform to requirements in ISO/IEC 14543-5-1.

6.7.2.9 Test case 8

—— Test Purpose

To validate that device under test will not send Device Group Search Response Message if device under test receives Device Group Search Request Message that does not match with search precondition.

—— Reference

9.8.2 of ISO/IEC 14543-5-1

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—— Conformance Category

Optional

—— Test Procedure

Test device sends Device Group Search Request Message to multicast port 239.255.255.250:3880.

This message conforms to definitions and requirements of Table 57 in ISO/IEC 14543-5-1 and:

1) It includes field: 01-SearchByDeviceGroupName whose value is the same as field: <DeviceGroupName> in the device group notification message sent by device under test;

2) It includes field: 01-SearchByDeviceGroupId whose value is different from field: <DeviceGroupID> in the device group notification message sent by device under test;

3) It does not include other fields of optional search precondition.

Simultaneously test device listens to UDP-based unicast message on port 3880.

—— Pass Verdict Condition

Test device shall not receive Device Group Search Response Message from device under test.

6.8 Service advertisement conformance test suite

6.8.1 Reference messages

Service Online Advertisement Message (Table 59 in ISO/IEC 14543-5-1)

Service Offline Advertisement Message (Table 60 in ISO/IEC 14543-5-1)

Service Registration Notification Message (Table 61 in ISO/IEC 14543-5-1)

Service Offline Notification Message Based on Device Pipe (Table 62 in ISO/IEC 14543-5-1)

6.8.2 Test case suite

6.8.2.1 Pre-condition

Pre-condition 1: applicable to test case 1 and 2

—— Test device and device under test are in the same IP broadcast domain of Local Area Networks (LAN);

—— Test device listens to on multicast port: 239.255.255.250:3880;

—— IGRS protocol on the device under test is initiated and running normally.

Pre-condition 2: applicable to test case 3 and 4

—— Test device and device under test are in the same IP broadcast domain of Local Area Networks (LAN);

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—— IGRS protocol on the device under test is initiated and running normally;

—— Test device set ups centralized device group as master device; ;

—— Device under test joins the centralized device group as slave device and device pipe is successfully set up between test device (master device) and device under test.

—— Test device listens to on the device pipe.

6.8.2.2 Test case 1

—— Test Purpose

To validate whether device under test can send correct Service Online Advertisement Message to multicast port: 239.255.255.250:3880 when IGRS service of device under test is added to network.

—— Reference

10.1.1 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Running IGRS service on device under test.

—— Pass Verdict Condition

1) Test device shall receive Service Online Advertisement Message from device under test on port 239.255.255.250:3880;

2) The advertisement message shall conform to definitions and requirements of Table 59 in ISO/IEC 14543-5-1.

6.8.2.3 Test case 2

—— Test Purpose

To validate whether device under test can send correct Service Offline Advertisement Message to multicast port: 239.255.255.250:3880 when IGRS service is offline.

—— Reference

10.1.1 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

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—— Test Procedure

1) Running IGRS service on device under test;

2) Terminating IGRS service normally on device under test.

—— Pass Verdict Condition

1) Test device shall receive Service Offline Advertisement Message from device under test on port 239.255.255.250:3880 after cancelling IGRS service on device under test;

2) The advertisement message shall conform to definitions and requirements of Table 60 in ISO/IEC 14543-5-1.

6.8.2.4 Test case 3

—— Test Purpose

In the case of device under test as slave device in centralized device group, to validate whether device under test can send correct Service Registration Notification Message to master device through device pipe when IGRS service is added to network.

—— Reference

10.1.2 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Running IGRS service on device under test.

—— Pass Verdict Condition

1) Test device shall receive Service Registration Notification Message from device under test through the device pipe;

2) The notification message shall conform to definitions and requirements of Table 61 in ISO/IEC 14543-5-1.

6.8.2.5 Test case 4

—— Test Purpose

In the case of device under test as slave device in centralized device group, to validate whether device under test can send correct Service Offline Notification Message Based on Device Pipe to master device when IGRS service is offline on device under test.

—— Reference

10.1.2 of ISO/IEC 14543-5-1

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—— Conformance Category

Optional

—— Test Procedure

1) Running IGRS service on device under test.

2) Terminating IGRS service normally on device under test.

—— Pass Verdict Condition

1) Test device shall receive Service Offline Notification Message Based on Device Pipe from device under test after terminating IGRS service on device under test;

2) The notification message shall conform to definitions and requirements of Table 62 in ISO/IEC 14543-5-1.

6.9 Service search conformance test suite

6.9.1 Reference messages

Service Search Request Message Based on Multicast (Table 63 in ISO/IEC 14543-5-1)

Service Search Response Message Based on UDP Unicast (Table 64 in ISO/IEC 14543-5-1)

Service Search Request Message by Proxy (Table 65 in ISO/IEC 14543-5-1)

Service Search Response Message by Proxy (Table 66 in ISO/IEC 14543-5-1)

6.9.2 Test case suite

6.9.2.1 Pre-condition

Pre-condition 1: applicable to test case 1 through 6, test case 8 and test case 9

—— Test device and device under test are in the same IP broadcast domain of Local Area Networks (LAN);

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device captures Device Online Advertisement message from device under test by listening to on multicast port: 239.255.255.250:3880;

—— IGRS service on device under test works normally;

—— Test device captures Service Online Advertisement Message from device under test by listening to on multicast port: 239.255.255.250:3880;

Pre-condition 2: applicable to test case 7

—— Test device and device under test are in the same IP broadcast domain of Local Area Networks (LAN);

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—— IGRS protocol on the device under test is initiated and running normally;

—— Test device captures Device Online Advertisement message from device under test by listening to on multicast port: 239.255.255.250:3880;

—— IGRS service on device under test works normally;

—— Test device captures Service Online Advertisement Message from device under test by listening to on multicast port: 239.255.255.250:3880;

—— Test device sets up centralized device group or specified peer-to-peer device group. And device under test joins that device group.

Pre-condition 3: applicable to test case 10

—— Test device and device under test are in the same IP broadcast domain of Local Area Networks (LAN);

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device captures Device Online Advertisement message from device under test by listening to on multicast port: 239.255.255.250:3880;

—— IGRS service on device under test works normally;

—— Test device captures Service Online Advertisement Message from device under test by listening to on multicast port: 239.255.255.250:3880;

—— Device under test has control interface through which device under test can be controlled to initiate service search by multicast.

Pre-condition 4: applicable to test case 11

—— Test device and device under test are in the same IP broadcast domain of Local Area Networks (LAN);

—— IGRS protocol on the device under test is initiated and running normally;

—— Device pipe is set up between test device and device under test;

—— Device under test has control interface through which device under test can be controlled to initiate service search by proxy.

Pre-condition 5: applicable to test case 12

—— Test device A, B, and device under test are in the same IP broadcast domain of Local Area Networks (LAN);

—— IGRS protocol on the device under test is initiated and running normally;

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—— Test device A captures Device Online Advertisement message from device under test by listening to on multicast port: 239.255.255.250:3880;

—— IGRS service on device under test works normally;

—— Device pipe is set up between test device A and device under test;

—— Device pipe is set up between test device B and device under test;

—— Device under test sets up centralized device group and test device A and B join the group as slave devices; they both register service on device under test (master device).

6.9.2.2 Test case 1

—— Test Purpose

To validate whether device under test can send correct Service Search Response Message Based on UDP Unicast to port 3880 of the other party when device under test receives Service Search Request Message Based on Multicast and there is a match in the search precondition.

—— Reference

10.2.1 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends correct Service Search Request Message Based on Multicast to multicast port 239.255.255.250:3880. This message conforms to definitions and requirements of Table 63 in ISO/IEC 14543-5-1 and it includes field: 01-SearchAll:TRUE whose value is the same as field: DeviceGroupName in the device group notification message sent by device under test; simultaneously test device listens to UDP-based unicast message on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Service Search Response Message Based on UDP Unicast from device under test on port 3880;

2) The response message shall conform to definitions and requirements of Table 64 in ISO/IEC 14543-5-1, that is, the message includes corresponding HTTP required field. And the content of each field shall also conform to requirements in ISO/IEC 14543-5-1;

3) The response message received by test device shall satisfy:

- The value of field: 01-SourceDeviceId in the response message and field: <DeviceId> in message body is the same as field: NT in device under test online advertisement message;

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- The value of field: 01-TargetDeviceId in the response message is the same as field: 01-SourceDeviceId in search request message sent by test device;

- The content of field: <AcknowledgeId> in the response message body is the same as the value of field: 01-SequenceId in search request message sent by test device;

- The content of field: <ClientId> in the response message body is the same as the value of field: 01-ClientId in search request message sent by test device.

