

[MS-DPWSRP]: Devices Profile for Web Services (DPWS): Shared Resource Publishing Data Structure

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Revision Summary

Date	Revision History	Revision Class	Comments
01/29/2010	0.1	Major	First Release.
03/12/2010	0.1.1	Editorial	Revised and edited the technical content.
04/23/2010	0.1.2	Editorial	Revised and edited the technical content.
06/04/2010	1.0	Major	Updated and revised the technical content.
07/16/2010	1.0	No change	No changes to the meaning, language, or formatting of the technical content.
08/27/2010	1.0	No change	No changes to the meaning, language, or formatting of the technical content.
10/08/2010	1.0	No change	No changes to the meaning, language, or formatting of the technical content.
11/19/2010	1.0	No change	No changes to the meaning, language, or formatting of the technical content.
01/07/2011	1.0	No change	No changes to the meaning, language, or formatting of the technical content.
02/11/2011	1.0	No change	No changes to the meaning, language, or formatting of the technical content.
03/25/2011	1.0	No change	No changes to the meaning, language, or formatting of the technical content.
05/06/2011	1.0	No change	No changes to the meaning, language, or formatting of the technical content.
06/17/2011	1.1	Minor	Clarified the meaning of the technical content.
09/23/2011	1.1	No change	No changes to the meaning, language, or formatting of the technical content.
12/16/2011	2.0	Major	Significantly changed the technical content.
03/30/2012	2.0	No change	No changes to the meaning, language, or formatting of the technical content.
07/12/2012	2.0	No change	No changes to the meaning, language, or formatting of the technical content.
10/25/2012	2.1	Minor	Clarified the meaning of the technical content.
01/31/2013	2.1	No change	No changes to the meaning, language, or formatting of the technical content.
08/08/2013	3.0	Major	Significantly changed the technical content.

Date	Revision History	Revision Class	Comments
11/14/2013	3.0	No change	No changes to the meaning, language, or formatting of the technical content.
02/13/2014	3.0	No change	No changes to the meaning, language, or formatting of the technical content.

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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 and can contain the terms MAY, SHOULD, MUST, MUST NOT, and SHOULD NOT as defined in RFC 2119. All other sections and examples in this specification are informative.

1.1 Glossary

The following terms are defined in [\[MS-GLOS\]](#):

access control list (ACL)
alias object
globally unique identifier (GUID)
security identifier (SID)
SOAP
Universal Naming Convention (UNC)
XML
XML namespace
XML schema (XSD)

The following terms are specific to this document:

discretionary access: A way of restricting access to an item that is shared with the **HomeGroup**. If an item is shared with the **HomeGroup** using discretionary access, the item's **access control list (ACL)** (see [\[MS-DTYP\]](#) section 2.4.5.1) is set such that only specific **HomeGroup users** have access to the item. Only users identified with **Internet SIDs** should be specified in the ACL.

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 (ID list): A data structure that refers to a location. An **item ID list** is a multi-segment data structure. Each segment contains content defined by a data source that is responsible for a particular location in the namespace referred to by preceding segments.

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

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

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

Web Services on Devices (WSD): A function-discovery protocol used to discover and transfer Shell Publishing data structure in a HomeGroup network environment. Implementation details are specified in [\[DPWS\]](#).

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

1.2 References

References to Microsoft Open Specifications documentation do not include a publishing year because links are to the latest version of the documents, which are updated frequently. References to other documents include a publishing year when one is available.

A reference marked "(Archived)" means that the reference document was either retired and is no longer being maintained or was replaced with a new document that provides current implementation details. We archive our documents online [\[Windows Protocol\]](#).

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

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

[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.ietf.org/rfc/rfc3548.txt>

1.2.2 Informative References

[MS-GLOS] Microsoft Corporation, "[Windows Protocols Master Glossary](#)".

[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.

1.4 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.

