

[MS-DPWSRP-Diff]:

Devices Profile for Web Services (DPWS): Shared Resource Publishing Data Structure

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1 Introduction

The Devices Profile for Web Services (DPWS): Shared Resource Publishing Data Structure describes the Shell Publishing data structure. This data structure is used by the HomeGroup Protocol to advertise shared files and folders in a HomeGroup peer-to-peer network environment.

Sections 1.7 and 2 of this specification are normative. All other sections and examples in this specification are informative.

1.1 Glossary

This document uses the following terms:

homegroup: A group of one or more computers that are AES joined together by using Advanced Encryption Standard (AES) through the HomeGroup Protocol, which are able to share resources (files, printers, and so on) with each other.

HomeGroup machine: The machine where files are being shared, and that creates the Shell Publishing data structure.

HomeGroup user: A user account on the HomeGroup machine where files are being shared.

Internet SID: A user SID that represents an online identity. The SID is unique across all providers and all machines. The SID is a hash of the identity's unique ID and the provider GUID.

item ID list (IDList): A data structure that refers to a location. An item ID list is a multi-segment data structure where each segment's content is defined by a data source that is responsible for the location in the namespace referred to by the preceding segments.

security identifier (SID): An identifier for security principals that is used to identify an account or a group. Conceptually, the SID is composed of an account authority portion (typically a domain) and a smaller integer representing an identity relative to the account authority, termed the relative identifier (RID). The SID format is specified in [MS-DTYP] section 2.4.2; a string representation of SIDs is specified in [MS-DTYP] section 2.4.2 and [MS-AZOD] section 1.1.1.2.

Web Services on Devices (WSD): A function-discovery protocol used to discover and communicate certain data structures in a HomeGroup network environment. Implementation details are specified in [DPWS].

XML schema: A description of a type of XML document that is typically expressed in terms of constraints on the structure and content of documents of that type, in addition to the basic syntax constraints that are imposed by XML itself. An XML schema provides a view of a document type at a relatively high level of abstraction.

MAY, SHOULD, MUST, SHOULD NOT, MUST NOT: These terms (in all caps) are used as defined in [RFC2119]. All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

1.2 References

Links to a document in the Microsoft Open Specifications library point to the correct section in the most recently published version of the referenced document. However, because individual documents in the library are not updated at the same time, the section numbers in the documents may not match. You can confirm the correct section numbering by checking the Errata.

1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact dochelp@microsoft.com. We will assist you in finding the relevant information.

[DPWS] Chans, S., Conti, D., Schlimmer, J., et al., "Devices Profile for Web Services", February 2006, <http://specs.xmlsoap.org/ws/2006/02/devprof/devicesprofile.pdf>

[MS-DTYP] Microsoft Corporation, "Windows Data Types".

[MS-HGRP] Microsoft Corporation, "HomeGroup Protocol".

[MS-SHLLINK] Microsoft Corporation, "Shell Link (.LNK) Binary File Format".

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997, <http://www.rfc-editor.org/rfc/rfc2119.txt>

[RFC3548] Josefsson, S., Ed., "The Base16, Base32, and Base64 Data Encodings", RFC 3548, July 2003, <http://www.rfc-editor.org/rfc/rfc3548.txt>

1.2.2 Informative References

[XMLNS] Bray, T., Hollander, D., Layman, A., et al., Eds., "Namespaces in XML 1.0 (Third Edition)", W3C Recommendation, December 2009, <http://www.w3.org/TR/2009/REC-xml-names-20091208/>

1.3 Overview

This specification extends DPWS [DPWS] by adding the Shell Publishing data structure. The Shell Publishing data structure describes shared files and folders by each HomeGroup user on each HomeGroup machine in a HomeGroup network environment. <1>

1.4 Relationship to Protocols and Other Structures

The Shell Publishing data structure is a data structure format made available to HomeGroup networked environment by a DPWS provider.

Shell Publishing Extension	This extension
DPWS	Industry standard
SOAP	Industry standard

1.5 Applicability Statement

Use of the Shell Publishing data structure is suitable when machines in a HomeGroup network environment share files and folders among HomeGroup members.

1.6 Versioning and Localization

This document covers versioning issues in the following areas:

- **Supported Transports:** This data structure uses the DPWS provider as the only transport.
- **Protocol Versions:** This data structure is not versioned.

- **Security and Authentication Methods:** This data structure does not support authentication. The data structure is signed using a HomeGroup public key (see [MS-HGRP] section 3.1.4.5).
- **Localization:** This data structure does not support localization.
- **Capability Negotiation:** This data structure does not support explicit capability negotiation.

1.7 Vendor-Extensible Fields

There are no vendor-extensible fields. The XML schema of the data structure is not validated, making it possible for vendors to extend the Shell Publishing data structure by adding additional elements and/or attributes. The extended data will not be interpreted unless consumed by the vendor who added it.