6.9.2.3 Test case 2

—— Test Purpose

To validate whether device under test can ignore other search preconditions and send correct Service Search Response Message Based on UDP Unicast when device under test receives Service Search Request Message Based on Multicast which is requesting search all.

—— Reference

10.2.1 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends correct Service Search Request Message Based on Multicast to multicast port 239.255.255.250:3880. This message conforms to definitions and requirements of Table 63 in ISO/IEC 14543-5-1 and:

1) It includes field: 01-SearchAll:TRUE;

2) It includes field: 01-SearchByDeviceName whose value is different from field: 01-DeviceName in device under test online advertisement message.

Simultaneously test device listens to UDP-based unicast message on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Service Search Response Message Based on UDP Unicast from device under test on port 3880;

2) The response message shall conform to definitions and requirements of Table 64 in ISO/IEC 14543-5-1.

6.9.2.4 Test case 3

—— Test Purpose

To validate whether device under test can send correct Service Search Response Message Based on UDP Unicast that includes all of the device information and the value of field: <ReturnCode> is 100 (successful) when device under test receives Service Search Request Message Based on Multicast with a device name as the match condition.

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—— Reference

10.2.1 and Clause 11 of ISO/IEC 14543-5-1;

Response status code of response message in Table 85 and 86 in ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends correct Service Search Request Message Based on Multicast to multicast port 239.255.255.250:3880. This message conforms to definitions and requirements of Table 63 in ISO/IEC 14543-5-1 and:

1) It includes field: 01-SearchByDeviceName whose value is the same as field: 01-DeviceName in device under test online advertisement message;

2) It does not include other fields of optional search precondition.

Simultaneously test device listens to UDP-based unicast message on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Service Search Response Message Based on UDP Unicast from device under test on port 3880;

2) The response message shall conform to definitions and requirements of Table 64 in ISO/IEC 14543-5-1;

3) The response message received by test device shall satisfy:

- Field: <ServiceInfoList> of the response message includes all the basic service information of device under test and its value is the same as corresponding field in Service Online Advertisement Message of device under test;

- The value of field: <ReturnCode> of the response message is 100.

6.9.2.5 Test case 4

—— Test Purpose

To validate whether device under test can send correct Service Search Response Message Based on UDP unicast including all of the device information and the value of field <ReturnCode> is 100 (successful) when device under test receives Service Search Request Message Based on Multicast with a device ID condition.

—— Reference

10.2.1 and Clause 11 of ISO/IEC 14543-5-1;

Response status code of response message in Table 85 and 86 in ISO/IEC 14543-5-1

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—— Conformance Category

Mandatory

—— Test Procedure

Test device sends correct Service Search Request Message Based on Multicast to multicast port 239.255.255.250:3880. This message conforms to definitions and requirements of Table 63 in ISO/IEC 14543-5-1 and:

1) It includes field: 01-SearchByDeviceId whose value is the same as field: NT in device under test online advertisement message;

2) It does not include other fields of optional search precondition.

Simultaneously test device listens to UDP-based unicast message on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Service Search Response Message Based on UDP unicast from device under test on port 3880;

2) The response message shall conform to definitions and requirements of Table 64 in ISO/IEC 14543-5-1;

3) The response message received by test device shall satisfy:

- Field: <ServiceInfoList> of the response message includes all the basic service information of device under test and its value is the same as corresponding field in Service Online Advertisement Message of device under test;

- The value of field: <ReturnCode> of the response message is 100.

6.9.2.6 Test case 5

—— Test Purpose

To validate whether device under test can send correct Service Search Response Message Based on UDP Unicast including all the basic service information of the device which matches to search precondition and the value of field: <ReturnCode> of the message is 100 (successful) when device under test receives Service Search Request Message Based on Multicast with a service type condition match.

—— Reference`

10.2.1 and Clause 11 of ISO/IEC 14543-5-1;

Response status code of response message in Table 85 and 86 in ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

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Test device sends correct Service Search Request Message Based on Multicast to multicast port 239.255.255.250:3880. This message conforms to definitions and requirements of Table 63 in ISO/IEC 14543-5-1 and:

1) It includes field: 01-SearchByServiceType whose value is the same as field: 01-ServiceType in online advertisement message sent by device under test;

2) It does not include other fields of optional search precondition.

Simultaneously test device listens to UDP-based unicast message on port 3880.

—— Pass Verdict Condition

Test device shall receive Service Search Response Message Based on UDP Unicast from device under test on port 3880;

The response message shall conform to definitions and requirements of Table 64 in ISO/IEC 14543-5-1;

The response message received by test device shall satisfy:

- Field: <ServiceInfoList> of the response message includes all the basic service information of device under test that matches to search precondition;
- The value of field: <ReturnCode> of the response message is 100.

6.9.2.7 Test case 6

—— Test Purpose

To validate whether device under test can send correct Service Search Response Message Based on UDP Unicast including all the basic service information of the device which matches to search precondition and the value of field: <ReturnCode> of the message is 100 (successful) when device under test receives Service Search Request Message Based on Multicast with a service name condition match.

—— Reference

10.2.1 and Clause 11 of ISO/IEC 14543-5-1;

Response status code of response message in Table 85 and 86 in ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends correct Service Search Request Message Based on Multicast to multicast port 239.255.255.250:3880. This message conforms to definitions and requirements of Table 63 in ISO/IEC 14543-5-1 and:

1) It includes field: 01-SearchByServiceName whose value is the same as field: 01-ServiceName in online advertisement message sent by device under test;

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2) It does not include other fields of optional search precondition.

Simultaneously test device listens to UDP-based unicast message on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Service Search Response Message Based on UDP Unicast from device under test on port 3880;

2) The response message shall conform to definitions and requirements of Table 64 in ISO/IEC 14543-5-1;

3) The response message received by test device shall satisfy:

- Field: <ServiceInfoList> of the response message includes all the basic service information of device under test that matches to search precondition;
- The value of field: <ReturnCode> of the response message is 100.

6.9.2.8 Test case 7

—— Test Purpose

To validate whether device under test can send correct Service Search Response Message Based on UDP Unicast including all the basic service information of the device which matches to search precondition and the value of field: <ReturnCode> of the message is 100 (successful) when device under test receives Service Search Request Message Based on Multicast with a service group ID condition match.

—— Reference

10.2.1 and Clause 11 of ISO/IEC 14543-5-1;

Response status code of response message in Table 85 and 86 in ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Test device sends correct Service Search Request Message Based on Multicast to multicast port 239.255.255.250:3880. This message conforms to definitions and requirements of Table 63 in ISO/IEC 14543-5-1 and:

1) It includes field: 01-SearchByDeviceGroupId whose value is the same as the device group ID in field: 01-DeviceGroupIdList which is in the online advertisement message of device under test;

2) It does not include other fields of optional search precondition.

Simultaneously test device listens to UDP-based unicast message on port 3880.

—— Pass Verdict Condition

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1) Test device shall receive Service Search Response Message Based on UDP Unicast from device under test on port 3880;

2) The response message shall conform to definitions and requirements of Table 64 in ISO/IEC 14543-5-1;

3) The response message received by test device shall satisfy:

- Field: <ServiceInfoList> of the response message includes all the basic service information of device under test and its value is the same as corresponding field in Service Online Advertisement Message of device under test;

- The value of field: <ReturnCode> of the response message is 100.

6.9.2.9 Test case 8

—— Test Purpose

To validate whether device under test can send correct Service Search Response Message Based on UDP Unicast when device under test receives Service Search Request Message Based on Multicast with a combination of search condition matches.