Complex Type	Description
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.
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:attribute name="un" type="xs:string" />
      <xs:attribute name="a" type="xs:string" />
      <xs:attribute name="s" type="xs:string" />
    </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		

Value	Encoding	Value	Encoding	Value	Encoding	Value	Encoding
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:

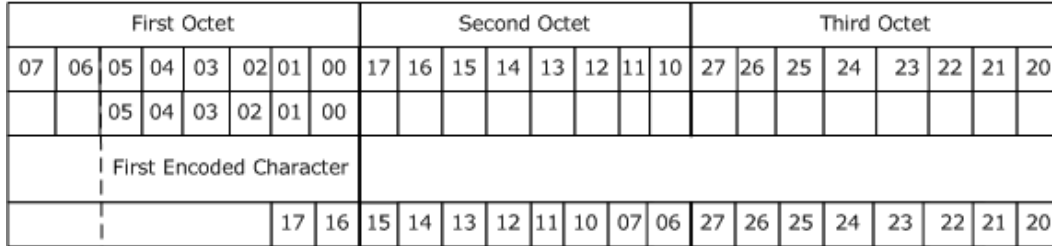


Figure 1: Data encoding at the 8-bit (octet) level

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.

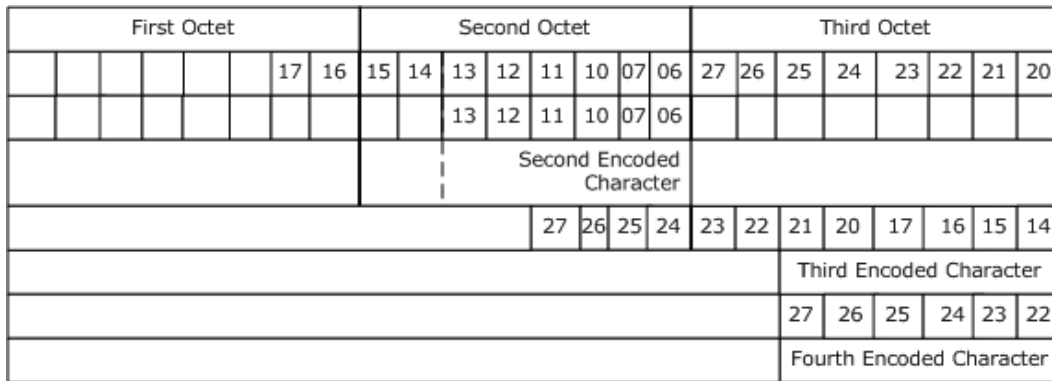


Figure 2: Data encoding of the lowest 6 bits and remaining 4 bits

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" />
  </o>
  <i>
    <p>\Users\nikola\AppData\Roaming\Microsoft\Windows\Libraries\Music.library-ms</p>
    <sl>MBAAAEAFCAAAAAAAAAAAAAAAAAAAkgAADBgAAAAUOEKgxWpcAF2JNOOnVKHQhdSjjzZlyBmtHAAAAAAAAAAAAAAAA
    AAAAAAAAAAAAYIAAAAHAAAAACAAAAAAAAAAAAAAAAAAcAAAAIEAAAgJAAACAAAAQBAAAAAAAAAAAgAwFX010SPxUQtA1QcV
    1UFJ1UA4War9GbhxVQwBHRhRXYcJl1bh1WaudGXN12Yy92cvZGdcdVauR2b3NHXm1mYyFmcpV2cc1Udz12YuwWaiJXYy1X
    LtNHAD0AAAwAAAKFA8BWNobLwHivQNEiw03Z8b578MLAAQrAs7rTuznAQAAAAAAAAEAAAQMTB1UwEfJ3++RaARpxLAY
    M656sWCAAAGCAAAA8BAAAGCAAAAUbQaAsGAVBAbAEAGATAUAMEAAAAAAAAAAATAAAAEzUQN1Ok2r3zezf55Ehp2pU5qR
    AAAAAAAAAAATAAAAAAAAAAAAAAAAAAAATAAAAEzUQN1cDVuC+OUrPVI5pXthzgpBRAAAAsAAAAAAAAALAAA8//AAAAAAAA
    AAAAAAAAAAAsAwBUMXc5War9Gbh1CUDxVVzVmczBQTpNmvcN3bmRHIOVgd39mcrBAACAAUAEAAAAAAAAo1OXwJEA4War9GbhBAA6AA
    CAQAav7rW7oAnatzFcqCAAawqTDAAAAGAAAAAAAAAAAAAAAAAAAAAAAAAuBQaAsGAVBAbAEAGAAAFaIFaxAAAAAAAAAtzCcCBA
    BBHcEFGdhBAPAgAAEAw7+q1OLwpW7sAnqAAAAc70AAAAIAAAAAAAAAAAAAAAAAAAAAQAHAwBARAEGA0BQYAAAAWAgUA
