

# ISO/IEC 14543-5-1:2010-02 (E)

## Information technology – Home electronic system (HES) architecture – Part 5-1: Intelligent grouping and resource sharing for Class 2 and Class 3 – Core protocol

---

### CONTENTS

FOREWORD.....	8
INTRODUCTION.....	9
1 Scope.....	10
2 Normative references .....	10
3 Terms, definitions and abbreviations .....	11
3.1 Terms and definitions .....	11
3.2 Abbreviations .....	12
4 Conformance.....	13
4.1 IGRS network.....	13
4.2 IGRS devices .....	13
5 IGRS architecture.....	14
5.1 Overview .....	14
5.2 IGRS Core Protocol.....	15
5.3 IGRS Application Profile.....	15
5.4 IGRS Application.....	16
5.5 IGRS and other standards .....	17
6 IGRS device interaction model .....	18
6.1 Overview .....	18
6.2 Device online .....	19
6.3 Device (group) discovery.....	19
6.4 Device pipe setup.....	19
6.5 Device group setup and join .....	20
6.6 Service discovery .....	20
6.7 Session setup.....	21
6.8 Service invocation .....	21
6.9 Session termination.....	21
6.10 Device/Service online/offline event subscription .....	21
6.11 Device/Service online/offline event notification .....	22
6.12 Device/Service online/offline event unsubscription .....	22
6.13 Pipe disconnection .....	22
6.14 Device group dismiss and secession .....	22
6.15 Device offline .....	23
7 IGRS message framework .....	23
7.1 Overview .....	23
7.2 IGRS request/notification message structure.....	24
7.3 IGRS response message structure .....	25
7.4 IGRS message based on secure device pipe.....	26
7.4.1 Message authentication code generation.....	26
7.4.2 Message encryption.....	27
8 IGRS device and service description .....	27
8.1 IGRS device description .....	27
8.1.1 Device description template.....	27
8.1.2 Device identifier.....	31
8.1.3 Device group identifier.....	31
8.1.4 Device type identifier.....	32
8.1.5 Device security mechanism descriptor .....	33

8.2	IGRS service description .....	40
8.2.1	Service description template.....	40
8.2.2	Service identifier.....	51
8.2.3	Service type identifier.....	51
8.2.4	Service access control.....	52
8.2.5	Identity authentication mechanism of service access control.....	53
8.3	IGRS client description.....	56
8.4	IGRS user description .....	56
	IGRS device grouping.....	56
9.1	Device advertisement.....	56
9.1.1	Device online advertisement.....	56
9.1.2	Device offline advertisement.....	58
9.2	Device pipe management .....	58
9.2.1	Unsecure device pipe setup.....	58
9.2.2	Unsecure device pipe maintenance .....	58
9.2.3	Secure device pipe setup .....	59
9.2.4	Secure device pipe teardown.....	79
9.2.5	Device trust relationship .....	80
9.2.6	Device online detection .....	80
9.3	Detailed device description document retrieval.....	81
9.3.1	Retrieve detailed device description document request.....	81
9.3.2	Retrieve detailed device description document response.....	82
9.4	Retrieve detailed device description document based on non-secure pipe.....	84
9.5	Device group setup .....	84
9.5.1	Global peer-to-peer device group .....	84
9.5.2	Specified peer-to-peer device group .....	84
9.5.3	Centralised device group.....	86
9.6	Device search .....	90
9.6.1	Device search based on multicast .....	90
9.6.2	Device search by proxy .....	94
9.7	Device online/offline event subscription.....	97
9.7.1	Device online/offline event subscription request .....	97
9.7.2	Device online/offline event subscription renewal request .....	99
9.7.3	Device online/offline event subscription response.....	100
9.7.4	Device online/offline event unsubscription .....	101
9.7.5	Device online/offline event notification.....	102
9.8	Device group search .....	104
9.8.1	Device group search request message .....	104
9.8.2	Device group search response message.....	105
	IGRS resource sharing .....	107
10.1	Service online advertisement.....	107
10.1.1	Service online advertisement based on multicast.....	107
10.1.2	Service online registration and offline notification based on device pipe.....	109
10.2	Service search .....	111
10.2.1	Service search based on multicast .....	111
10.2.2	Service search by proxy .....	114
10.3	Service online/offline event subscription.....	117
10.3.1	Service online/offline event subscription request .....	117