2 Structures

2.1 The Shell Publishing Data Structure

The Shell Publishing data structure describes a method of publishing and discovering shared files and folders in a HomeGroup configured network environment.

The Shell Publishing data structure MUST be transported using WSD. The WSD type MUST be ShellPublishing.

This structure uses SID structures as specified in [MS-DTYP] section 2.4.2.

An individual HomeGroup member MUST publish certain data about his or her shared files and folders as specified in section 2.1.2.1, in order to participate in the HomeGroup sharing.

The Shell Publishing XML data structure is defined as follows:

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:simpleType name="serializedType">
    <xs:restriction base="xs:string">
      <xs:pattern value="\{[A-Za-z0-9+/*}\}"/>
    </xs:restriction>
  </xs:simpleType>
  <xs:element name="pi" type="pi" />
</xs:schema>
```

pi: A **pi** complex type, as specified in section 2.1.2.1. Published items. Serves as an envelope for descriptions of a HomeGroup user's shared files.

2.1.1 Namespaces

XML Namespace	Reference
http://www.w3.org/2001/XMLSchema	[XMLNS]

2.1.2 Complex Types

The following table summarizes the set of common XML schema complex types defined by this specification.

Complex Type	Description
pi	Published items. The envelope for the description of shared files and folders.
usersFilesDescription	Describes shared files and folders per HomeGroup user, per HomeGroup machine in the HomeGroup.
o	Owner. Describes a HomeGroup user in the HomeGroup machine that is sharing the files and folders on the HomeGroup.
il	Items list. Describes a list of items that are being shared by a HomeGroup user in a HomeGroup machine on the HomeGroup.
dil	Discretionary access items list. Describes a list of items that have their security set so that only a specific set of HomeGroup users has access to them.

Complex Type	Description
i	Item. Describes a file or folder that is being shared by a HomeGroup user in a HomeGroup machine on the HomeGroup.
ul	User list. Describes a list of SIDs that identifies the users the particular item is shared with.

2.1.2.1 pi

The pi (published items) complex type is an envelope that contains the description of shared files and folders.

```
<xs:element name="pi">
  <xs:complexType>
    <xs:element name="usersFilesDescription" type="usersFilesDescription" />
  </xs:complexType>
</xs:element>
```

usersFilesDescription: A description of the HomeGroup user's files. Defines the resources shared by a HomeGroup user on a HomeGroup machine.

2.1.2.2 usersFilesDescription

The usersFilesDescription complex type describes shared files and folders per HomeGroup user, per HomeGroup machine in the HomeGroup.

```
<xs:element name="usersFilesDescription">
  <xs:complexType>
    <xs:all>
      <xs:element name="o" type="o" />
      <xs:element name="il" type="il" minOccurs="0" />
      <xs:element name="dil" type="dil" minOccurs="0" />
    </xs:all>
  </xs:complexType>
</xs:element>
```

o: The owner of the shared resource. The owner is typically the HomeGroup user who designates a resource for sharing.

il: Optional element. When present, contains a sequence of one or more items (the item list).

dil: Optional element. When present, contains a sequence of one or more items (the item list), which are shared with specific other members of the HomeGroup using discretionary access.

The **usersFilesDescription** MUST contain at least an **il** or a **dil** element. If both the **il** and **dil** elements are missing, the message will be discarded.

2.1.2.3 o

The o (owner) complex type describes a HomeGroup user in the HomeGroup machine that is sharing the files and folders on the HomeGroup.

```
<xs:element name="o">
  <xs:complexType>
    <xs:annotation>
```

```

        <xs:documentation>owner information, attributes are user name, alias and
        SID</xs:documentation>
      </xs:annotation>
    </xs:complexContent>
  </xs:complexType>
</xs:element>

```

- un:** The owner's user name (display name). This is the display name for the HomeGroup user on the HomeGroup machine sharing the files and folders on the HomeGroup.
- a:** The owner's alias. Describes the **alias object** of the HomeGroup user on the HomeGroup machine sharing the files and folders on the HomeGroup. This value MAY be used by the implementation as a hint for the HomeGroup user identity.
- s:** Concatenation of the HomeGroup GUID and the SID (security identifier) of the account sharing the files on the HomeGroup machine. This is the unique identifier for the HomeGroup and the security identifier for the HomeGroup user on the HomeGroup machine that is sharing the files and folders on the HomeGroup.

2.1.2.4 il

The **il** (items list) complex type describes a list of items that are being shared by a HomeGroup user in a HomeGroup machine on the HomeGroup.

```

<xs:element name="il">
  <xs:complexType>
    <xs:annotation>
      <xs:documentation>item list</xs:documentation>
    </xs:annotation>
    <xs:all>
      <xs:element name="i" minOccurs="1" maxOccurs="unbounded" type="i" />
    </xs:all>
  </xs:complexType>
</xs:element>

```

- i:** An item in the item list. Contains a description of shared files and folders for the HomeGroup user on the HomeGroup machine.

2.1.2.5 dil

The **dil** (discretionary access items list) complex type describes a list of items that have their security set so that only a specific set of HomeGroup users has access to them. Clients of the information SHOULD only present these items to the user if the user's security identifier (SID) values match one of the user identities in the **ul** (user list) complex type. Items that are shared by using discretionary access can be shared only with users represented by Internet SIDs.