    EDAAAAAAo1OSwJEA1l1bh1WaudGA8ACAQAav7rW7sAnatzEccCAAAATDAAAAGAAAAAAAAAAAAAAAAAAAAAAAAASBwBAEGATB
    QaA4GANBAAAYBAYBQMAAAAAAgW70BnQAQTJNKUPN1fxAAAAACAQAav7rW7sAnatTHcqCAAQuTDAAAAGAAAAAAAAAAAA
    AAAAAAAAAANBQaAMGAYBwBAMHAvBgZAQHAAAAGAIFAxAAAAAAAtzFcCBAXlmbk92dzBAPAgAAEAw7+q1OLwpW7cBnqAAA
    Ao70AAAAIAAAAAAAAAAAAAAAAAAAwVakGAuBAZA8GA3BwcAAAAWAWEAAAAAAAAo1ODyZEAWUSCJVQS5XMAAAQAgAAE
    Aw7+q1OXwpW7MInqAAAAGe/AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAATAkGAIbGcAEGAYBQaAUGAZBAAAGBAQCgMAMtHAAGW7M
    IngAQTVNVSD5XMuwUSCBgdAgAAEAw7+q1OXwpW7MInqAAAAQ6CBAAAAIAAAAAAAAAAAAAAAAAAAAAQAHAwBARAEGA0BQY
    bAkGAIbGcAEGAYBQeA0CatBwCAAAAABwAgGAlBAbAwGAzAgMA4CAkBAwAwGAsAQLAMDAAQNAgDA0AAAAoBAAAggDAAA
    JAAAgA3AAQMTB1UirIWGxLT4M0u8PxmkgZb03zAAwAAAAAEBEAAQKDAAAUAWHQBTQDi66kGEiINcAsCMw0ZGA8CR6
    wFAAAAAAAAAAAAAAAAAAAAAAAAAAA0BQMAAAAAAgW7oAnARQVzVmczBAYAgAAEAw7+e1OVBPw7oAnqAAAAQ60AAAAEAAAA
    AAAAAAAAAAGNAAAAAQVAMHAlBgcAMHAAAAQAMHAoBQZAwGAsBwMAIDAuAAZAwGAsBALA0CAyAQMAgAAwMAAAUUAUED
    AAAAAo1OXwJEA4War9GbhBAA6AACAQAav7rW7oAnatzFcqCAAawqTDAAAAGAAAAAAAAAAAAAAAAAAAAAAAAAuBQaAsGAVBAb
    AEGAAAFaIFaxAAAAAAAtzCcCBABBHcEFGdhBAPAgAAEAw7+q1OLwpW7sAnqAAAAc70AAAAIAAAAAAAAAAAAAAAAAAAAA
    AQAHAwBARAEGA0BQYAAAAWAgUAEDAAAAAAo1OSwJEA1l1bh1WaudGA8ACAQAav7rW7sAnatzEccCAAAATDAAAAGAAA
    AAAAAAAAAAAAAAAAAAAAAASBwBAEGATBQaA4GANBAAAYBAYBQMAAAAAAgW70BnQAQTJNKUPN1fxAAAAACAQAav7rW7sAnat
    HcqCAAQuTDAAAAGAAAAAAAAAAAAAAAAAAAAANBQaAMGAYBwBAMHAvBgZAQHAAAAGAIFAxAAAAAAAtzFcCBAXlmbk92d
    zBAPAgAAEAw7+q1OLwpW7cBnqAAAAo70AAAAIAAAAAAAAAAAAAAAAAAAAAwVakGAuBAZA8GA3BwcAAAAWAWEAAAAAAAA
    o1ODyZEAWUSCJVQS5XMAAAQAgAAEAw7+q1OXwpW7MInqAAAAGe/AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAATAkGAIbGcAEGAY
    BQaAUGAZBAAAGBAQCgMAMtHAAGW7MInqAQTVNVSD5XMuwUSCBgdAgAAEAw7+q1OXwpW7MInqAAAAQ6CBAAAAIAAAAA
