Windows Protocols Errata

This topic lists the Errata found in the Windows Protocols Technical Specifications, Overview Documents, and Reference documents since they were last published. Since this topic is updated frequently, we recommend that you subscribe to these RSS or Atom feeds to receive update notifications.

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Errata are content issues in published versions of protocols documents that could impact an **implementation**. Examples of errata are errors or missing information in the normative sections of the Technical Specifications or in the use cases (examples) in the Technical Specifications and Overview Documents.

Content issues that don't impact an implementation, for example, editorial updates due to typos, formatting updates, and rewrites for readability and clarity, are **not** included in Errata.

The sections below list the Windows Protocols documents that contain active Errata (i.e., Errata not yet released with the documents on MSDN) and provide links to archived Errata (i.e., Errata already released with the documents on MSDN).

Protocols Documents with Active Errata

[MC-DTCXA]: MSDTC Connection Manager OleTx XA Protocol

[MS-ADA2]: Active Directory Schema Attributes M

[MS-ADA3]: Active Directory Schema Attributes N-Z

[MS-ADLS]: Active Directory Lightweight Directory Services Schema

[MS-CDP]: Connected Devices Platform Protocol Version 3

[MS-CFB]: Compound File Binary File Format

[MS-CIFS]: Common Internet File System (CIFS) Protocol

[MS-CMRP]: Failover Cluster: Management API (ClusAPI) Protocol

[MS-COMA]: Component Object Model Plus (COMplus) Remote Administration Protocol

[MS-CSSP]: Credential Security Support Provider (CredSSP) Protocol

[MS-DFSC]: Distributed File System (DFS) Referral Protocol

[MS-DHCPM]: Microsoft Dynamic Host Configuration Protocol (DHCP) Server Management Protocol

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[MS-DNSP]: Domain Name Service (DNS) Server Management Protocol

[MS-DPWSSN]: Devices Profile for Web Services (DPWS) Size Negotiation Extension

[MS-DRSR]: Directory Replication Service (DRS) Remote Protocol

[MS-DTYP]: Windows Data Types

[MS-DVRJ]: Device Registration Join Protocol

[MS-ECS]: Enterprise Client Synchronization Protocol

[MS-EMF]: Enhanced Metafile Format

[MS-ERREF]: Windows Error Codes

[MS-FSA]: File System Algorithms

[MS-FSCC]: File System Control Codes

[MS-FSRVP]: File Server Remote VSS Protocol

[MS-GPOL]: Group Policy: Core Protocol

[MS-GSSA]: Generic Security Service Algorithm for Secret Key Transaction Authentication for DNS (GSS-TSIG) Protocol Extension

[MS-HGSA]: Host Guardian Service: Attestation Protocol

[MS-HVRS]: Hyper-V Remote Storage Profile

[MS-IPAMM2]: IP Address Management (IPAM) Management Protocol Version 2

[MS-IRP]: Internet Information Services (IIS) Inetinfo Remote Protocol

[MS-KPP]: Key Provisioning Protocol

[MS-KPS]: Key Protection Service Protocol

[MS-LSAD]: Local Security Authority (Domain Policy) Remote Protocol

[MS-LSAT]: Local Security Authority (Translation Methods) Remote

[MS-MWBF]: Microsoft Web Browser Federated Sign-On Protocol

[MS-NCT]: Network Cost Transfer Protocol

[MS-NFPB]: Near Field Proximity Bidirectional Services Protocol

[MS-NFPS]: Near Field Proximity Sharing Protocol

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[MS-NKPU]: Network Key Protector Unlock Protocol