```

<xs:element name="dil">
  <xs:complexType>
    <xs:annotation>
      <xs:documentation>discretionary access item list</xs:documentation>
    </xs:annotation>
    <xs:all>
      <xs:element name="i" minOccurs="1" maxOccurs="unbounded" type="i" />
    </xs:all>
  </xs:complexType>

```

```
</xs:element>
```

i: An item in the item list. Contains a description of shared files and folders for the HomeGroup user on the HomeGroup machine.

2.1.2.6 i

The **i** (item) complex type describes a file or folder that is being shared by a HomeGroup user in a HomeGroup machine on the HomeGroup.

```
<xs:element name="i" minOccurs="1"
maxOccurs="unbounded">
  <xs:complexType>
    <xs:annotation>
      <xs:documentation>item, sub elements are path (absolute UNC or machine relative),
display name and BASE-64 encoded serialized shell link</xs:documentation>
    </xs:annotation>
    <xs:all>
      <xs:element name="p" type="xs:anyURI"/>
      <xs:element name="dn" type="xs:string" minOccurs="0" />
      <xs:element name="sl" type="serializedType"/>
      <xs:element name="ul" type="ul" minOccurs="0" />
    </xs:all>
  </xs:complexType>
</xs:element>
```

p: An absolute **UNC** path or a relative machine path to the shared file or folder. If the path begins with a "\" then it is a machine-relative path. Relative paths are related to the HomeGroup machine where the message originated. The machine name is taken from the WSD Shell Publishing message that is transporting this data structure.

This element is used to access the shared resource if the shell link element **pi.usersFilesDescription.il.i.sl** is not present or if the HomeGroup machine originating the message has changed since the link was created.

dn: Optional element. When present, contains the display name of the item. The display name is sent so that if the message client implementation uses the display name, it is unnecessary to use additional protocols to retrieve the display name.

sl: A base-64-encoded binary stream representing a serialized shell link. The shell link references a file or folder shared by the HomeGroup user on the machine and contains the associated item ID list. This information is sent so that if the implementation uses the item ID list, it is unnecessary to use additional protocols to retrieve the ID list. Shell Links are specified in [MS-SHLLINK].

This field uses nonstandard base-64 encoding as specified in section 2.1.4.2.

ul: Optional element. When present, contains the users list. This is a list of Internet SIDs (security identifiers) that identifies the users that have discretionary access to a shared item. This list SHOULD only be included if the user is sharing out items by using discretionary access.

2.1.2.7 ul

The **ul** (user list) complex type describes a list of SIDs that identifies the users the particular item is shared with. Because sharing based on discretionary access is only possible using Internet SIDs, this list MUST contain only Internet SIDs.

```
<xs:element name="ul">
  <xs:complexType>
    <xs:annotation>
```

```

    <xs:documentation>user list</xs:documentation>
  </xs:annotation>
  <xs:all>
    <xs:element name="u" minOccurs="1">
      <xs:complexType>
        <xs:sequence>
          <xs:element name="s" type="xs:string" minOccurs="1" maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:all>
</xs:complexType>
</xs:element>

```

u.s: The SID of the account sharing the files on the HomeGroup machine. Describes the security identifier for the HomeGroup user on the HomeGroup machine that is sharing the files and folders on the HomeGroup.

2.1.3 Simple Types

The following table summarizes the set of common XML schema simple type definitions defined by this specification.

Simple type	Description
serializedType	A base-64-encoded binary stream

2.1.3.1 serializedType

The serializedType simple type contains a base-64-encoded binary stream.