    AAAAATAAAAAQAHAwBARAEGA0BQYAAAAWAgUAEDAAAAAAo1OSwJEA1l1bh1WaudGA8ACAQAav7rW7sAnatzEccCAAAATDAAA
    AMDAAQNAgDA0AAAAoBAAAAAAAAAQHAAAAACAAAAASAAAAzTOLWqWOb10lgo8ypOky4DAAAAAAAAAAAgBAAAMAAAKWAAAA
    AAAA4War9Gbh1CcjBAAAAAAAAAgdMZXA83/JVraoUOqV22Md01ac+CweHBRgDACU19WTaHT2FAL/9fs1qGK1jalTnTt
    GnvAs3RwK4AgAVdv1kAAAAAA</sl>
  </i>
  </il>
  <dil>
    <i>
      <p>\Users\HomeGroupUser\Desktop</p>
      <sl>MBAAAEAFCAAAAAAAAAAAAAAAAAAAkgAADBRAAAQ5iLF6+wucA0JZxmuPsLHQD6a/h9D7yBAAAAAAAAAAAAAAAA
      AAAAAAAAAAAAE8EAAAHAAAAACAAAAAAAAAAAAAAAAAAcAAAAIEAAAgJAAACAAAAQBAAAAAAAAAAAgAwFXSFUTB5UQSNDXVN
      VRSNFVAVNXZyNDXEV2crR3bwBgwBAAAMAAAgSBAfGVdAwC8h4LUDhIszdg/W+OPzCAAA0KA7+6k78JAEAAAAAAAAATAAAEz
      UQN1cDVuC+OUrPVI5pXthzgpBRAAAAsAAAAAAAAALAAA8//AAAAAAAAABAAAEzUQNFMxXyTvfkgQUa8CAGjeuOrLAAAoAA
      AAAAFAAAAKAAAAGUAEEANBQQA4EABBgUAMDAAAAAAAAAAQLAAAAxMFUTpDp969s3M4QRreORYqdkVuaEAAAAADAAAAAwEA
      AAAAAAAAAAAAAAAAAAAAwKAMcAfzFXSFUTB5UQSNDXVNXZyNHAN12Yy92cvZGdg4UZ0d3bytGAAIAAMBQMAAAAAAgK+A
      smQAQVzVmczAAOAgAAEAw7+q1P5qpK+AsmqAAAAwiAAAAAAAA8DAAAAAAAAAAAAAAAAAAAAQVAMHAlBgcAMDAAAFaOHAXA
      AAAAAq4jbcGBAEV2crR3bwBAZAgAAEAw7+q1P5qpK+AsmqAAAAQWBAAAAA8BAAAAAAAAAAAAAgOAAAAAAAAARAUGAZBwaAQHA
      vBacAAAAABwAgGAlBAbAwGAzAgMA4CAkBAwAwGAsAQLAIDaxAwNAYDA5AAAAyBAAAgwBAAAJAAAgabAAAQMTB1UirIWG
      xLT4M0u8PxmkgZb03BAAAgAAAAAgEAAAQCGtRk7t01NzBVWVLF3Qdr9FAAAMAAAAARABAAkWAAAFa8BUg/E0gouOpB
      hoYjAArADMDmBAVMkOCBAAAAAAAAAAAAAAAAAAAAAAAAAAADAEAAAAAAoiP5qZEAU1c1J3cAAGATAABA8uvq4jx9oiP5qp
      KAAA7xCAA AAAOAAAAAAAAAAAAAYDAAAAAUFAzBQZAIHazzBAAAAEAzBAaAUGAsBAbAMDAYAgLAQGA8BAbAwCatAgMAEDA
      4AQMAADAAAFawEAzAAAAAAAAAg4DwaCBVNXZyNDA4AACQAQAav7rK+krmq4DwaqCAAAALCAAAAwPAAAAAAAAAAAAAAAA
      AAABwCAUGAYBwMAAAUAgeAEDAAAAAAoiPuxZEAQZtZgdvBHAKBACAQAav7rK+krmq4DwaqCAAAAZFAAAAAWAAAAAA
```