[MS-NNS]: .NET NegotiateStream Protocol

[MS-NSPI]: Name Service Provider Interface (NSPI) Protocol

[MS-OAPX]: OAuth 2.0 Protocol Extensions

[MS-OAPXBC]: OAuth 2.0 Protocol Extensions for Broker Clients

[MS-OIDCE]: OpenID Connect 1.0 Protocol Extensions

[MS-OTPCE]: One-Time Password Certificate Enrollment Protocol

[MS-PAR]: Print System Asynchronous Remote Protocol

[MS-PKAP]: Public Key Authentication Protocol

[MS-RDPBCGR]: Remote Desktop Protocol: Basic Connectivity and Graphics Remoting

[MS-RDPEDYC]: Remote Desktop Protocol: Dynamic Channel Virtual Channel Extension

[MS-RDPEFS]: Remote Desktop Protocol: File System Virtual Channel Extension

[MS-RDPEGT]: Remote Desktop Protocol Geometry Tracking Virtual Channel Protocol Extension

[MS-RDPEPC]: Remote Desktop Protocol: Print Virtual Channel Extension

[MS-RDPERP]: Remote Desktop Protocol: Remote Programs Virtual

[MS-RDPESC]: Remote Desktop Protocol: Smart Card Virtual Channel Extension

[MS-RDPEUDP]: Remote Desktop Protocol: UDP Transport Extension

[MS-RDPEVOR]: Remote Desktop Protocol: Video Optimized Remoting Virtual Channel Extension

[MS-RDPRFX]: Remote Desktop Protocol: RemoteFX Codec Extension

[MS-RMPR]: Rights Management Services (RMS): Client-to-Server Protocol

[MS-RMSOD]: Rights Management Services Protocols Overview

[MS-RPCE]: Remote Procedure Call Protocol Extensions

[MS-RPRN]: Print System Remote Protocol

[MS-RSMC]: Remote Session Monitoring and Control Protocol

[MS-RSVD]: Remote Shared Virtual Disk Protocol

[MS-SAMR]: Security Account Manager (SAM) Remote Protocol (Client-to-Server)

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[MS-SAMS]: Security Account Manager (SAM) Remote Protocol (Server-to-Server)

[MS-SMB]: Server Message Block (SMB) Protocol

[MS-SMB2]: Server Message Block (SMB) Protocol Versions 2 and 3

[MS-TSGU]: Terminal Services Gateway Server Protocol

[MS-UAMG]: Update Agent Management Protocol

[MS-VAPR]: Virtual Application Publication and Reporting (App-V)

[MS-VHDX]: Virtual Hard Disk v2 (VHDX) File Format

[MS-W32T]: W32Time Remote Protocol

[MS-WFDAA]: Wi-Fi Direct (WFD) Application to Application Protocol

[MS-WFDPE]: Wi-Fi Display Protocol Extension

[MS-WSDS]: WS-Enumeration Directory Services Protocol Extensions

[MS-WSTEP]: WS-Trust X.509v3 Token Enrollment Extensions

[MS-WSUSAR]: Windows Server Update Services: Administrative API Remoting Protocol

[MS-WSUSOD]: Windows Server Update Services Protocols Overview

[MS-WSUSSS]: Windows Update Services: Server-Server Protocol

MS-WUSP]: Windows Update Services: Client-Server Protocol

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[MC-DTCXA]: MSDTC Connection Manager OleTx XA Protocol

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Errata below are for Protocol Document Version V19.0 – 2016/07/14.