```

<xs:simpleType name="serializedType">
  <xs:restriction base="xs:string">
    <xs:pattern value="\{[A-Za-z0-9+/*}\}"/>
  </xs:restriction>
</xs:simpleType>

```

pattern: This value describes base-64 encoding using the following pattern: `[A-Za-z0-9+/*}\]*`

This field uses non-standard base-64 encoding as specified in section 2.1.4.2.

2.1.4 Encryption Rules

2.1.4.1 Data Signing

The Shell Publishing data structure MUST be signed using a HomeGroup public key ([MS-HGRP] section 3.1.4.5) prior to being encoded. To create the signature, the data structure is hashed and the hash value is encrypted using HomeGroup public key. This signature is then appended to the data structure.

2.1.4.2 Data Encoding

This data structure MUST be base-64 encoded after being signed and before being transported in a WSD message. The base-64 encoding used by this data structure is a modification on the standard encoding specified by [RFC3548]. The alphabet used is the same, but the encoding algorithm is different (see 2.1.4.2.2).

2.1.4.2.1 Alphabet

The base-64 alphabet used by this data structure is the following:

Value	Encoding	Value	Encoding	Value	Encoding	Value	Encoding
0	A	17	R	34	i	51	z
1	B	18	S	35	j	52	0
2	C	19	T	36	k	53	1
3	D	20	U	37	l	54	2
4	E	21	V	38	m	55	3
5	F	22	W	39	n	56	4
6	G	23	X	40	o	57	5
7	H	24	Y	41	p	58	6
8	I	25	Z	42	q	59	7
9	J	26	a	43	r	60	8
10	K	27	b	44	s	61	9
11	L	28	c	45	t	62	+
12	M	29	d	46	u	63	/
13	N	30	e	47	v		
14	O	31	f	48	w		
15	P	32	g	49	x		
16	Q	33	h	50	y		

2.1.4.2.2 Encoding

The data being encoded is manipulated at the 8-bit chunk (octet) borders. The lowest 6 bits are converted to an appropriate alphabet character. (The value represented by these 6 bits is converted to a corresponding character, shown in the table in section 2.1.4.2.1). The remaining 2 bits are combined with the next octet by making them the lowest 2 bits. And the process is repeated, with each step having 2 more extra bits until 6 bits remain, which are then converted to a character without the use of the next octet. The following diagram illustrates this process:

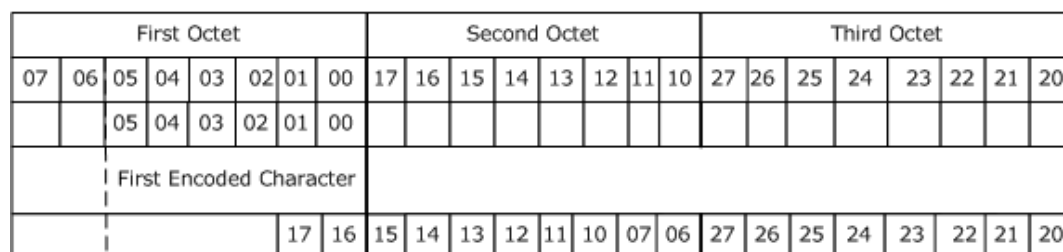


Figure 1: Data encoding at the 8-bit (octet) level

The lowest 6 bits of the second octet are converted to the next character, and the remaining 4 bits are moved to be the lowest 4 bits of the next octet.

First Octet						Second Octet								Third Octet											
					17	16	15	14	13	12	11	10	07	06	27	26	25	24	23	22	21	20			
									13	12	11	10	07	06											
						Second Encoded Character																			
										27	26	25	24	23	22	21	20	17	16	15	14				
														Third Encoded Character											
														27	26	25	24	23	22						
														Fourth Encoded Character											

Figure 2: Data encoding of the lowest 6 bits and remaining 4 bits

3 Structure Examples

3.1 Shell Publishing Data Structure Example

This section contains an example of the Shell Publishing data structure. This example is given raw, before the structure is signed and base-64 encoded. Sections 3.2 and 3.3 contain examples of signing and base-64 encoding for this particular example.