```
AAAAA6AAAAAEBQZAMHArBAdA8GawBAAAAEAzBAaUGAsBabAMDyAgLAQGAsBabAwCAatAgMAEDA3AgNAkDAAAGFAAA
AAAAAAAAAAAAAAAAAYAAADAAAGiFAAAAAAAAAAYFwBh5WYyNDAAAAAAAAAYBUMPRbhc/Sy2G3HIG2MwGod2MuuzB4R04F
AQhIX54YwAFzT02B3vkstx9BihNj1BanNjr7cAeENeBAUIyVOOGAAAAA</s1> <ul> <u>
<s>S-1-11-96-3623454863-58364-18864-2661722203-1597581903-1847293483-3855340794-256571992-
1330011019-2935621724</s> </u> </ul> </i> </pi>
<p>\Users\HomeGroupUser\AppData\Roaming\Microsoft\Windows\Libraries\Documents.library-ms</p>
<sl>MBAAAEAFCAAAAAAAAAADAAAAAAAAAYkgAADBgAAAAUptMb6+wucAs2YKL2PsLHArNmyi9D7yBMjDAAAAAAAAAAAAAAAA
AAAAAAAAAAAGIAAAAHAAACAAAAAAAAAAAAAAAAcAAAAEEAAQJAAAAACAAAQBAAAAAAAAAAAGAAwFXSFUTB5UQSDNXVN
VRSNFVNXZyNDXBBHcEFGdhx1UvFWbp52Zc1UajJ3bz9m20x1Vp5GZvd3ccxUaiJXYy1WZzxFRvNWdtVmb0NnLslmYyFm
c51SbzBAiDAAAMAAAgSBafgVdAwC8h4LUDhIszdg/W+OpzCAA0KA7+6k78JAEAAAAAAAAATAAAEzUQN1cDVuC+OUrPVI5
pxthzgpbrAAAAA8//AAAAAAAAABBAAEzUQNFMXyYtVfkQUa8CAGjeuOrlAAAAOAAAAAFAAAAKAAAAUA
EEANBQQA4EABBGUAMDAAAAAAAAAAQLAAAXMFUTpDp969s3M4QReORYqdkVuaEAAAADAAAAAwEAAAAAAAAAAAAAAAA
AAAAwKAMcAFzFXSFUTB5UQSDNXVNXZyNHAN12Yy92cvZGdg4UZ0d3bytGAAIAAMBQMAAAAAAGk+AsmQAVzVmczAAOAgA
AEAw7+qiP5qpK+AsmqAAAAwIAAAAAA8DAAAAAAAAAAAAAAAAAAAAQVAMHALBgcAMDAAAAFAIFaxAAAAAAq4juaKBABHc
EFGdhBAPAgAAEAw7+qiP5qpK+ormqAAAAUWBAAAAAwBAAAAAAAAAAAAAAAAAAAAQQAHAwBARAEGA0BQYAAAAWAgUAEADA
AAAAoiP1sTEAI1bh1WaudGA8AACAQAAv7rK+krmq4TuaqCAAAGZFAAAAAATAAAAAAAAAAAAAAAAAASBwbAEGatBQaA4
GAnBAAAYBAYBQMAAAAAAGk+0+mUAQTJNkUPN1fxAAAABACAQAAv7rK+krmq4T7bqCAAawZFAAAAAwKAAAAAAAAAAAA
AAAAANBQQA4EABBGUAMDAAAAAAAAAAQLAAAXMFUTpDp969s3M4QReORYqdkVuaEAAAADAAAAAwEAAAAAAAAAAAAAAAA
AAAA4CAAAAAA8DAAAAAAAAAAAAAAAAAAAAQVAMHALBgcAMDAAAAFAIFaxAAAAAAq4z6aCBAx1mbk92dzBAPAgAAEAw7+qiP5qpK+sumQAAABWB
AAAAA4CAAAAAA8DAAAAAAAAAAAAAAAAAAAAQVAMHALBgcAMDAAAAFAIFaxAAAAAAq4z6aCBAx1mbk92dzBAPAgAAEAw7+
qiP5qpK+EHnqAAAgjBAAAAA0BAAAAAAAAAAAAAAAAAATAkGAIbgcAEGAYBQaAUGAzBAAAgBAaCgMAMjDAAGk+AHngA