10.3.2	Service online/offline event subscription renewal request .....	119
10.3.3	Service online/offline event subscription response .....	120
10.3.4	Service online/offline event unsubscription .....	121
10.3.5	Service online/offline event notification .....	122
10.4	Service description document retrieval .....	124
10.4.1	Retrieve service description document request .....	124
10.4.2	Retrieve service description document response .....	126
10.4.3	Other approaches to retrieve service description documents .....	127
10.5	Session .....	127
10.5.1	Session setup condition .....	127
10.5.2	Common session setup and teardown process .....	127
10.5.3	Session setup when service access control in master/slave device group is not consistent with device pipe security attribute .....	131
10.6	Service invocation .....	137
10.6.1	Service invocation request message .....	137
10.6.2	Service invocation response message .....	137
10.6.3	Notification message based on session .....	138
11	Request/response status codes .....	139
Annex A (normative)	IGRS service discovery protocols (ISDP) .....	142
A.1	General .....	142
A.2	ISDP message format .....	142
A.2.1	General .....	142
A.2.2	ISDP start-lines .....	142
A.2.3	ISDP message headers .....	142
A.2.4	ISDP processing rules .....	143
A.3	ISDP usage in IGRS specification .....	143
Annex B (normative)	Description documents .....	145
B.1	Specification description .....	145
B.2	Session description .....	249
B.3	Service description .....	250
B.4	Pipe description .....	253
B.5	Device template .....	254
B.6	Master slave device group advertisement .....	256
B.7	Device type list .....	256
B.8	Peer-to-peer device group advertisement .....	257
B.9	Device description .....	257
Bibliography	.....	259

Figure 1 – IGRS specification framework .....	15
Figure 2 – IGRS application interaction.....	17
Figure 3 – IGRS device interaction model .....	18
Figure 4 – Secure device pipe setup .....	59
Table 1 – IGRS request and notification message.....	24
Table 2 – IGRS response message.....	25
Table 3 – Message authentication code .....	27
Table 4 – Device security mechanism protocol algorithm .....	40
Table 5 – Service access control policy .....	53
Table 6 – Device authentication mechanisms and the corresponding encryption algorithm descriptor .....	56
Table 7 – Device online advertisement.....	57
Table 8 – Device offline advertisement .....	58
Table 9 – Pipe setup request based on symmetric-key cryptosystem .....	60
Table 10 – Pipe setup response based on symmetric-key cryptosystem.....	61
Table 11 – Pipe setup request based on symmetric-key authentication, encrypted message transmission, and authentication mechanism .....	61
Table 12 – Pipe setup response based on symmetric-key authentication, encrypted message transmission, and authentication mechanism .....	62
Table 13 – Pipe setup request based on authentication, encrypted message transmission, and authentication mechanism of public-key cryptosystem .....	63
Table 14 – Pipe setup response based on authentication, encrypted message transmission, and authentication mechanism of public-key cryptosystem .....	63
Table 15 – Pipe setup request based on trusted third party authentication, encrypted message transmission, and authentication mechanism .....	64
Table 16 – Pipe setup response based on trusted third party authentication, encrypted message transmission, and authentication mechanism .....	64
Table 17 – Authentication request based on identity authentication and message authentication mechanism of symmetric-key cryptosystem.....	65
Table 18 – Authentication response based on identity authentication and message authentication mechanism of symmetric-key cryptosystem.....	66
Table 19 – Authentication result request based on identity authentication and message authentication mechanism of symmetric-key cryptosystem.....	67
Table 20 – Authentication result response based on identity authentication and message authentication mechanism of symmetric-key cryptosystem.....	67
Table 21 – Authentication request based on identity authentication and encrypted message transmission and authentication mechanism of symmetric-key cryptosystem.....	68
Table 22 – Authentication response based on identity authentication and encrypted message transmission and authentication mechanism of symmetric-key cryptosystem.....	69
Table 23 – Authentication result request based on identity authentication and encrypted message transmission and authentication mechanism of symmetric-key cryptosystem .....	70
Table 24 – Authentication result response based on identity authentication and encrypted message transmission and authentication mechanism of symmetric-key cryptosystem .....	70
Table 25 – Authentication request based on authentication and encrypted message transmission and authentication mechanism of public-key cryptosystem .....	71