—— Reference

10.2.1 and Clause 11 of ISO/IEC 14543-5-1;

Response status code of response message in Table 85 and 86 in ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends correct Service Search Request Message Based on Multicast to multicast port 239.255.255.250:3880. This message conforms to definitions and requirements of Table 63 in ISO/IEC 14543-5-1 and:

1) It includes field: 01-SearchByDeviceId whose value is the same as field: USN of device under test online advertisement message;

2) It includes field: 01-SearchByServiceName whose value is the same as field: 01-ServiceName of online advertisement message sent by device under test;

3) It does not include other fields of optional search precondition;

Simultaneously test device listens to UDP-based unicast message on port 3880.

—— Pass Verdict Condition

1) Test device shall receive Service Search Response Message Based on UDP Unicast from device under test on port 3880;

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2) The response message shall conform to definitions and requirements of Table 64 in ISO/IEC 14543-5-1;

3) The response message received by test device shall satisfy:

- Field: <ServiceInfoList> of the response message includes all the basic service information of device under test which matches with search precondition;
- The value of field: <ReturnCode> of the response message is 100.

6.9.2.10 Test case 9

—— Test Purpose

To validate device under test will not send Search Response Message Based on UDP Unicast if device under test receives Service Search Request Message Based on Multicast which does not match to search condition.

—— Reference

10.2.1 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends correct Service Search Request Message Based on Multicast to multicast port 239.255.255.250:3880. This message conforms to definitions and requirements of Table 63 in ISO/IEC 14543-5-1 and:

1) It includes field: 01-SearchByServiceName whose value is different from field: 01-ServiceName in Service Online Advertisement Message of device under test

2) It does not include other fields of optional search precondition.

Simultaneously test device listens to UDP-based unicast message on port 3880.

—— Pass Verdict Condition

Test device shall not receive Service Search Response Message Based on UDP Unicast from device under test on port 3880.

6.9.2.11 Test case10

—— Test Purpose

To validate whether device under test can send correct Service Search Request Message Based on Multicast to multicast port: 239.255.255.250:3880 when device under test needs to search service based on multicast.

—— Reference

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10.2.1 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Device under test initiates search request for service based on multicast; simultaneously test device listens to message on multicast port 239.255.255.250:3880.

—— Pass Verdict Condition

1) Test device shall receive Service Search Request Message Based on Multicast from device under test on multicast port;

2) The request message shall conform to definitions and requirements of Table 63 in ISO/IEC 14543-5-1.

6.9.2.12 Test case 11

—— Test Purpose

To validate whether device under test can send correct Service Search Request Message by Proxy through device pipe when device under test needs to search service on specified device.

—— Reference

10.2.2 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Device under test initiates a request to search service on test device; simultaneously test device listens to message on the device pipe between test device and device under test.

—— Pass Verdict Condition

1) Test device shall receive Service Search Request Message by Proxy from device under test;

2) The request message shall conform to definitions and requirements of Table 65 in ISO/IEC 14543-5-1. The message includes corresponding HTTP command lines and required field. The content of each field shall also conform to requirements in ISO/IEC 14543-5-1.

6.9.2.13 Test case 12

—— Test Purpose

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To validate whether device under test can inquire about all the information it receives and send correct response message when device under test as master device receives Service Search Request Message by Proxy from slave device.

—— Reference

10.2.2 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Test device A sends correct Service Search Request Message by Proxy to device under test through the device pipe between test device A and device under test; the message conforms to definitions and requirements of Table 65 in ISO/IEC 14543-5-1 and it includes field: 01-SearchAll:TRUE; simultaneously test device A listens to message on the device pipe between test device A and device under test.

—— Pass Verdict Condition

1) Test device A shall receive Service Search Response Message by Proxy from device under test;

2) The response message shall conform to definitions and requirements of Table 66 in ISO/IEC 14543-5-1. that is, the message includes corresponding HTTP command lines and required field, and the type of each field shall also conform to requirements in ISO/IEC 14543-5-1.

3) Field: <ServiceInfoList> of the response message includes all the service information which device under test can receive.

6.10 Service online/offline event subscription conformance test suite

6.10.1 Reference messages

Service Online/Offline Event Subscription Request Message (Table 67 in ISO/IEC 14543-5-1)

Service Online/Offline Event Subscription Renewal Request Message (Table 68 in ISO/IEC 14543-5-1)

Service Online/Offline Event Subscription Response Message (Table 69 in ISO/IEC 14543-5-1)

Service Online/Offline Event Unsubscription Message (Table 70 in ISO/IEC 14543-5-1)

Service Online/Offline Event Notification Message (Table 71 in ISO/IEC 14543-5-1)

6.10.2 Test case suite

6.10.2.1 Pre-condition

Pre-condition 1: applicable to test case 1

—— Test device and device under test are in the same IP broadcast domain of LAN;

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3346 —— IGRS protocol on the device under test is initiated and running normally;

3347 —— Device pipe is successfully set up between test device and device under test;

3348 —— Device under test has control interface through which device under test can be
3349 controlled to initiate service online/offline event subscription.

3350 Pre-condition 2: applicable to test case 2

3351 —— Test device and device under test are in the same IP broadcast domain of LAN;

3352 —— IGRS protocol on the device under test is initiated and running normally;

3353 —— Device pipe is successfully set up between test device and device under test;

3354 —— Device under test successfully subscribes service online/offline event on test device;

3355 —— Device under test has control interface through which device under test can be
3356 controlled to initiate service online/offline event subscription renewal.

3357 Pre-condition 3: applicable to test case 3

3358 —— Test device and device under test are in the same IP broadcast domain of LAN;

3359 —— IGRS protocol on the device under test is initiated and running normally;

3360 —— Device pipe is successfully set up between test device and device under test;

3361 —— Device under test successfully subscribes service online/offline event on test device;

3362 —— Device under test has control interface through which device under test can be
3363 controlled to initiate service online/offline event unsubscription.

3364 Pre-condition 4: applicable to test case 4

3365 —— Test device and device under test are in the same IP broadcast domain of LAN;

3366 —— IGRS protocol on the device under test is initiated and running normally;

3367 —— Device pipe is successfully set up between test device and device under test;

3368 —— Device under test sets up centralized device group and test device joins the group as
3369 slave device.

3370 Pre-condition 5: applicable to test case 5 and 6

3371 —— Test device and device under test are in the same IP broadcast domain of LAN;

3372 —— IGRS protocol on the device under test is initiated and running normally;

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—— Device pipe is successfully set up between test device and device under test;

—— Device under test sets up centralized device group and test device joins the group as slave device;

—— Test device successfully subscribes service online/offline event on device under test.

6.10.2.2 Test case 1

—— Test Purpose

To validate whether device under test can send correct Service Online/Offline Event Subscription Request Message when it needs to subscribes service online/offline event.

—— Reference

10.3.1 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Device under test initiates a request to subscribe online/offline event on test device and simultaneously test device listens to on the device pipe between test device and device under test.

—— Pass Verdict Condition

1) Test device shall receive Service Online/Offline Event Subscription Request Message from device under test;

2) The request message shall conform to definitions and requirements of Table 67 in ISO/IEC 14543-5-1, that is, the message includes corresponding HTTP command lines and required field. And the content of each field shall also conform to requirements in ISO/IEC 14543-5-1.

6.10.2.3 Test case 2

—— Test Purpose

To validate whether device under test can send correct Service Online/Offline Event Subscription Renewal Request Message if it needs renewal subscription after successfully subscribing service online/offline event.

—— Reference

10.3.2 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

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—— Test Procedure

Device under test initiates a request to renew the online/offline event subscription on test device and simultaneously test device listens to on the device pipe between test device and device under test.

—— Pass Verdict Condition

1) Test device shall receive Service Online/Offline Event Subscription Renewal Request Message from device under test;

2) The request message shall conform to definitions and requirements of Table 68 in ISO/IEC 14543-5-1, that is, the message includes corresponding HTTP command lines and required field. And the content of each field shall also conform to requirements in ISO/IEC 14543-5-1.

6.10.2.4 Test case 3

—— Test Purpose

To validate whether device under test can send correct Service Online/Offline Event Unsubscription Message if it needs to cancel the subscription after successfully subscribing service online/offline event.