ARPNUVNVkfx4CTJJEAA4HAIABA8uvq4DwaqiPwxpKAAAAIdAAAAAUAAAAAAAAAAAAQFAAAAAQEAvBwYAUHAtBQZ4A4G
A0BwCA4CasBQaAIGAYBQYAIHA5BQLA0GAzBAAAAEAzBAaUGAsBabAMDyAgLAQGAsBabAwCAatAgMAQDA1AwNUDAAAAH
AAAAGOAkAAAAqEAAAAXMFUTJuiYZEvMhzQ7y/ETaCmt5cHAAAAcAAAAASAAAAJY0GRu36U3ktVZztUcD1tG0AAwAA
AAAAEBEAwLDAAAUAWHQB+TQDi66kGEiINcAsCMw0ZGA8yQ6wFAAAAAAAAAAAAAAAAAAAAAA0BQMAAAAAAGk+krmRA
QVzVmczBAYAgAAEAw7+qiPG3jK+krmqAAAAHLAAAAA4AAAAAAAAAAAAAGNAAAAAQVAMHALBgcAMHAAAQAMHA0BQZAwG
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AEGAYBQeA0CAatBwCAAAABwCAgGALBabAwGAzAgMA4CAkBAwGAsAQLAMDA0AQNAcDA1AAAAwBAAAAAAAAAAAAAAAAAY
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kstx9BihNj1VanNjr7cAeENeBAUIyVOOGAAAAA</s1> <ul> <u>
<s>S-1-11-96-3623454863-58364-18864-2661722203-1597581903-1555942514-2007325574-4116307836-2518318601-
3450682263</s> </u> </ul> <u> <s>S-1-11-96-3623454863-58364-18864-
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: h1jIul2avxWYiAyc9IyUtETL10iMx0iM
0x00A0: 1UTN3EDM4YzMtMDMyQjM2QTM2ETLxYjM
0x00C0: xITMxADM30SMwATMiAyL+0gCgACIgwTa
0x00E0: s5TDKACIgACIgwTa+0gCgACIgACIgACP
0x0100: w5DXVNXZyNHXul2avxWYcFEcwRUy0FGX
0x0120: S9WYt1mbnxVTPnmcvN3bmRHXXlmbk92d
0x0140: zxFTpJmchJXalNHXNV3cpNmLslmYyFmc
0x0160: 51SbzzLw5TDKACIgACIgACI8MHb+0kQ
0x0180: BFUQFFkRDFUQBFUQBFUQBFUQBFUQBFUQ
0x01A0: rdWQBRkQnFUQBFUQBFUQBFUQBFUQBFUQ
0x01C0: K50TP5mVLhUuOR2UqpmeaxWeC1EdIFUQ
0x01E0: BFUQBFUQCFUQBFUQBFUQBFUQBFUQBFUQ
0x0200: BFUQZ1UQBFUQIFUQBF0QBFUQBFUQBFUQ
0x0220: BFUQBFUQjFUQBFUSFFUQBFUQBFUQBFUQ
0x0240: BFUQRJUQBFUQBFUQBFUQBFUQBFUQBFUQ
0x0260: wMFU4VUU0FUMRNmVxU1RKFTVBRzVhJXO
0x0280: HJGa4ZVU3JESShmUYl1YKfjYoFzVhVHZ
0x02A0: Hh1TsJTW51jMjZnWHR2YkZVY1J1MiNjT
0x02C0: IhVTs1WW5ZUbjBnVyM2YxUFZ6xmMZV3d
0x02E0: XFwakhVW5xGWMRnTIFERPFUQbDXQBFUQ
0x0300: LZUQ4I0VO9mQmdHSpZXUOVUa390MahjY
0x0320: 1cDONxUQBFUyF0c3IHV1pnbBFVQBFUQ
0x0340: BFUQFVUQBFUUNR1QxU1dFZmSzsYKSFwQ