Errata Published*	Description
2017/04/17	In various sections, the upper-limit information for the lenDSN and lenXaDll fields was updated and a typo in a message name corrected. In Section 2.2.3.2.5, XATMUSER_MTAG_RMOPEN, changed from: lenDSN (4 bytes): A 32-bit unsigned integer that MUST contain the count of bytes in the DSN string that follows this message. The maximum value of this field is 3072, but it MAY<1> be limited to 256. <1> Section 2.2.3.2.5: On Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, Windows Server 2008 R2, Windows 8, Windows Server 2012, Windows 8.1, and Windows Server 2012 R2, the provided values of the lenDSN field are confirmed to be less than 256. Changed to: lenDSN (4 bytes): A 32-bit unsigned integer that MUST contain the count of bytes in the DSN string that follows this message. It MUST be less than 3072, but it MAY be required to be less than 256.<1> <1> Section 2.2.3.2.5: On Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, Windows Server 2008 R2, Windows 8, Windows Server 2012, Windows 8.1, and Windows Server 2012 R2, the lenDSN field is less than 256. In Section 3.4.5.1.1, Receiving an XATMUSER_MTAG_RMOPEN Message, changed from: When the XA Resource Manager Bridge Facet receives an XATMUSER_ MTAG_RMOPEN message (section 2.2.3.2.5), it MUST perform the following actions: … Test if all of the following conditions are satisfied: SHOULD check if the lenDSN field of the message is less than an implementation-specific value.<49> SHOULD check if the lenXaDll field of the message is less than less than an implementation-specific value.<50> … Otherwise:<52> Set the State field of the created XA Resource Manager object to Ended. … Otherwise: XA Resource Manager Bridge Facet MAY:<53> … <49> Section 3.4.5.1.1: On Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, Windows Server 2008 R2, Windows 8, Windows Server 2012, Windows 8.1, and

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Errata Published*	Description
	Windows Server 2012 R2, the provided values of the lenDSN field in an XATMUSER_MTAG_RMOPEN message (section 2.2.3.2.5) are confirmed to be less than 256. On Windows 10 and Windows Server 2016, the provided values of the lenDSN field in an XATMUSER_MTAG_RMOPEN message are confirmed to be less than 3072. <50> Section 3.4.5.1.1: On Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, Windows Server 2008 R2, Windows 8, Windows Server 2012, Windows 8.1, Windows Server 2012 R2, Windows 10, and Windows Server 2016, the provided values of the lenXaDll field in an XATMUSER_MTAG_RMOPEN message (section 2.2.3.2.5) are confirmed to be less than 256. <52> Section 3.4.5.1.1: When an error condition other than those specified occurs during the processing of an XATMUSER_ MTAG_RMOPEN message (section 2.2.3.2.5), a message with an invalid MTAG is sent back on Windows NT 4.0 Option Pack. <53> Section 3.4.5.1.1: On Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, Windows Server 2008 R2, Windows 8, Windows Server 2012, Windows 8.1, and Windows Server 2012 R2, if the value of the lenDSN field or the lenXaDll field in an XATMUSER_MTAG_RMOPEN message (section 2.2.3.2.5) is greater than 256, an XATMUSER_MTAG_E_RMOPENFAILED response message (section 2.2.3.2.3) is sent, and the Connection State is set to Ended. On Windows 10 and Windows Server 2016, if the value of the lenDSN field in an XATMUSER_MTAG_RMOPEN message is greater than 3072 or the lenXaDll field in an XATMUSER_MTAG_RMOPEN message is greater than 256, an XATMUSER_MTAG_E_RMOPENFAILED response message is sent, and the Connection State is set to Ended. On Windows NT, Windows 2000, and Windows XP, the message is ignored, and the Connection State remains at Processing Open Request. Changed to: When the XA Resource Manager Bridge Facet receives an XATMUSER_ MTAG_RMOPEN message (section 2.2.3.2.5), it MUST perform the following actions: … Test if all of the following conditions are satisfied: SHOULD check if the lenDSN field of the message is less than an implementation-specific value.<49> SHOULD check if the lenXaDll field of the message is less than less than an implementation-specific value.<50> … Otherwise:<52> Set the State field of the created XA Resource Manager object to Ended. … Otherwise: XA Resource Manager Bridge Facet MAY:<53> … <49> Section 3.4.5.1.1: On Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, Windows Server 2008 R2, Windows 8, Windows Server 2012, Windows 8.1, and Windows Server 2012 R2, the lenDSN field in an XATMUSER_MTAG_RMOPEN message (section 2.2.3.2.5) is less than 256. On Windows 10 and Windows Server 2016, the lenDSN field in an XATMUSER_MTAG_RMOPEN message is less than 3072. <50> Section 3.4.5.1.1: On Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, Windows Server 2008 R2, Windows 8, Windows Server 2012, Windows 8.1, Windows Server 2012 R2, Windows 10, and Windows Server 2016, the lenXaDll field in an XATMUSER_MTAG_RMOPEN message (section 2.2.3.2.5) is less than 256.