—— Reference

10.3.4 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Device under test initiates a request to cancel service online/offline event subscription on test device and simultaneously test device listens to through the device pipe between test device and device under test.

—— Pass Verdict Condition

1) Test device shall receive Service Online/Offline Event Unsubscription Message from device under test;

2) The message shall conform to definitions and requirements of Table 70 in ISO/IEC 14543-5-1, that is, the message includes corresponding HTTP command lines and required field. And the content of each field shall also conform to requirements in ISO/IEC 14543-5-1.

6.10.2.5 Test case 4

—— Test Purpose

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To validate whether device under test can send correct Service Online/Offline Event Subscription Response Message within 30 s when device under test (master device) receives Service Online/Offline Event Subscription Request Message.

—— Reference

10.3.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Test device sends Service Online/Offline Event Subscription Request Message to device under test through device pipe between test device and device under test, and this message conforms to definitions and requirements of Table 67 in ISO/IEC 14543-5-1; simultaneously test device listens to through the device pipe.

—— Pass Verdict Condition

1) After sending its request, test device shall receive Service Online/Offline Event Subscription Response Message from device under test within 30 s;

2) The response message shall conform to definitions and requirements of Table 69 in ISO/IEC 14543-5-1, that is, the message includes corresponding HTTP command lines and required field. And the content of each field shall also conform to requirements in ISO/IEC 14543-5-1.

6.10.2.6 Test case 5

—— Test Purpose

To validate whether device under test can send correct Service Online/Offline Event Subscription Response Message within 30 s when device under test (master device) receives Service Online/Offline Event Subscription Renewal Request Message.

—— Reference

10.3.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Test device sends service online/offline subscription renewal request message to device under test through device pipe between test device and device under test, and this message conforms to definitions and requirements of Table 68 in ISO/IEC 14543-5-1; simultaneously test device listens to through the device pipe.

—— Pass Verdict Condition

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1) After sending its request, test device shall receive Service Online/Offline Event Subscription Response Message from device under test within 30 s;

2) The response message shall conform to definitions and requirements of Table 69 in ISO/IEC 14543-5-1, that is, the message includes corresponding HTTP command lines and required field. And the content of each field shall also conform to requirements in ISO/IEC 14543-5-1.

6.10.2.7 Test case 6

—— Test Purpose

To validate, after receiving service online/offline event subscription, whether the device under test (master device) can send correct Service Online/Offline Event Notification Message if a service event is triggered.

—— Reference

10.3.5 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Triggered Service Event: test device starts a service and sends Service Online Registration Notification Message to device under test; test device cancels a service and sends Service Offline Notification Message Based on Device Pipe to device under test. Simultaneously test device listens to through the device pipe between test device and device under test.

—— Pass Verdict Condition

1) Test device shall receive Service Online/Offline Event Notification Message from device under test;

2) The notification message shall conform to definitions and requirements of Table 71 in ISO/IEC 14543-5-1, that is, the message includes corresponding HTTP command lines and required field. And the content of each field shall also conform to requirements in ISO/IEC 14543-5-1.

6.11 Service description document retrieval conformance test suite

6.11.1 Reference messages

Retrieve Service Description Document Request Message (Table 72 in ISO/IEC 14543-5-1).

Retrieve Service Description Document Response Message (Table 73 in ISO/IEC 14543-5-1).

6.11.2 Test case suite

6.11.2.1 Pre-condition

Pre-condition 1: applicable to test case 1 through test case 4

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—— Test device and device under test are in the same IP broadcast domain of Local Area Networks (LAN);

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device captures Device Online Advertisement message from device under test and attains the content of field: NT by listening to on multicast port: 239.255.255.250:3880;

—— IGRS service on device under test works normally;

—— Test device captures Service Online Advertisement Message from device under test and attains the content of field: 01-ServiceId by listening to on multicast port: 239.255.255.250:3880;

—— Device pipe is set up between test device and device under test;

—— Service description document is stored on device under test;

—— Test device listens to on the device pipe between test device and device under test.

Pre-condition 2: applicable to test case 5

—— Test device and device under test are in the same IP broadcast domain of Local Area Networks (LAN);

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device sends periodic Device Online Advertisement message on multicast port: 239.255.255.250:3880;

—— Test device sends Service Online Advertisement Message on multicast port: 239.255.255.250:3880;

—— Device pipe is set up between test device and device under test;

—— Test device listens to on the device pipe between test device and device under test.

—— Device under test has control interface through which device under test can be controlled to initiate the retrieval of service description documents of other devices.

6.11.2.2 Test case 1

—— Test Purpose

To validate whether device under test can send correct Retrieve Service Description Document Response Message within 30 s when device under test receives a Retrieve Service Description Document Request Message which matches with the description of field: 01-TargetDeviceId of the request message.

—— Reference

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10.4.2 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends a Retrieve Service Description Document Request Message to device under test through device pipe between test device and device under test; this message conforms to definitions and requirements of Table 72 in ISO/IEC 14543-5-1. The value of field: 01-TargetDeviceId is set as the same as the value of field: NT of device under test online advertisement message; simultaneously test device is listening to for 30 s through the device pipe.

—— Pass Verdict Condition

1) After sending its request message, test device shall receive a Retrieve Service Description Document Response Message from device under test within 30 s;

2) The format of the response message shall conform to definitions and requirements of Table 73 in ISO/IEC 14543-5-1;

3) The response message received by test device shall satisfy:

- The value of field: 01-SourceDeviceId in the response message is the same as field: 01-TargetDeviceId in the request message from test device;
- The value of field: 01-TargetDeviceId in the response message is the same as field: 01-SourceDeviceId in the request message from test device.

6.11.2.3 Test case 2

—— Test Purpose

To validate whether device under test can send correct a Retrieve Service Description Document Response Message within 30 s when device under test receives a Retrieve Service Description Document Request Message which matches with the description of field: <ServiceId> of the request message.

—— Reference

10.4.2 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends Retrieve Service Description Document Request Message to device under test through device pipe between test device and device under test; this message conforms to definitions and requirements of Table 72 in ISO/IEC 14543-5-1. The content of field: <ServiceId> is set as the same as the value of field: 01-ServiceId of Service Online

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Advertisement Message of device under test; simultaneously test device is listening to for 30 s through the device pipe.

—— Pass Verdict Condition

1) After sending its request message, test device shall receive Retrieve Service Description Document Response Message from device under test within 30 s;

2) The format of the response message shall conform to definitions and requirements of Table 73 in ISO/IEC 14543-5-1;

3) The response message received by test device shall satisfy:

- The value of field: <ClientId> in the response message is the same as field: <ClientId> in the request message from test device;

- The value of field: <ServiceId> in the response message is the same as field: <ServiceId> in the request message from test device.

6.11.2.4 Test case 3

—— Test Purpose

To validate whether device under test can send Retrieve Service Description Document Response Message with field: <ReturnCode> of the message body is 100 (successful) when device under test receives Retrieve Service Description Document Request Message and is successful retrieving the document.

—— Reference

10.4.2 and Clause 11 of ISO/IEC 14543-5-1

Response status code of response message in Table 85 and 86 in ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends Retrieve Service Description Document Request Message to device under test through device pipe between test device and device under test. This message conforms to definitions and requirements of Table 72 in ISO/IEC 14543-5-1 and:

1) The value of field: 01-TargetDeviceId is set as the same as the value of field: NT of device under test online advertisement message;

2) The content of field: <ServiceId> is set as the same as the value of field: 01-ServiceId of Service Online Advertisement Message of device under test.

Simultaneously test device listens to UDP-based unicast message on port 3880.

—— Pass Verdict Condition

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1) After sending its request message, test device shall receive Retrieve Service Description Document Response Message from device under test within 30 s;

2) The format of the response message shall conform to definitions and requirements of Table 73 in ISO/IEC 14543-5-1;

3) The value of field: <ReturnCode> of the response message is 100.

6.11.2.5 Test case 4

—— Test Purpose

To validate whether device under test can send Retrieve Service Description Document Response Message with field: <ReturnCode> of the message body sets to 304 (service detailed description information does not exist or blank) when device under test receives Retrieve Service Description Document Request Message and fails to retrieve the document.