0x0360: SBHemFUWnZTN2M3VDFUQbD2QBFUQBFEO
0x0380: CFUQbD2QBFUQBFVnQRFWQzdUQ2JUQiFUR
0x03A0: HFEdbFUVB1URBFUQBFUQBFUQ0FUQBFUR
0x03C0: 6VVUOx2TrJjczoxZ6dGRGVTNfhGcyAXV
0x03E0: 1EnUBFUQB1UQBFUQBFEBVBFUQBFUQBFUQ
0x0400: BFUQBFUQ0FUQBFUR6VVUOFzYEZVdDtyT
0x0420: VJHUW1UNwhHdop3ZwJmUBFUQBNXQBFUQ
0x0440: BFETBFUQBhzLvEUQBFUQBFUQBFUQBFUQ
0x0460: BF0cBd3dCVVTYNWNXFmc5ckYoFzQVREe
0x0480: WZ1ew12Y6JUUBnTtNmdONjYtJFSJ9kV
0x04A0: HR2M502YyJUQBNUQBFVQFRUQBFUQBF0b
0x04C0: x8EW3pURBRzVhJXOHJGaCFUQ2EUQDFUU
0x04E0: BFkd3I3V38WQuFGd6Z0YxNUQBF0dxRFR
0x0500: BFUQbDwQBFUQBFUQBFUQBFUQBFUQBFUQ
0x0520: BFUdCFVYBN3RBznQBJWQFdUQBF0ZGFUS

```

0x0540: GFEeBFUQBFUQBFd6N0YDJUQCJESjVkr
0x0560: HRGacFEUBdWQBVUQ3dzKxFzTMDHcXdzc
0x0580: B5WcBFUQBN2NwEUQBFUQJFUQBFUQBFUQ
0x05A0: BFUQBFUQBFUQBFUQRFVQBhUQ3JUQSFUR
0x05C0: HFEMCFVWBFUQBdVQnVVQFRUQBFUQBF0b
0x05E0: x80U3pURB1UMihWMXFWdkdUQ4EUQDFUU
0x0600: BFkd3I3V3MXQuFGdqV0YxNUQBFUQ1RFR
0x0620: BFUQBdWQBFUQBFUQBFUQBFUQBFUQBFUQ
0x0640: BF0UCdnYBV0RBnRnQRFWQ0cUQuJUQBFUW
0x0660: CFUWCFTBFUQBFUQnd1NwIkbRFUUUpkT
0x0680: rVFUOxmZ4FUQBFkQBNURFUQ2dj cXdzc
0x06A0: B5WY0RFSjF3QBQUQRVHVEFUQBF0ZBFUQ
0x06C0: BFUQBFUQBFUQBFUQBFUQBFUQ0JUUhFUT
0x06E0: HFUeCdnYB1ESBZnQnpVQRhUQBFUQHUFUS
0x0700: GFEeBFUQBFUQBFd6Z0YDJUQYxWbitWO
0x0720: yQmeCFEUBdWQBVUQ3dzKxFzTMDHcXdzY
0x0740: C5WcBFUQB92NwEUQBFUQJFUQBFUQBFUQ
0x0760: BFUQBFUQBFUQBFUQ3ZVQrdUQ1JUQaFEO
0x0780: HF0Mcd3YBFUQBdVQbVQFRUQBFUQBF0b
0x07A0: x8ER5pVRBdXVTNkSWF1U1gVTBFUQRF0Z
0x07C0: BFURBd3NrEXMPh1dwd1NN1kbxFUQBF0Z
0x07E0: F9SQBFUQB1UQBFUQBFUQBFUQBFUQBFUQ
0x0800: BFUQBFVBT2RB1mQnNWQFdUQ5JUUhFUV
0x0820: HFkeCFUQbQdmQBF1Qn1UQNRHSBF0ZXdTT
0x0840: J52ZBFFVW5kVTRUNY1Ud3V1UDJ0ZkF0Z
0x0860: BFURBd3NrEXMPh1dwd1NN1kbxFUQBFUU
0x0880: 2MkQBFUQB1UQBFUQBFUQBFUQBFUQBFUQ
0x08A0: BFUQBFVBFVBSBpnQRFWQndUQ1FUQif0a
0x08C0: HFUaCd2YBV0RB1nQRVWQwMUQ0J0djFUQ
0x08E0: BFUQCd3YBd2RBxmQBjWQ3dUQ6F0ZNFEN
0x0900: DF0aCFkYBd3RBNXQRxUQNRUQwEUUOF0Z