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	<52> Section 3.4.5.1.1: When an error condition other than those specified occurs during the processing of an XATMUSER_MTAG_RMOPEN message (section 2.2.3.2.5), a message with an invalid MTAG is sent back on Windows NT 4.0 Option Pack. <53> Section 3.4.5.1.1: On Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, Windows Server 2008 R2, Windows 8, Windows Server 2012, Windows 8.1, and Windows Server 2012 R2, if the value of the lenDSN field or the lenXaDll field in an XATMUSER_MTAG_RMOPEN message (section 2.2.3.2.5) is greater than or equal to 256, an XATMUSER_MTAG_E_RMOPENFAILED response message (section 2.2.3.2.3) is sent, and the Connection State is set to Ended. On Windows 10 and Windows Server 2016, if the value of the lenDSN field in an XATMUSER_MTAG_RMOPEN message is greater than or equal to 3072 or the lenXaDll field in an XATMUSER_MTAG_RMOPEN message is greater than or equal to 256, an XATMUSER_MTAG_E_RMOPENFAILED response message is sent, and the Connection State is set to Ended. On Windows NT, Windows 2000, and Windows XP, the message is ignored, and the Connection State remains at Processing Open Request. In Section 3.4.5.2.1, Receiving an XATMUSER_MTAG_RMOPEN Message, changed from: … Test if all of the following conditions are satisfied: SHOULD check if the lenDSN field of the message is less than an implementation-specific value.<54> SHOULD check if the lenXaDll field of the message is less than an implementation-specific value.<55> <54> Section 3.4.5.2.1: On Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, Windows Server 2008 R2, Windows 8, Windows Server 2012, Windows 8.1, and Windows Server 2012 R2, the provided values of the lenDSN field in an XATMUSER_MTAG_RMOPEN message (section 2.2.3.2.5) are confirmed to be less than 256. On Windows 10, and Windows Server 2016, the provided values of the lenDSN field in an XATMUSER_MTAG_RMOPEN message are confirmed to be less than 3072. <55> Section 3.4.5.2.1: On Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, Windows Server 2008 R2, Windows 8, Windows Server 2012, Windows 8.1, Windows Server 2012 R2, Windows 10, and Windows Server 2016 the provided values of the lenXaDll field in an XATMUSER_MTAG_RMOPEN message (section 2.2.3.2.5) are confirmed to be less than 256. Changed to: … Test if all of the following conditions are satisfied: SHOULD check if the lenDSN field of the message is less than an implementation-specific value.<54> SHOULD check if the lenXaDll field of the message is less than an implementation-specific value.<55> <54> Section 3.4.5.2.1: On Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, Windows Server 2008 R2, Windows 8, Windows Server 2012, Windows 8.1, and Windows Server 2012 R2, the lenDSN field in an XATMUSER_MTAG_RMOPEN message (section 2.2.3.2.5) is less than 256. On Windows 10, and Windows Server 2016, the lenDSN field in an XATMUSER_MTAG_RMOPEN message is less than 3072. <55> Section 3.4.5.2.1: On Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, Windows Server 2008 R2, Windows 8, Windows Server 2012, Windows 8.1, Windows Server 2012 R2, Windows 10, and Windows Server 2016 the lenXaDll field in an XATMUSER_MTAG_RMOPEN message (section 2.2.3.2.5) is less than 256.