—— Reference

10.4.2 and Clause 11 of ISO/IEC 14543-5-1

Response status code of response message in Table 85 and 86 in ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

1) Delete service description document stored on device under test;

2) Test device sends Retrieve Service Description Document Request Message to device under test through device pipe between test device and device under test. This message conforms to definitions and requirements of Table 72 in ISO/IEC 14543-5-1 and:

- The value of field: 01-TargetDeviceId is set as the same as the value of field: NT of device under test online advertisement message;
- The value of field: <ServiceId> is set as the same as the value of field: 01-ServiceId of Service Online Advertisement Message of device under test;

Simultaneously test device listens to UDP-based unicast message on port 3880.

—— Pass Verdict Condition

1) In step 2, after sending its request message, test device shall receive Retrieve Service Description Document Response Message from device under test within 30 s;

2) In step 2, the format of the response message shall conform to definitions and requirements of Table 73 in ISO/IEC 14543-5-1;

3) In step 1, the value of field: <ReturnCode> of the response message is 304.

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6.11.2.6 Test case 5

—— Test Purpose

To validate whether device under test can send Retrieve Service Description Document Response Message when device under test needs to retrieve service description documents of other devices.

—— Reference

10.4.1 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Device under test initiates a request to retrieve service description document on test device; simultaneously test device listens to on the device pipe.

—— Pass Verdict Condition

1) Test device shall receive Retrieve Service Description Document Request Message from device under test;

2) The request message received by test device shall conform to definitions and requirements of Table 72 in ISO/IEC 14543-5-1.

6.12 Session conformance test suite

6.12.1 Reference messages

Common Session Setup Request Message (Table 74 in ISO/IEC 14543-5-1).

Common Session Setup Response Message (Table 76 in ISO/IEC 14543-5-1).

Common Session Teardown Notification Message (Table 77 in ISO/IEC 14543-5-1).

Retrieve Session Encryption Key Generation Request (Table 78 in ISO/IEC 14543-5-1).

Retrieve Session Encryption Key Generation Response (Table 79 in ISO/IEC 14543-5-1).

Session Encryption Key Transfer Request Message (Table 80 in ISO/IEC 14543-5-1).

Session Encryption Key Transfer Response Message (Table 81 in ISO/IEC 14543-5-1).

6.12.2 Common session setup test case suite

6.12.2.1 Pre-condition

Pre-condition 1: applicable to test case 1 through test case 4

—— Test device and device under test are in the same IP broadcast domain of Local Area Networks (LAN);

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—— IGRS protocol on the device under test is initiated and running normally;

—— Test device captures Device Online Advertisement message from device under test and attains the content of field: NT by listening to on multicast port: 239.255.255.250:3880;

—— IGRS service on device under test works normally;

—— Test device captures Service Online Advertisement Message from device under test and attains the content of field: 01-ServiceId by listening to on multicast port: 239.255.255.250:3880;

—— Secure device pipe is set up between test device and device under test according to the security requirements of IGRS service;

—— Test device listens to on the device pipe between test device and device under test.

Pre-condition 2: applicable to test case 5

—— Test device and device under test are in the same IP broadcast domain of Local Area Networks (LAN);

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device captures Device Online Advertisement message from device under test and attains the content of field: NT by listening to on multicast port: 239.255.255.250:3880;

—— IGRS service on device under test works normally;

—— Test device captures Service Online Advertisement Message from device under test and attains the content of field: 01-ServiceId by listening to on multicast port: 239.255.255.250:3880;

—— Secure device pipe is set up between test device and device under test according to the security requirements of IGRS service;

—— A session is successfully established between IGRS client of test device and IGRS service of device under test;

—— Test device listens to on the device pipe between test device and device under test;

—— Device under test has control interface through which IGRS service of device under test can be controlled to initiate session termination.

Pre-condition 3: applicable to test case 6

—— Test device and device under test are in the same IP broadcast domain of Local Area Networks (LAN);

—— IGRS protocol on the device under test is initiated and running normally;

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—— Test device periodically sends Device Online Advertisement message to multicast port: 239.255.255.250:3880;

—— Test device sends Service Online Advertisement Message to multicast port: 239.255.255.250:3880, advertising IGRS service of test device;

—— Secure device pipe is set up between test device and device under test according to the security requirements of IGRS service;

—— Test device listens to on the device pipe between test device and device under test;

Pre-condition 4: applicable to test case 7

—— Test device and device under test are in the same IP broadcast domain of Local Area Networks (LAN);

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device periodically sends Device Online Advertisement message to multicast port: 239.255.255.250:3880;

—— Test device sends Service Online Advertisement Message to multicast port: 239.255.255.250:3880, advertising IGRS service of test device;

—— Secure device pipe is set up between test device and device under test according to the security requirements of IGRS service;

—— A session is successfully established between IGRS client of device under test and IGRS service of test device;

—— Test device listens to on the device pipe between test device and device under test;

—— Device under test has control interface through which IGRS client of device under test can be controlled to initiate session termination.

6.12.2.2 Test case 1

—— Test Purpose

To validate whether device under test can send correct Common Session Setup Response Message within 30 s when device under test receives Common Session Setup Request Message.

—— Reference

10.5.2 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

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—— Test Procedure

Test device sends Common Session Setup Request Message to device under test through secure device pipe between test device and device under test; this message conforms to definitions and requirements of Table 74 in ISO/IEC 14543-5-1 and:

1) The value of field: 01-TargetDeviceId is set as the same as the value of field: NT of device under test online advertisement message;

2) The value of field: <ServiceId> is set as the same as the value of field: 01-ServiceId of Service Online Advertisement Message of device under test;

Simultaneously test device is listening to through the secure device pipe.

—— Pass Verdict Condition

1) After sending its request message, test device shall receive Common Session Setup Response Message from device under test within 30 s;

2) The format of the response message shall conform to definitions and requirements of Table 76 in ISO/IEC 14543-5-1;

3) The response message received by test device shall satisfy:

- The value of field: 01-SourceDeviceId in the response message is the same as field: 01-TargetDeviceId in the request message from test device;
- The value of field: 01-TargetDeviceId in the response message is the same as field: 01-SourceDeviceId in the request message from test device.
- The value of field: <AcknowledgeId> in the response message body is the same as the value of field: <SequenceId> in the request message body sent by test device;
- The value of field: 01-AcknowledgeId of device pipe response sequence ID in the response message header is the same as the value of field: 01-SequenceId of device pipe request sequence ID in the request message header sent by test device;
- The value of field: <ClientId> in the response message is the same as field: <ClientId> in the request message from test device;
- The value of field: <ServiceId> in the response message is the same as field: <ServiceId> in the request message from test device.

6.12.2.3 Test case 2

—— Test Purpose

To validate whether device under test can send correct Common Session Setup Response Message within 30 s and field: <ReturnCode> of the message body is 100 (successful) when device under test receives Common Session Setup Request Message with correct request message parameter and is allowed to establish session.

—— Reference

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10.5.2 and Clause 11 of ISO/IEC 14543-5-1

Response status code of response message in Table 85 and 86 in ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends Common Session Setup Request Message to device under test through secure device pipe between test device and device under test. This message conforms to definitions and requirements of Table 74 in ISO/IEC 14543-5-1 and:

1) The value of field: 01-TargetDeviceId is set as the same as the value of field: NT of device under test online advertisement message;

2) The content of field: <ServiceId> is set as the same as the value of field: 01-ServiceId of Service Online Advertisement Message of device under test;

3) The parameters contained in the field: <UserInfo> of the request message are all correct.

Simultaneously test device is listening to through the secure device pipe.

—— Pass Verdict Condition

After sending its request message, test device shall receive Common Session Setup Response Message from device under test within 30 s;

The format of the response message shall conform to definitions and requirements of Table 76 in ISO/IEC 14543-5-1;

The response message received by test device shall satisfy:

- The value of field: <UserId> in the response message body is the same as field: <UserId> in the request message from test device;
- The value of field: <ReturnCode> of the response message body is 100.

6.12.2.4 Test case 3

—— Test Purpose

To validate whether device under test can send correct Common Session Setup Response Message within 30 s and field: <ReturnCode> of the message body is 505 (identity authentication failed) when device under test receives Common Session Setup Request Message with incorrect request message parameter and failed identity authentication.