Table 26 – Authentication response based on authentication and encrypted message transmission and authentication mechanism of public-key cryptosystem .....	72
Table 27 – Authentication result request based on authentication and encrypted message transmission and authentication mechanism of public-key cryptosystem .....	73
Table 28 – Authentication result response based on authentication and encrypted message transmission and authentication mechanism of public-key cryptosystem .....	74
Table 29 – Authentication request based on authentication, encrypted message transmission, and authentication mechanism of trusted third party .....	75
Table 30 – Authentication response based on authentication, encrypted message transmission, and authentication mechanism of trusted third party .....	76
Table 31 – Authentication result request based on authentication, encrypted message transmission, and authentication mechanism of trusted third party .....	77
Table 32 – Authentication result response based on authentication, encrypted message transmission, and authentication mechanism of trusted third party .....	78
Table 33 – Secure device pipe setup confirmation request .....	78
Table 34 – Secure device pipe setup confirmation response .....	79
Table 35 – Secure device pipe teardown notification message .....	80
Table 36 – Trust relationship formed between devices after pipe setup .....	80
Table 37 – Device online detection request message .....	81
Table 38 – Device online detection response message .....	81
Table 39 – Device description document retrieval request message .....	82
Table 40 – Device description document retrieval response message .....	83
Table 41 – Device group advertisement message of specified peer-to-peer device group .....	85
Table 42 – Device leaves a specified peer-to-peer device group quit group message .....	86
Table 43 – Device group advertisement message of master-slave device group .....	87
Table 44 – Request message to join a master-slave device group .....	88
Table 45 – Response message to join a master-slave device group .....	88
Table 46 – Device group dissolve notification message sent by master device .....	89
Table 47 – Withdraw notification message sent by slave device .....	89
Table 48 – Device search request message .....	90
Table 49 – Device search response message .....	92
Table 50 – Device search request that slave device generates to master device .....	94
Table 51 – Device search response message .....	96
Table 52 – Device event subscription request message .....	98
Table 53 – Device online/offline event subscription renewal request message .....	100
Table 54 – Device online/offline event subscription response message .....	101
Table 55 – Device online/offline event unsubscription message .....	102
Table 56 – Device online/offline event notification message .....	103
Table 57 – Device group search request message .....	105
Table 58 – Device group search response message .....	106
Table 59 – Service online advertisement message .....	108
Table 60 – Service offline advertisement message .....	109
Table 61 – Service online registration notification message .....	110
Table 62 – Service offline notification message .....	111
Table 63 – Multicast-based service search request message .....	112

Table 64 – UDP unicast-based service search request message.....	113
Table 65 – Service search request message by proxy.....	115
Table 66 – Service search response message by proxy .....	116
Table 67 – Service online/offline event subscription request message .....	118
Table 68 – Service online/offline event subscription renewal request .....	120
Table 69 – Service online/offline event subscription response.....	121
Table 70 – Service online/offline event unsubscription message .....	122
Table 71 – Service online/offline event notification message.....	123
Table 72 – Retrieve service description document request message.....	125
Table 73 – Retrieve service description document response message .....	126
Table 74 – Common session setup request message.....	128
Table 75 – Token setup and structure .....	129
Table 76 – Common session setup response message .....	130
Table 77 – Common session teardown notification message.....	131
Table 78 – Retrieve session encryption key generation request .....	133
Table 79 – Retrieve session encryption key generation response .....	134
Table 80 – Session encryption key transfer request message .....	135
Table 81 – Session encryption key transfer response message.....	136
Table 82 – Service invocation request message.....	137
Table 83 – Service invocation response message .....	138
Table 84 – Notification message based on session .....	139
Table 85 – Response status code category.....	140
Table 86 – Response status code definition .....	141