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2016/10/10	In Section 2.2.3.2.5, XATMUSER_MTAG_RMOPEN, changed the field definition for lenDSN from: lenDSN (4 bytes): A 32-bit unsigned integer that MUST contain the count of bytes in the DSN string that follows this message. It MUST be less than 3072.<1> <1> Section 2.2.3.2.5: On Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, Windows Server 2008 R2, Windows 8, Windows Server 2012, Windows 8.1, and Windows Server 2012 R2, the provided values of the lenDSN field are confirmed to be less than 256. Changed to: lenDSN (4 bytes): A 32-bit unsigned integer that MUST contain the count of bytes in the DSN string that follows this message. The maximum value of this field is 3072, but it MAY<1> be limited to 256. <1> Section 2.2.3.2.5: On Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, Windows Server 2008 R2, Windows 8, Windows Server 2012, Windows 8.1, and Windows Server 2012 R2, the provided values of the lenDSN field are confirmed to be less than 256.

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[MS-ABTP]: Automatic Bluetooth Pairing Protocol

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[MS-ADA2]: Active Directory Schema Attributes M

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Errata below are for Protocol Document Version V29.0 – 2016/07/14.

Errata Published*	Description
2017/05/01	In Section 2.459, Attribute msDS-SourceAnchor, changed from: The msDS-SourceAnchor attribute defines a unique, immutable identifier for the object in the authoritative directory. Changed to: The msDS-SourceAnchor attribute defines a unique, immutable identifier for the object in the authoritative directory. This attribute is reserved for future use.
2017/05/01	In Section 2.288, Attribute msDS-ComputerSID, the 'isMemberOfPartialAttributeSet' attribute was added. Changed from: … systemFlags: FLAG_SCHEMA_BASE_OBJECT showInAdvancedViewOnly: TRUE … Changed to: … systemFlags: FLAG_SCHEMA_BASE_OBJECT isMemberOfPartialAttributeSet: FALSE showInAdvancedViewOnly: TRUE … In Section 2.290, Attribute msDS-CustomKeyInformation, the 'isMemberOfPartialAttributeSet' attribute was added. Changed from: …

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	RangeUpper: 132096 showInAdvancedViewOnly: TRUE … Changed to: … RangeUpper: 132096 isMemberOfPartialAttributeSet: FALSE showInAdvancedViewOnly: TRUE … In Section 2.294, Attribute msDS-DeviceDN, the 'isMemberOfPartialAttributeSet' attribute was added. Changed from: … systemFlags: FLAG_SCHEMA_BASE_OBJECT showInAdvancedViewOnly: TRUE … Changed to: … systemFlags: FLAG_SCHEMA_BASE_OBJECT isMemberOfPartialAttributeSet: FALSE showInAdvancedViewOnly: TRUE … Added a new Section 2.304, Attribute msDS-DrsFarmID: **2.304 Attribute msDS-DrsFarmID** This attribute is not necessary for Active Directory to function. The protocol does not define a format beyond that required by the schema. cn: ms-DS-Drs-Farm-ID ldapDisplayName: msDS-DrsFarmID attributeId: 1.2.840.113556.1.4.2265 attributeSyntax: 2.5.5.12 omSyntax: 64 isSingleValued: TRUE systemOnly: TRUE searchFlags: 0 schemaIdGuid: 6055f766-202e-49cd-a8be-e52bb159edfb isMemberOfPartialAttributeSet: TRUE systemFlags: FLAG_SCHEMA_BASE_OBJECT isDefunct: TRUE Version-Specific Behavior: Implemented on Windows Server 2012 R2 and Windows Server 2016.

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	In Section 2.346, Attribute msDS-KeyApproximateLastLogonTimeStamp, the 'isMemberOfPartialAttributeSet' attribute was added. Changed from: … systemFlags: FLAG_SCHEMA_BASE_OBJECT showInAdvancedViewOnly: TRUE … Changed to: … systemFlags: FLAG_SCHEMA_BASE_OBJECT isMemberOfPartialAttributeSet: FALSE showInAdvancedViewOnly: TRUE … In Section 2.349, Attribute msDS-KeyId, the 'isMemberOfPartialAttributeSet' attribute was added. Changed from: … RangeUpper: 132096 showInAdvancedViewOnly: TRUE … Changed to: … RangeUpper: 132096 isMemberOfPartialAttributeSet: FALSE showInAdvancedViewOnly: TRUE … In Section 2.350, Attribute msDS-KeyMaterial, the 'isMemberOfPartialAttributeSet' attribute was added. Changed from: … RangeUpper: 132096 showInAdvancedViewOnly: TRUE … Changed to: … RangeUpper: 132096 isMemberOfPartialAttributeSet: FALSE showInAdvancedViewOnly: TRUE …