—— Reference

10.5.2 and Clause 11 of ISO/IEC 14543-5-1

Response status code of response message in Table 85 and 86 in ISO/IEC 14543-5-1

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—— Conformance Category

Mandatory

—— Test Procedure

Test device sends Common Session Setup Request Message to device under test through secure device pipe between test device and device under test. This message conforms to definitions and requirements of Table 74 in ISO/IEC 14543-5-1 and:

1) The value of field: 01-TargetDeviceId is set as the same as the value of field: NT of device under test online advertisement message;

2) The content of field: <ServiceId> is set as the same as the value of field: 01-ServiceId of Service Online Advertisement Message of device under test;

3) The parameters of field: <UserId> in the request message is illegal.

Simultaneously test device is listening to through the secure device pipe.

—— Pass Verdict Condition

1) After sending its request message, test device shall receive Common Session Setup Response Message from device under test within 30 s;

2) The format of the response message shall conform to definitions and requirements of Table 76 in ISO/IEC 14543-5-1;

3) The value of field: <ReturnCode> of the response message body is 505.

6.12.2.5 Test case 4

—— Test Purpose

To validate whether device under test can send correct Common Session Setup Response Message within 30 s and field: <ReturnCode> of the message body is 506 (ticket request failed) when device under test receives Common Session Setup Request Message with incorrect request message parameter and failed token authentication.

—— Reference

10.5.2 and Clause 11 of ISO/IEC 14543-5-1

Response status code of response message in Table 85 and 86 in ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

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Test device sends Common Session Setup Request Message to device under test through secure device pipe between test device and device under test. This message conforms to definitions and requirements of Table 74 in ISO/IEC 14543-5-1 and:

1) The value of field: 01-TargetDeviceId is set as the same as the value of field: NT of device under test online advertisement message;

2) The content of field: <ServiceId> is set as the same as the value of field: 01-ServiceId of Service Online Advertisement Message of device under test;

3) The parameters of field: <Token> in the request message is set to be incorrect.

Simultaneously test device is listening to through the secure device pipe.

—— Pass Verdict Condition

1) After sending its request message, test device shall receive Common Session Setup Response Message from device under test within 30 s;

2) The format of the response message shall conform to definitions and requirements of Table 76 in ISO/IEC 14543-5-1;

3) The value of field: <ReturnCode> of the response message body is 506.

6.12.2.6 Test case 5

—— Test Purpose

To validate whether device under test can send correct Common Session Teardown Notification Message when IGRS service of device under test needs to terminate the session.

—— Reference

10.5.2 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

IGRS service initiates session termination of IGRS clients on test device; simultaneously test device is listening to session messages exchanged between test device and device under test.

—— Pass Verdict Condition

1) Test device shall receive Common Session Teardown Notification Message from device under test;

2) The format of the notification message shall conform to definitions and requirements of Table 77 in ISO/IEC 14543-5-1.

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6.12.2.7 Test case 6

—— Test Purpose

To validate whether device under test can send correct Common Session Setup Request Message and establish a session with target service on test device when IGRS client needs to invoke IGRS service on the test device.

—— Reference

10.5.2 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

IGRS client of device under test initiates IGRS service invocation on test device; simultaneously test device is listening to messages through the secure device pipe between test device and device under test.

—— Pass Verdict Condition

1) Test device shall receive Common Session Setup Request Message from device under test;

2) The format of the request message shall conform to definitions and requirements of Table 74 in ISO/IEC 14543-5-1;

6.12.2.8 Test case 7

—— Test Purpose

To validate whether device under test can send correct Common Session Teardown Notification Message when IGRS client of device under test needs to terminate the session.

—— Reference

10.5.2 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

IGRS client initiates session termination of IGRS service on test device; simultaneously test device is listening to session messages exchanged between test device and device under test.

—— Pass Verdict Condition

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1) Test device shall receive Common Session Teardown Notification Message from device under test;

2) The format of the notification message shall conform to definitions and requirements of Table 77 in ISO/IEC 14543-5-1.

6.12.3 Session setup when service access control in centralized device group is not consistent with device pipe security attribute test case suite

6.12.3.1 Pre-condition

Pre-condition 1: applicable to test case 1 through test case 3

—— Test device A, test device B and device under test are in the same IP broadcast domain of LAN;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device A captures Device Online Advertisement from device under test and attains the content of field: NT by listening to on multicast port: 239.255.255.250:3880;

—— Test device B sets up centralized device group; device under test and test device A join the group as slave devices;

—— IGRS service of device under test works normally;

—— Test device A captures Service Online Advertisement Message and attains the content of field: 01-ServiceId by listening to on multicast port: 239.255.255.250:3880;

—— Unsecure device pipe is set up between test device A and device under test, but security mechanism IGRS:DeviceSecurity:NULL does not satisfy the security requirement of IGRS service on device under test;

—— Test device A listens to on the device pipe.

Pre-condition 2: applicable to test case 4

—— Test device A, test device B and device under test are in the same IP broadcast domain of LAN;

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device A captures Device Online Advertisement from device under test and attains the content of field: NT by listening to on multicast port: 239.255.255.250:3880;

—— Test device B sets up centralized device group; device under test and test device A join the group as slave devices;

—— IGRS service of device under test works normally;

—— Test device A captures Service Online Advertisement Message and attains the content of field: 01-ServiceId by listening to on multicast port: 239.255.255.250:3880;

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3920 —— Unsecure device pipe is set up between test device A and device under test, but
3921 security mechanism IGRS:DeviceSecurity:NULL does not satisfy the security
3922 requirement of IGRS service on device under test;

3923 —— A session is successfully established between IGRS client of test device A and IGRS
3924 service of device under test by using session encryption key;

3925 —— Test device A listens to on the device pipe;

3926 —— Device under test has control interface through which IGRS service of device under test
3927 can be controlled to initiate session termination.

3928 Pre-condition 3: applicable to test case 5 through test case 7

3929 —— Test device A, test device B and device under test are in the same IP broadcast
3930 domain of LAN;

3931 —— IGRS protocol on the device under test is initiated and running normally;

3932 —— Test device B sets up centralized device group; device under test and test device A join
3933 the group as slave devices;

3934 —— Test device A periodically sends Device Online Advertisement to multicast port:
3935 239.255.255.250:3880;

3936 —— Test device A sends service online advertisement to multicast port:
3937 239.255.255.250:3880, advertising IGRS service of test device A;

3938 —— Unsecure device pipe is set up between test device A and device under test, but
3939 security mechanism IGRS:DeviceSecurity:NULL does not satisfy the security
3940 requirement of IGRS service on test device A;

3941 —— Device pipe is normally set up between device under test and test device B;

3942 —— Test device A listens to on the device pipe between test device A and device under test;

3943 —— Device under test has control interface through which IGRS client of device under test
3944 can be controlled to initiate IGRS service invocation on other devices.

3945 Pre-condition 4: applicable to test case 8

3946 —— Test device A, test device B and device under test are in the same IP broadcast
3947 domain of LAN;

3948 —— IGRS protocol on the device under test is initiated and running normally;

3949 —— Test device B sets up centralized device group; device under test and test device A join
3950 the group as slave devices;

3951 —— Test device A periodically sends Device Online Advertisement to multicast port:
3952 239.255.255.250:3880;

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—— Test device A sends service online advertisement to multicast port: 239.255.255.250:3880, advertising IGRS service of test device A;

—— Unsecure device pipe is set up between test device A and device under test, but security mechanism IGRS:DeviceSecurity:NULL does not satisfy the security requirement of IGRS service on test device A;

—— A session is successfully established between IGRS client of device under test and IGRS service of test device A by using session encryption key;

—— Test device A listens to on the device pipe between test device A and device under test;

—— Device under test has control interface through which IGRS client of device under test can be controlled to initiate session termination.

Pre-condition 5: applicable to test case 9

—— Test device A, test device B and device under test are in the same IP broadcast domain of LAN;

—— IGRS protocol on the device under test is initiated and running normally;

—— Device under test sets up centralized device group; test device A and test device B join the group as slave devices;

—— Device pipe is set up between test device A and device under test;

—— Test device A listens to on the device pipe between test device A and device under test.