```
<?xml version="1.0" encoding="UTF-8"?>
<pi>
  <usersFilesDescription>
    <o un="nikola" a="nikola" s="S-1-5-21-2555710863-3024264161-1621211007-1001" />
    <il>
      <i>
        <p>\Users\nikola\AppData\Roaming\Microsoft\Windows\Libraries\Music.library-ms</p>
        <sl>MBAAAEAFCAAAAAAAAAADAAAAAAAAYkgAADBgAAAAUOEKgcwPcAF2JNOOnVKHQhdSjjzZlyBMtHAAAAAAAAABAAAAAAAA
AAAAAAAAAAAAAAAAAYIAAAAHAAAAACAAAAAAAAAAAAAAAAAAAAIAEAAAgJAAACAAAAQBAAAAAAAAAAAAAAgAAwFXO10SPxUQtA1QcV
1UFJ1UA4War9GbhxVQwBHRhRXYcJ1bh1WaudGXN12Yy92cvZGdcVaur2b3NHXmLmYyFmcpV2cc1Udz12YuwWaiJXYy1X
LtnHAD0AAAwAAAKFA8BWN0BLwHivQNEiwO3Z8b578MLAAQrAs7rTuznAQAAAAAAAAEAAAQMTB1UwEfJ3++RaARpxLAY
M656sWCAAAgCAAAAA8BAAAgCAAAAUbQaAsGAvBAbAEGAtAAUAMEAAAAAAAAAAAtAAAAEzUQN1Ok2r3zeZgDF55Ehp2pU5qR
AAAAAAAAAAATAAAAAAAAAAAAAAAAAtAAAAEzUQN1cDVuC+OUrPVI5pxthzgpbrAAAAsAAAAALAAA8//AAAAAAAAAAAAAAAA
AAsAwBUMXc5War9Gbh1CUDxVVzVmczBQTpNmvcN3bmRHIOVGd39mcrBAACAAUAEAAAAAAAAo1OXwJEA4War9GbhBAA6AA
CAQAav7rW7oAnatzFcqCAAAwqTDAAAAgAAAAAAAAAAAAAAAAAAAAAUbQaAsGAvBAbAEGAAgFAIFAxAAAAAAAtzCcCBA
BBHcEFGdhBAPAgAAEAw7+q1OLwPw7sAnqAAAAc70AAAAIAAAAAAAAAAAAAAAAAAAAAQQAHAwBARAEGA0BQYAAAAWAgUA
EDAAAAAAAAo1OSwJEA11bh1WaudGA8ACAQAav7rW7sAnatzEccqCAAAAUtDAAAAgAAAAAAAAAAAAAAAAAAAAASBwbAEGATB
Qaa4GAnBAAAYBAYBQMAAAAAAgW70BnQAQTJNkUPN1fxAAAAACAQAav7rW7sAnatTHcQCAAAQuTDAAAAgAAAAAAAAAAAA
AAAAAAAAANBQaAMGAYBwbAMHAvBgZAQHAAAGAIFAxAAAAAAAtzFcCBAXlmbk92dzBAPAgAAEAw7+q1OLwPw7cBnqAAA
Ao70AAAAIAAAAAAAAAAAAAAAAAAAwVAKGauBAZA8GA3BwcAAAAWAAWAEAAAAAAAAo1ODyZEAWUSCJVQS5XMAAAQAgAAE
Aw7+q1OXwpW7MInqAAAAGe/AAAAAAAAAAAAAAAAAAAAAAAAAAATakGaiBgcAEGAYBQaAUGAZBAAAgBAQCgMAMtHAAgW7M
IngAQTVNVSD5XMuwUSCBgdAgAAEAw7+q1OXwpW7MInqAAAAGe/AAAAAAAAAAAAAAAAAAAAAAAAAAATakGaiBgcAEGAYBQa
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    </i>
  </dl>
  <u>
    <u>
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```

```

1330011019-2935621724</s>          </u>          </ul>          </i>          <i>
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2661722203-1597581903-1847293483-3855340794-256571992-1330011019-2935621724</s>          </u>
</ul>          </i>          </dil>
</usersFilesDescription>
</pi>

```

3.2 Signed XML Data

The following signature has been created based on the Shell Publishing data structure example in section 3.1. This signature has been created by hashing the data using the HomeGroup public key (see section 2.1.4.1). This signature can be appended to the Shell Publishing data structure example before base-64 encoding in order to create an authentic message.

```

0x0000:          01 00 00 9d 21 49 20 76
0x0008: ff 72 31 7f 31 5f 57 ef-22 ae 08 92 8e 08 29 5d
0x0028: cd 54 ab 8f 7e 9a 42 ea-a4 c1 03 07 41 38 62 77
0x0048: de 33 cb 83 c2 4f eb b2-cb 10 84 02 8b 22 4f d0
0x0068: 74 e2 04 c6 af 3c 23 8a-5d e3 7c c0 5b b1 84 c2
0x0088: 2c 95 67 aa ff 17 08 7a-48 52 0f 30 2b 6c cd 3d
0x00A8: 3a 24 97 67 0a 68 5d b2-8c 3c a9 d6 90 cf 18 3b
0x00C8: 69 c8 58 de 94 57 e8 39-30 98 0a 79 ac 44 85 02
0x00E8: 21 5e 5e cf 96 24 64 27-59 0a 98 cb 88 68 a5 66
0x0108: 14 1e e6 4a 7d ab e0 15-8e 5b 57 08 3d 7f 0c c3
0x0128: f3 d9 dc 68 95 48 8d 5d-e3 1d 42 3b d0 a1 33 ed
0x0148: f0 30 ea 0e 5c de ca 93-a5 c2 fe a5 72 0c c6 3b
0x0168: c6 aa dd 38 99 dd 44 22-f5 e0 d4 df 74 2a f3 4b
0x0188: 32 c5 55 59 c4 a1 a6 52-3f 9f a2 39 24 33 38 c5
0x01A8: 45 3b 9c f1 24 de be af-41 c0 6d 28 0e 5a 75 4c
0x01C8: 4a 64 5d b0 b0 6d d1 d2-39 2f 1c f3 64 f3 0c 3a
0x01E8: df 9f 00 ec 48 37 01 24-f7 a4 9a