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	In Section 2.351, Attribute msDS-KeyPrincipal, the 'isMemberOfPartialAttributeSet' attribute was added. Changed from: … linkID: 2218 showInAdvancedViewOnly: TRUE … Changed to: … linkID: 2218 isMemberOfPartialAttributeSet: FALSE showInAdvancedViewOnly: TRUE … In Section 2.353, Attribute msDS-KeyUsage, the 'isMemberOfPartialAttributeSet' attribute was added. Changed from: … RangeUpper: 132096 showInAdvancedViewOnly: TRUE … Changed to: … RangeUpper: 132096 isMemberOfPartialAttributeSet: FALSE showInAdvancedViewOnly: TRUE …
2016/08/29	In Section 2.209, Attribute msDS-AllowedDNSSuffixes, changed “forest” to “domain” in the description of the msDS-AllowedDNSSuffixes attribute. Changed from: For a given Active Directory forest, this attribute specifies the list of DNS suffixes (by their fully qualified domain name (FQDN) (1) ([MS-ADTS] section 1.1)) allowed to be used to identify computers that are members of that forest. Changed to: For a given Active Directory domain, this attribute specifies the list of DNS suffixes (by their fully qualified domain name (FQDN) (1) ([MS-ADTS] section 1.1)) allowed to be used to identify computers that are members of that domain.

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[MS-ADA3]: Active Directory Schema Attributes N-Z

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Errata Published*	Description
2017/01/23	In Section 2.207, Attribute rIDUsedPool, the description of the attribute rIDUsedPool was revised to indicate that the attribute is not necessary for Active Directory to function and does not require a format definition beyond that required by the schema. Changed from: This attribute specifies the RID pools that have been used by a DC. Changed to: This attribute specifies the RID pools that have been used by a DC. It is set to zero and never changed. This attribute is not necessary for Active Directory to function. The protocol does not define a format beyond that required by the schema.

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[MS-ADDM]: Active Directory Web Services: Data Model and Common Elements

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[MS-ADFSOAL]: Active Directory Federation Services OAuth Authorization Code Lookup Protocol

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[MS-ADFSPIP]: Active Directory Federation Services and Proxy Integration Protocol

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[MS-ADFSWAP]: Active Directory Federation Service (AD FS) Web Agent Protocol

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[MS-ADLS]: Active Directory Lightweight Directory Services Schema

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Errata below are for Protocol Document Version V19.1 – 2016/07/14.

Errata Published*	Description
2017/05/01	In Section 2.112, Attribute isRecycled, the isMemberOfPartialAttributeSet attribute was added. Changed from: ... searchFlags: fPRESERVEONDELETE systemFlags: FLAG_SCHEMA_BASE_OBJECT | FLAG_ATTR_REQ_PARTIAL_SET_MEMBER ... Changed to: ... searchFlags: fPRESERVEONDELETE systemFlags: FLAG_SCHEMA_BASE_OBJECT | FLAG_ATTR_REQ_PARTIAL_SET_MEMBER isMemberOfPartialAttributeSet: TRUE ... In Section 2.171, Attribute msDS-BridgeHeadServersUsed, the schemaFlagsEx attribute was added. Changed from: ... searchFlags: 0 systemFlags: FLAG_ATTR_NOT_REPLICATED | FLAG_ATTR_IS_OPERATIONAL | FLAG_SCHEMA_BASE_OBJECT ... Changed to: ... searchFlags: 0 systemFlags: FLAG_ATTR_NOT_REPLICATED | FLAG_ATTR_IS_OPERATIONAL | FLAG_SCHEMA_BASE_OBJECT schemaFlagsEx: FLAG_ATTR_IS_CRITICAL ... In Section 2.190, Attribute msDS-LastKnownRDN, the rangeLower and rangeUpper attributes were added.