6.12.3.2 Test case 1

—— Test Purpose

To validate whether device under test can send correct Common Session Setup Response Message within 30 s and field: <ReturnCode> of the message body is 403 (failed device authority) when device under test receives Common Session Setup Request Message but the device pipe which has been set up does not satisfy the security requirement of IGRS service on device under test.

—— Reference

10.5.3 and Clause 11 of ISO/IEC 14543-5-1

Response status code of response message in Table 85 and 86 in ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

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Test device A sends Common Session Setup Request Message to device under test through Unsecure device pipe between test device A and device under test. This message conforms to definitions and requirements of Table 74 in ISO/IEC 14543-5-1 and:

1) The value of field: 01-TargetDeviceId is set as the same as the value of field: NT of device under test online advertisement message;

2) The value of field: <ServiceId> is set as the same as the value of field: 01-ServiceId of Service Online Advertisement Message of device under test.

Simultaneously test device A listens to messages through the device pipe.

—— Pass Verdict Condition

1) After sending its request message, test device A shall receive Common Session Setup Response Message from device under test within 30 s;

2) The format of the response message shall conform to definitions and requirements of Table 76 in ISO/IEC 14543-5-1;

3) The value of field: <ReturnCode> of the response message is 403.

6.12.3.3 Test case 2

—— Test Purpose

To validate whether device under test can send correct Session Encryption Key Transfer Response Message within 30 s when device under test receives Session Encryption Key Transfer Request Message and rejects common session setup request of other devices because of failed device authority.

—— Reference

10.5.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Test device A sends Common Session Setup Request Message to device under test and receives Common Session Setup Response Message from device under test with session setup rejection because of failed device authority;

2) The process of Retrieve Session Encryption Key Generation Request/response is finished between test device A (slave device) and test device B (master device of test device A and device under test);

3) Test device A sends Session Encryption Key Transfer Request Message to device under test through unsecure device pipe between test device A and device under test. This message conforms to definitions and requirements of Table 80 in ISO/IEC 14543-5-1; simultaneously test device A listens to messages through the device pipe.

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—— Pass Verdict Condition

1) In step 3, after sending its request message, test device A receives Session Encryption Key Transfer Response Message from device under test within 30 s;

2) In step 3, the format of the response message shall conform to definitions and requirements of Table 81 in ISO/IEC 14543-5-1.

6.12.3.4 Test case 3

—— Test Purpose

To validate whether device under test can send correct encrypted Common Session Setup Response Message within 30 s after the process of session encryption key transfer request/response is finished between device under test and other devices and it receives encrypted Common Session Setup Request Message.

—— Reference

10.5.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) Test device A sends Common Session Setup Request Message to device under test and receives Common Session Setup Response Message from device under test with session setup rejection because of failed device authority;

2) The process of Retrieve Session Encryption Key Generation Request/response is finished between test device A (slave device) and test device B (master device of test device A and device under test);

3) Test device A sends Session Encryption Key Transfer Request Message to device under test and receives Session Encryption Key Transfer Response Message from device under test;

4) Test device A sends Common Session Setup Request Message to device under test by using session encryption key which is sent in step 3 through unsecure device pipe; simultaneously test device A listens to messages through the unsecure device pipe.

—— Pass Verdict Condition

1) In step 4, after sending its request message, test device A shall receive Common Session Setup Response Message by using session encryption key which is sent in step 3 within 30 s from device under test;

2) In step 3, the format of the decryption result of the response message shall conform to definitions and requirements of Table 76 in ISO/IEC 14543-5-1.

6.12.3.5 Test case 4

—— Test Purpose

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To validate whether device under test can send correct Common Session Teardown Notification Message with session encryption key when IGRS service of device under test needs to terminate the session with session encryption key between device under test and other devices.

—— Reference

10.5.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Device under test initiates session termination between its IGRS service and IGRS client of test device A; simultaneously test device A listens to session messages exchanged between test device A and device under test.

—— Pass Verdict Condition

1) Test device A shall receive Common Session Teardown Notification Message with session encryption key from device under test;

2) The format of the decryption result of the message shall conform to definitions and requirements of Table 77 in ISO/IEC 14543-5-1.

6.12.3.6 Test case 5

—— Test Purpose

To validate whether device under test can send correct Retrieve Session Encryption Key Generation Request to the master device of the two devices when the other device rejects Common Session Setup Request Message from IGRS client of device under test because of failed device authority.

—— Reference

10.5.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) IGRS client of device under test initiates IGRS service invocation of test device A;

2) Test device A sends Common Session Setup Response Message and rejects session setup because of failed device authority after receiving Common Session Setup Request Message from device under test; simultaneously test device B listens to messages through the device pipe between test device B and device under test.

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—— Pass Verdict Condition

1) In step 2, test device B (master device) receives Retrieve Session Encryption Key Generation Request from device under test (slave device);

2) In step 2, the format of the request message shall conform to definitions and requirements of Table 78 in ISO/IEC 14543-5-1.

6.12.3.7 Test case 6

—— Test Purpose

To validate whether device under test can send correct Session Encryption Key Transfer Request Message to the other device after session setup request from device under test is rejected because of failed device authority and device under test receives Retrieve Session Encryption Key Generation Response from master device.

—— Reference

10.5.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) IGRS client of device under test initiates IGRS invocation service of test device A;

2) Test device A sends Common Session Setup Response Message to reject session setup because of failed device authority after receiving Common Session Setup Request Message from device under test;

3) Test device B sends Retrieve Session Encryption Key Generation Response to device under test after receiving Retrieve Session Encryption Key Generation Request from device under test; simultaneously test device A listens to messages through the device pipe between test device A and device under test.

—— Pass Verdict Condition

1) In step 3, test device A shall receive Session Encryption Key Transfer Request Message from device under test;

2) In step 3, the format of the request message shall conform to definitions and requirements of Table 80 in ISO/IEC 14543-5-1.

6.12.3.8 Test case 7

—— Test Purpose

To validate whether device under test can send correct Common Session Setup Request Message with the session encryption key to the other device after device under test receives Session Encryption Key Transfer Response Message from the other party.

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—— Reference

10.5.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

1) IGRS client of device under test initiates IGRS service invocation of test device A;

2) Test device A sends Common Session Setup Response Message to reject session setup because of failed device authority after receiving Common Session Setup Request Message from device under test;

3) Test device B sends Retrieve Session Encryption Key Generation Response to device under test after receiving Retrieve Session Encryption Key Generation Request from device under test;

4) Test device A sends Session Encryption Key Transfer Response Message to device under test after receiving Session Encryption Key Transfer Request Message from device under test; simultaneously test device A listens to messages through the device pipe between test device A and device under test.

—— Pass Verdict Condition

1) In step 4, test device A shall receive Common Session Setup Request Message with session encryption key from device under test;

2) In step 4, the format of the decryption result of the request message shall conform to 2) definitions and requirements of Table 74 in ISO/IEC 14543-5-1.

6.12.3.9 Test case 8

—— Test Purpose

To validate whether device under test can send correct Common Session Teardown Notification Message with session encryption key when IGRS client of device under test needs to terminate the session established by using the session encryption key between device under test and other devices.

—— Reference

10.5.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

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IGRS client of device under test initiates session termination between device under test and IGRS service of test device A; simultaneously test device A listens to session messages exchanged between test device A and device under test.

—— Pass Verdict Condition

1) Test device A shall receive Common Session Teardown Notification Message with session encryption key from device under test;

2) The format of the decryption result of the request message shall conform to definitions and requirements of Table 77 in ISO/IEC 14543-5-1.

6.12.3.10 Test case 9

—— Test Purpose

To validate whether device under test can send correct Retrieve Session Encryption Key Generation Response when device under test as the master device receives Retrieve Session Encryption Key Generation Request from slave device of its device group.

—— Reference

10.5.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

Test device A sends Retrieve Session Encryption Key Generation Request to device under test through the device pipe between test device A and device under test and the request includes device IDs of test device A and test device B; simultaneously test device A listens to session messages exchanged between test device A and device under test.

—— Pass Verdict Condition

1) Test device A shall receive Retrieve Session Encryption Key Generation Response from device under test;

2)The format of the response message shall conform to definitions and requirements of Table 79 in ISO/IEC 14543-5-1.