```


3.3 Base-64-Encoded Shell Publishing Data Structure Example

This section contains a signed, base-64-encoded version of the Shell Publishing data structure example provided in section 3.1. The base-64 encoding has been applied to the structure after appending the signature given in section 3.2.

```
0x0000: TxAAAwzP41GbgYXZyNXav5WPiEjLwICI
0x0020: 152YvRWaudWPiUFVG1COi8jPNoAPwLmP
0x0040: NoAIgwTdzVmczZUasV2cEV2cjJXawRXa
0x0060: v5mPNoAIgACI88GI15WPI4War9GbhJCI
0x0080: h1jIu12avxWYiAyc9IyUtETLl0iMx0iM
0x00A0: 1UTN3EDM4YzMtMDMyQjM2QTM2ETLxYjM
0x00C0: xITMxADM30SMwATMiAyL+0gCgACIgwTa
0x00E0: s5TDKACIgACIgwTa+0gCgACIgACIgACP
0x0100: w5DXVNXZyNHXul2avxWYcFEcwRUY0FGX
0x0120: S9WYtLmbnxVTpNmcvN3bmRHXXLmbk92d
0x0140: zxFtPjMchJXalNHXNV3cpNmLs1mYyFmc
0x0160: 51SbzXzLw5TDKACIgACIgACI8MHb+0kQ
0x0180: BFUQFFkRDFUQBFUQBFUQBFUQBFUQBFUW
0x01A0: rdWQBRkQnFUQBFUQBFUQBFUQBFUQBFUW
0x01C0: K50TP5mVhUoR2UqpmeaxWeC1EdIFUQ
0x01E0: BFUQBFUQCFUQBFUQBFUQBFUQBFUQBFUQ
0x0200: BFUQZ1UQBFUQIFUQBFUQBFUQBFUQBFUQ
0x0220: BFUQBFUQjFUQBFUSFFUQBFUQBFUQBFUQ
0x0240: BFUQRJUQBFUQBFUQBFUQBFUQBFUQBFUQ
0x0260: wMFU4VVU0FUMRNmVxU1RKFTVBRzVhJXO
0x0280: HJGa4ZVU3JESShmUY11YKFjYoFzVhVHZ
0x02A0: Hh1TsJTW51jMjZnWHR2YkZVY1J1MiNjT
0x02C0: IhVTs1WW5ZUbjBnVyM2YxUFZ6xmMZV3d
0x02E0: XFWaKhVW5xGWMRnTIFERPFUQBFUQBFUQ
0x0300: LZUQ4I0V09mQMdHSpZXUOVUa390MahjY
0x0320: 1cDONxUQBFUQUYF0c3IHV1pnbBFVQBFUQ
0x0340: BFUQFVUQBFUUNR1QxU1dFZmszsyKSFwQ
0x0360: SBHeMFUWNZTN2M3VDFUQBFUQBFUQBFUQ
0x0380: CFUQBFUQBFUQBFUQBFUQBFUQBFUQBFUQ
0x03A0: HFEdBFUVB1URBFUQBFUQBFUQBFUQBFUQ
0x03C0: 6VVU0x2TrJjczoxZ6dGRGVTNFhGcyAXV
0x03E0: 1EnUBFUQB1UQBFUQBFUQBFUQBFUQBFUQ
0x0400: BFUQBFUQ0FUQBFUR6VVUOFzYEZVdDtyT
0x0420: VJHUW1LUNwhHdop3ZwJmUBFUQBNXQBFUQ
0x0440: BFETBFUQBhzLvEUQBFUQBFUQBFUQBFUQ
0x0460: BF0cBd3dCVVTYNWNXFmc5ckYoFzQVREe
0x0480: WZ1eW12Y6JUUBnTtNmDONjYtJFSJ9kV
0x04A0: HR2M502YyJUQBNUQBVVQFRUQBFUQBFUQ
0x04C0: x8EW3pURBRzVhJXOHJGaCFUQ2EUQDFUQ
0x04E0: BFkd3I3V38WQuFGd6Z0YxNUQBF0dxRFR
0x0500: BFUQBFUQBFUQBFUQBFUQBFUQBFUQBFUQ
0x0520: BFUdCFVYBN3RBZnQBjWQFduQBF0ZGFUS
0x0540: GFEeBFUQBFUQBFUQBFUQBFUQBFUQBFUQ
0x0560: HRGaCFEUBdWQBVUQ3dzKxFzTMDHcXdzc
0x0580: B5WcBFUQBN2NwEUQBFUQJFUQBFUQBFUQ
0x05A0: BFUQBFUQBFUQBFUQBFUQBFUQBFUQBFUQ
0x05C0: HFEMCFVWBFUQBFUQBFUQBFUQBFUQBFUQ
0x05E0: x80U3pURB1UMihWMXFwkdUQ4EUQDFUQ
0x0600: BFkd3I3V3MXQuFGdqV0YxNUQBFUQ1RFR
0x0620: BFUQBFUQBFUQBFUQBFUQBFUQBFUQBFUQ
0x0640: BF0UCdnYBV0RBRnQRFWQ0cUQuJUQBFUQ
0x0660: CFUWCFVTBFUQBFUQnd1NwIkbRFUQUUpkT
0x0680: rVFU0xmZ4FUQBFkQBNUQRFUQ2djcxXdzc
0x06A0: B5WY0RFSjF3QBFUQRVHVEFUQBF0ZBFUQ
0x06C0: BFUQBFUQBFUQBFUQBFUQBFUQBFUQBFUQ
0x06E0: HFUeCdnYB1ESBZnQnpVQRhUQBFUQHUFUS
0x0700: GFEeBFUQBFUQBFUQBFUQBFUQBFUQBFUQ
0x0720: yQmeCFEUBdWQBVUQ3dzKxFzTMDHcXdzY
0x0740: C5WcBFUQB92NwEUQBFUQJFUQBFUQBFUQ
0x0760: BFUQBFUQBFUQBFUQ3ZVQrdUQ1JUQaFEO
0x0780: HF0McD3YBFUQBFUQBFUQBFUQBFUQBFUQ
```

```