0x0920: EFEMBFUQB9mQBFUQndGRBFUQKFUQbDWY
0x0940: zEUQBFVTUJUMV1mcJd1R4xEV00EM1hDU
0x0960: 4tWbnp1YPNjeBFUQ3FUQBFUQBVkQFFUQ
0x0980: RtERBFUQVf0dIF1QrQVUE1mN2s2RF1Wa
0x09A0: ONUQzNUT3BjWHFEODJ1N3ZUQBFUQBFUQ
0x09C0: BFUQBFUQBFUQBFUQBFUQBFUQwIUUNFUQ
0x09E0: BFUQBd2V38WQuJVQRZ1eW12Y6JUQZF0Z
0x0A00: BFURBd3NrUWMPZ1Qwd1NvFkbxFUQBFUU
0x0A20: 2ATQBFUQB1UQBFUQBFUQBFUQBFUQBFUQ
0x0A40: BFUQBF1VB1ESBxmQnNWQNhUQBFUQRFUT
0x0A60: IF0bcF1WBd3RBnNq31UQJRUQ1FUQaF0d
0x0A80: HF0cCFETBBzQB1XQR1UQnRUQ4F0dNFUQ
0x0AA0: BFUVBFUVBVERBFUQBFUQvFzTYdnSFFEN
0x0AC0: XFmc5ckYoJUQBTQBNUQRFUQ2dj cXdzb
0x0AE0: B5WY0pnRjF3QBQUQ3FHVEFUQBF0ZBFUQ
0x0B00: BFUQBFUQBFUQBFUQBFUQBFUQ1JUUhF0c
0x0B20: HFkdCFkYBV0RBFUQnZUQJZUQ4FUQBFUQ
0x0B40: BFUY0p3QjNkQBjkQINWRGdEzoJUQQF0Z
0x0B60: BFURBd3NrEXMPx0dwd1NzFkbxFUQBF0Y
0x0B80: 3ATQBFUQB1UQBFUQBFUQBFUQBFUQBFUQ
0x0BA0: BFUQBFVUBFESBdnQBjVQFdUQwIUUZFUQ
0x0BC0: BF0VBdWVBVERBFUQBFUQvFzTTdnSFFUS
0x0BE0: xIGaxcVY1R2RBhTQBNUQRFUQ2dj cXdzc
0x0C00: B5WY0pWRjF3QBQUQ3BVHVEFUQBF0ZBFUQ
0x0C20: BFUQBFUQBFUQBFUQBFUQBFUQTJ0diFUR
0x0C40: HFEdCFVYBRzRB5mQBFUQZJUQZJUUNFUQ
0x0C60: BFUQBd2V3AjQuFVQRR1SotWVQ5EbmhXQ
0x0C80: BFUQCF0QBFVQBZ3Nydl1NzFkbhRHVINWc

4 Security

4.1 Security Considerations for Implementers

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

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5 Appendix A: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include released service packs:

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

Exceptions, if any, are noted below. If a service pack or Quick Fix Engineering (QFE) number appears with the product version, behavior changed in that service pack or QFE. The new behavior also applies to subsequent service packs of the product 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.

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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