6.13 Service invocation conformance test suite

6.13.1 Reference messages

Service Invocation Request Message (Table 82 in ISO/IEC 14543-5-1).

Service Invocation Response Message (Table 83 in ISO/IEC 14543-5-1).

Notification Message Based on Session (Table 84 in ISO/IEC 14543-5-1).

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6.13.2 Test case suite

6.13.2.1 Pre-condition

Pre-condition 1: applicable to test case 1 and 2

—— Test device and device under test are in the same IP broadcast domain of Local Area Networks (LAN);

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device captures Device Online Advertisement message from device under test and attains the content of field: NT by listening to on multicast port: 239.255.255.250:3880;

—— IGRS service on device under test works normally;

—— Test device captures Service Online Advertisement Message from device under test and attains the content of field: 01-ServiceId by listening to on multicast port: 239.255.255.250:3880;

—— Secure device pipe is set up between test device and device under test according to the security requirements of IGRS service;

—— A session is successfully established between IGRS client of test device and target service of device under test;

—— Test device listens to on the device pipe between test device and device under test;

—— Test device knows the invocation interface of IGRS service on device under test.

Pre-condition 2: applicable to test case 3

—— Test device and device under test are in the same IP broadcast domain of Local Area Networks (LAN);

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device periodically sends Device Online Advertisement message to multicast port: 239.255.255.250:3880;

—— Test device sends Service Online Advertisement Message to multicast port: 239.255.255.250:3880, advertising IGRS service of test device;

—— Device pipe is set up between test device and device under test;

—— A session is successfully established between IGRS client of device under test and IGRS service of test device;

—— Test device listens to on the device pipe between test device and device under test;

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—— Device under test has control interface through which IGRS client of device under test can be controlled to initiate IGRS service invocation of other devices.。

Pre-condition 3: applicable to test case 4

—— Test device and device under test are in the same IP broadcast domain of Local Area Networks (LAN);

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device captures Device Online Advertisement message from device under test and attains the content of field: NT by listening to on multicast port: 239.255.255.250:3880;

—— IGRS service on device under test works normally;

—— Test device captures Service Online Advertisement Message from device under test and attains the content of field: 01-ServiceId by listening to on multicast port: 239.255.255.250:3880;

—— Secure Device pipe is set up between test device and device under test according to the security requirements of IGRS service;

—— A session is successfully established between IGRS client of test device and target service of device under test;

—— Test device listens to on the device pipe between test device and device under test;

—— Test device knows invocation interface of IGRS service on device under test;

—— Device under test has control interface through which IGRS service of device under test can be controlled to send Notification Message Based on Session

Pre-condition 4: applicable to test case 5

—— Test device and device under test are in the same IP broadcast domain of Local Area Networks (LAN);

—— IGRS protocol on the device under test is initiated and running normally;

—— Test device periodically sends Device Online Advertisement message to multicast port: 239.255.255.250:3880;

—— Test device sends Service Online Advertisement Message to multicast port: 239.255.255.250:3880, advertising IGRS service of test device;

—— Device pipe is set up between test device and device under test;

—— A session is successfully established between IGRS client of device under test and IGRS service of test device;

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—— Test device listens to on the device pipe between test device and device under test;

—— Device under test has control interface through which IGRS client of device under test can be controlled to send Notification Message Based on Session.

6.13.2.2 Test case 1

—— Test Purpose

To validate whether device under test can send correct Service Invocation Response Message after device under test receives Service Invocation Request Message.

—— Reference

10.6.2 of ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends Service Invocation Request Message to device under test through the session between test device and device under test. This message conforms to definitions and requirements of Table 82 in ISO/IEC 14543-5-1 and:

1) The value of field: 01-TargetDeviceId is set as the same as the value of field: NT of device under test online advertisement message;

2) The value of field: <ServiceId> is set as the same as the value of field: 01-ServiceId of Service Online Advertisement Message of device under test.

Simultaneously test device listens to session messages exchanged between test device and device under test.

—— Pass Verdict Condition

1) Test device shall receive Service Invocation Response Message from device under test;

2) The response message shall conform to definitions and requirements of Table 83 in ISO/IEC 14543-5-1;

3) The response message received by test device shall satisfy:

- The value of field: 01-SourceDeviceId in the response message is the same as field: 01-TargetDeviceId in the request message from test device;
- The value of field: 01-TargetDeviceId in the response message is the same as field: 01-SourceDeviceId in the request message from test device;
- The value of field: <AcknowledgeId> in the response message body is the same as the value of field: <SequenceId> in the request message body sent by test device;

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- The value of field: 01-AcknowledgeId in the response message header is the same as the value of field: 01-SequenceId of the request message header sent by test device;

- The value of field: <ClientId> in the response message is the same as field: <ClientId> in the request message from test device;

- The value of field: <ServiceId> in the response message is the same as field: <ServiceId> in the request message from test device.

6.13.2.3 Test case 2

—— Test Purpose

To validate whether device under test can send correct Service Invocation Response Message and field: <ReturnCode> of the message body is 100 (successful) when device under test receives Service Invocation Request Message with correct invocation method and parameter and it can complete service invocation.

—— Reference

10.6.2 and Clause 11 of ISO/IEC 14543-5-1

Response status code of response message in Table 85 and 86 in ISO/IEC 14543-5-1

—— Conformance Category

Mandatory

—— Test Procedure

Test device sends Service Invocation Request Message to device under test through the session between test device and device under test. This message conforms to definitions and requirements of Table 82 in ISO/IEC 14543-5-1 and:

1) The value of field: 01-TargetDeviceId is set as the same as the value of field: NT of device under test online advertisement message;

2) The content of field: <ServiceId> is set as the same as the value of field: 01-ServiceId of Service Online Advertisement Message of device under test;

3) Service invocation method and parameter settings are all correct.

Simultaneously test device listens to session messages exchanged between test device and device under test.

—— Pass Verdict Condition

1) Test device shall receive Service Invocation Response Message from device under test;

2) The response message shall conform to definitions and requirements of Table 83 in ISO/IEC 14543-5-1;

3) Field: <ReturnCode> of the response message body is 100.

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4311 **6.13.2.4 Test case 3**

4312 —— Test Purpose

4313 To validate whether device under test can send correct Service Invocation Request Message
4314 when IGRS client of device under test invokes IGRS service of test device.

4315 —— Reference

4316 10.6.1 of ISO/IEC 14543-5-1

4317 —— Conformance Category

4318 Optional

4319 —— Test Procedure

4320 IGRS client of device under test invokes IGRS service of test device; simultaneously test
4321 device listens to session messages exchanged between test device and device under test.

4322 —— Pass Verdict Condition

4323 1) Test device shall receive Service Invocation Request Message from device under test;

4324 2) The request message shall conform to definitions and requirements of Table 82 in
4325 ISO/IEC 14543-5-1.

4326 **6.13.2.5 Test case 4**

4327 —— Test Purpose

4328 To validate whether IGRS service of device under test can send correct Notification Message
4329 Based on Session.

4330 —— Reference

4331 10.6.3 of ISO/IEC 14543-5-1

4332 —— Conformance Category

4333 Optional

4334 —— Test Procedure

4335 IGRS service of device under test sends Notification Message Based on Session to IGRS
4336 client of test device; simultaneously test device listens to session messages exchanged
4337 between test device and device under test.

4338 —— Pass Verdict Condition

4339 1) Test device shall receive Notification Message Based on Session from device under test;

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2) The notification message shall conform to definitions and requirements of Table 84 in ISO/IEC 14543-5-1.

6.13.2.6 Test case 5

—— Test Purpose

To validate whether IGRS client of device under test can send correct Notification Message Based on Session.

—— Reference

10.6.3 of ISO/IEC 14543-5-1

—— Conformance Category

Optional

—— Test Procedure

IGRS client of device under test sends Notification Message Based on Session to IGRS service of test device; simultaneously test device listens to session messages exchanged between test device and device under test.

—— Pass Verdict Condition

1) Test device shall receive Notification Message Based on Session from device under test;

2) The notification message shall conform to definitions and requirements of Table 84 in ISO/IEC 14543-5-1.

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