0x07A0: x8ER5pVRBdXVTNkSWF1U1gVTBFUQRFOZ
0x07C0: BFURBd3NrEXMPH1dwd1NN1kbxFUQBF0Z
0x07E0: F9SQBFUQBLUQBFBFUBFUBFUBFUBFUQ
0x0800: BFUQBFEBVt2RB1mQnNWQFdUQ5JUUhFUV
0x0820: HFkeCFUQBdmQBF1Qn1UQNRHSBF0ZXdTt
0x0840: J52ZBFFVW5kVTRUNY1Ud3V1UDJ0ZkF0Z
0x0860: BFURBd3NrEXMPH1dwd1NN1kbxFUQBFUU
0x0880: 2MkQBFUQBLUQBFBFUBFUBFUBFUBFUQ
0x08A0: BFUQBFVVBVFSBpnQRFWQNdUQ1FUQiFOa
0x08C0: HFUaCd2YBV0RB1nQRVWQwMUQ0J0djFUQ
0x08E0: BFUQCd3YBd2RBxmQBJWQ3dUQ6F0ZNFEN
0x0900: DF0acFkYBd3RBNXQRxUQNRUQwEUUOF0Y
0x0920: EFEMBFBFB9mQBFUQndGRBFBFUBFUBdWY
0x0940: zEUQBFVVTUJUMV1mcJd1R4xEV00EM1hDU
0x0960: 4tWbnp1YPNjeBFUQ3FUQBFUBVkBQFFUQ
0x0980: RtERBFUQVF0dIF1QRQVUE1mN2s2Rf1Wa
0x09A0: ONUQzNUT3BjWHFEODJ1N3ZUQBFUBFUQ
0x09C0: BFUQBFUBFBFUBFUBFUBFUBFUQwIUUNFUQ
0x09E0: BFUQBd2V38WQuJVQRZ1eW12Y6JUQZF0Z
0x0A00: BFURBd3NrUWMPZ1Qwd1NvFkbxFUQBFUU
0x0A20: 2ATQBFUBVUBFBFUBFUBFUBF0ZOFUQ
0x0A40: BFUQBF1VB1ESBxmQnNWQNhUQBFUQRfUT
0x0A60: IF0bCF1WBd3RBNnQ31UQJRUQ1FUQaF0d
0x0A80: HF0cCFETBBzQB1XQR1UQnRUQ4F0dnFUQ
0x0AA0: BFUVBFUBVERBFUBFUQvFzTYdnSFFEN
0x0AC0: XFmc5ckYoJUQBZTQBNUQRFUQ2djCXDzb
0x0AE0: B5WY0pnRjF3QBFUQ3FHVEFUQBF0ZBFUQ
0x0B00: BFUQBFUBFBFUBFUBFUBFUBFUQ1JUUhF0c
0x0B20: HFkdCFkYBV0RBFUQnZUQJZUQ4FUQBFUQ
0x0B40: BFUYOp3QjNkQBjKQINWRGdEz0JUQQF0Z
0x0B60: BFURBd3NrEXMPx0dwd1NzFkbxFUQBF0Y
0x0B80: 3ATQBFUQBLUQBFBFUBFUBFUBFUBFUQ
0x0BA0: BFUQBFVUBFBESBdnQBJVQFdUQwIUUZFUQ
0x0BC0: BF0VBdWVBVERBFUBFUQvFzTTdnSFFUS
0x0BE0: xIGaxcVY1R2RBhTQBNUQRFUQ2djCXDzc
0x0C00: B5WY0pWRjF3QBFUQBVHVEFUQBF0ZBFUQ
0x0C20: BFUQBFUBFBFUBFUBFUBFUBFUQTJ0diFUR
0x0C40: HFEdCFVYBRzRB5mQBFUQZJUQZJUUNFUQ
0x0C60: BFUQBd2V3AjqFVQRR1SotWVQ5EbmhXQ
0x0C80: BFUQCF0QBFVQBZ3Nyd1NzFkbhRHVINWc
0x0CA0: DFUQBFVdURUQBFBFUBFUQBFUBFUBFUQ
0x0CC0: BFUQBFUBFBFUBQ5kQRFWQNdUQ5J0diFUT
0x0CE0: IFkdCdmWBFFSBFUQBdUQJZUQ4FUQBFUQ
0x0D00: BFUYOpnRjNkQBhFbtJ2a5IDZ6JUQQF0Z
0x0D20: BFURBd3NrEXMPx0dwd1NjJkbxFUQBF0b
0x0D40: 3ATQBFUQBLUQBFBFUBFUBFUBFUBFUQ
0x0D60: BFUQBdnVbt2RBVnQBpVQ4cUQzI0djFUQ
0x0D80: BF0VBF0VBVERBFUBFUQvFzTELnWFF0d
0x0DA0: VN1QKZVUTVDWNFUQBFBFUBFUQFF0d3sSc
0x0DC0: x8EW3B3V30USuFXQBFBFUBFUBFUBFUQ
0x0DE0: BFUQBFUBFBFUBFUBFUBFUBFUQBFUQF0a
0x0E00: HFUaCd2YBV0RB1nQRFWQNdUQ6JUQBF0Z
0x0E20: CFUUDdWtB1EdIFUQNd1NN1kbnFUUZZ1T
0x0E40: WNFR1gVT1dXVTNkQnRWQnFUQFF0d3sSc
0x0E60: x8EW3B3V30USuFXQBFBFUBFUBFUBFUQ
0x0E80: BFUQBFUBFBFUBFUBFUBFUBFUUUFUV
0x0EA0: IFkeCFVYB10RBVXQBjWQrdUQpJ0ZjFUR
0x0EC0: HFUeCFVZBBzQBRnQ3NWQBFUBJ0djF0Z
0x0EE0: HFEbCFkYBd3RBpXQn1UQ0MUQRJUQiFOd
0x0F00: HF0cBFFTB1ERBBTQR5UQnRUQwEUQBF0b
0x0F20: CFUQBFUBFUUIFUQBF0QBFUBFUBFUBFUQ
0x0F40: BFkeU9ETXF3dPJWmWw2ZvhTew90a5RDR
0x0F60: BFUQBFUBFBFUBdmQBFUBFUBFUBF0SXFUQ
0x0F80: BFUQBFUBRzVhJXOHJGaxM0YqJUQBFUQ
0x0FA0: BFUQBdGZNPFWBNHoz8iSWJXYvV1TxZ1M
0x0FC0: y0EZPPTYjtyQ3VGSJCJ3ZEF0QVFTOXRVY
0x0FE0: IRLMGFETvkJZTFtChtEbqFGb05EVuRFd
0x1000: H5mdBN3MSd3S0E0ZBZFZ2FzaBFUQBFUQ
0x1020: 88yCS5TDKACIGACIgwzLp5TDKACIGACP
0x1040: vkGb+0gcGACpVU3c1J3cG1Gb1NHR1N3Y