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	Changed from: ... systemOnly: TRUE searchFlags: 0 systemFlags: FLAG_SCHEMA_BASE_OBJECT ... Changed to: ... systemOnly: TRUE searchFlags: 0 rangeLower: 1 rangeUpper: 255 systemFlags: FLAG_SCHEMA_BASE_OBJECT ... In Section 2.207, Attribute msDS-OptionalFeatureFlags, the schemaFlagsEx attribute was added. Changed from: ... searchFlags: 0 systemFlags: FLAG_SCHEMA_BASE_OBJECT ... Changed to: ... searchFlags: 0 systemFlags: FLAG_SCHEMA_BASE_OBJECT schemaFlagsEx: FLAG_ATTR_IS_CRITICAL ... In Section 2.248, Attribute msDS-USNLastSyncSuccess, the schemaFlagsEx attribute was added. Changed from: ... searchFlags: 0 systemFlags: FLAG_SCHEMA_BASE_OBJECT | FLAG_ATTR_NOT_REPLICATED | FLAG_ATTR_IS_OPERATIONAL ... Changed to: ... searchFlags: 0 systemFlags: FLAG_SCHEMA_BASE_OBJECT | FLAG_ATTR_NOT_REPLICATED | FLAG_ATTR_IS_OPERATIONAL

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	schemaFlagsEx: FLAG_ATTR_IS_CRITICAL ...

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[MS-ADSC]: Active Directory Schema Classes

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[MS-ADTS]: Active Directory Technical Specification

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[MS-AIPS]: Authenticated Internet Protocol

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[MS-APDS]: Authentication Protocol Domain Support

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[MS-AZOD]: Authorization Protocols Overview

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[MS-BKRP]: BackupKey Remote Protocol

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[MS-CAPR]: Central Access Policy Identifier (ID) Retrieval Protocol

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[MS-CDP]: Connected Devices Platform Protocol Version 3

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Errata below are for Protocol Document Version V2.0 – 2017/03/16.

Errata Published*	Description
2017/04/17	In Section 2.2.2.1.1, Common Header, a RequestID field was added to the definition, with the following description: RequestID (8 bytes): A monotonically increasing number, generated on the sending side, that uniquely identifies the message. It can then be used to correlate response messages to their corresponding request messages.

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[MS-CHAP]: Extensible Authentication Protocol Method for Microsoft Challenge Handshake Authentication Protocol (CHAP)

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[MS-CFB]: Compound File Binary File Format

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Errata below are for Protocol Document Version V5.0 – 2016/07/14.

Errata Published*	Description
2017/01/23	In Section 2.6.4, Red-Black Tree, a product behavior note was updated to encompass Windows 10 and Windows Server 2016 in addition to earlier products. Changed from: … • For each UTF-16 code point, convert to uppercase by using the Unicode Default Case Conversion Algorithm, simple case conversion variant (simple case foldings), with the following notes.<2>Compare each uppercased UTF-16 code point binary value. <2>… For Windows Vista Windows Server 2008, Windows 7, Windows Server 2008 R2 operating system, Windows 8, Windows Server 2012, Windows 8.1, and Windows Server 2012 R2: The compound file implementation conforms to the Unicode 5.0 Default Case Conversion Algorithm... Changed to: … • For each UTF-16 code point, convert to uppercase by using the Unicode Default Case Conversion Algorithm, simple case conversion variant (simple case foldings), with the following notes.<2>Compare each uppercased UTF-16 code point binary value. <2>… For Windows Vista and later and for Windows Server 2008 and later, the compound file implementation conforms to the Unicode 5.0 Default Case Conversion Algorithm...