```

0x1060: y1Gc012bu5TDKwzLwlmPAEAAA0ZIJBid
0x1080: /LXM/FzXX9uIuigkOiQKd1Mvr+ofaKk6
0x10A0: kG8AHEE0idn3zs8gC/06yuMEEKwii8E0
0x10C0: 0JOBG/KPjoYXjzHwbFLhCzSlnp6/Xgge
0x10E0: IJ1DwsCbN3jOkc5ZKgWxyyIPpaNkPjx0
0x1100: phMWeT5VonDMYqQesSUhCEiXe9slkQ2J
0x1120: ZpAmLjIalaGFeYuS9tK4V44WXhQP/xww
0x1140: znN3oVJSN214dI00QH6MtDPMq7AXer8k
0x1160: lKs/lKHDGvjxq2NOZ2NRiUP4U/NdqM/S
0x1180: yUcVZRcomK1PfKaOkMDOFX0OcGPJe77r
0x11A0: BBcbo4gW1xkSk1Fsw2W0SnzLcMPZzzgO
0x11C0: f/JAsj0NBQy9kqJ

4 Security

4.1 Security Considerations for Implementers

The Shell Publishing data structure relies on HomeGroup key signing to validate authenticity of the data.

4.2 Index of Security Fields

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5 (Updated Section) Appendix A: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include updates to those products.

- Windows 7 operating system
- Windows Home Server 2011 server software
- Windows 8 operating system
- Windows 8.1 operating system
- Windows 10 operating system

Exceptions, if any, are noted in this section. If an update version, service pack or Knowledge Base (KB) number appears with a product name, the behavior changed in that update. The new behavior also applies to subsequent updates unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms "SHOULD" or "SHOULD NOT" implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term "MAY" implies that the product does not follow the prescription.

<1> Section 1.3: This protocol is disabled in Windows 10 v1803 operating system **and subsequent updates**.

6 Change Tracking

No table of changes is available. The document is either new or has had no changes since its last release.

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