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[MS-CIFS]: Common Internet File System (CIFS) Protocol

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Errata below are for Protocol Document Version V26.0 – 2016/07/14.

Errata Published*	Description
2017/03/20	In Section 6, Appendix A: Product Behavior, in note <330> for Section 3.3.5.57.7, changed the FSCTL "FSCTL_PIPE_TRANCEIVE" to "FSCTL_PIPE_TRANSCEIVE". Changed from: <330> Section 3.3.5.57.7: Windows servers write data to and read data from ("transceive" on) named pipes on the underlying object store using an FSCTL_PIPE_TRANCEIVE request ([MS-FSCC] section 2.3.33). Processing follows as described in [MS-FSA] section 2.1.5.9, with the following mapping of input elements: • Open is the Server.Open identified by the SMB_Parameters.Words.Setup.FID field of the request. • InputBufferSize is SMB_Parameters.Words.TotalDataCount bytes. • InputBuffer is the Trans_Data.WriteData field of the request. • OutputBufferSize is 4 bytes (size of FSCTL_PIPE_TRANSCEIVE reply data) + SMB_Parameters.Words.MaxDataCount bytes. The returned Status is copied into the SMB_Header.Status field of the response. If the operation is successful, the following additional mapping of output elements applies: • OutputBuffer is an FSCTL_PIPE_TRANCEIVE structure ([MS-FSCC] section 2.3.34) and is copied into the ReadData field of the response. Changed to: <330> Section 3.3.5.57.7: Windows servers write data to and read data from ("transceive" on) named pipes on the underlying object store using an FSCTL_PIPE_TRANSCEIVE request ([MS-FSCC] section 2.3.33). Processing follows as described in [MS-FSA] section 2.1.5.9, with the following mapping of input elements: • Open is the Server.Open identified by the SMB_Parameters.Words.Setup.FID field of the request. • InputBufferSize is SMB_Parameters.Words.TotalDataCount bytes. • InputBuffer is the Trans_Data.WriteData field of the request. • OutputBufferSize is 4 bytes (size of FSCTL_PIPE_TRANSCEIVE reply data) + SMB_Parameters.Words.MaxDataCount bytes. The returned Status is copied into the SMB_Header.Status field of the response. If the operation is successful, the following additional mapping of output elements applies: • OutputBuffer is an FSCTL_PIPE_TRANSCEIVE structure ([MS-FSCC] section 2.3.34) and is copied into the ReadData field of the response.

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Errata Published*	Description
2017/03/20	In Section 3.3.5.51, Receiving an SMB_COM_NT_CREATE_ANDX Request, changed from: When opening a named pipe, the FileName field MUST contain only the relative name of the pipe. That is, the "\PIPE\" prefix MUST NOT be present. This is in contrast with other commands, such as SMB_COM_OPEN_ANDX and TRANS2_OPEN2, which require that the "\PIPE" prefix be present in the path name. If Server.Session.IsAnonymous is TRUE, the server MUST invoke the event specified in [MS-SRVS] section 3.1.6.17 by providing the FileName field with the "\PIPE\" prefix removed as input parameter. If the event returns FALSE, indicating that no matching named pipe is found that allows an anonymous user, the server MUST fail the request with STATUS_ACCESS_DENIED and MUST increase Server.Statistics.sts0_permerrors by 1. Otherwise, the server MUST continue the create processing. Changed to: When opening a file, the server MUST strip any trailing backslash characters from the FileName field before opening the file from the underlying object store. When opening a named pipe, the FileName field MUST contain only the relative name of the pipe. That is, the "\PIPE\" prefix MUST NOT be present. This is in contrast with other commands, such as SMB_COM_OPEN_ANDX and TRANS2_OPEN2, which require that the "\PIPE" prefix be present in the path name. If Server.Session.IsAnonymous is TRUE, the server MUST invoke the event specified in [MS-SRVS] section 3.1.6.17 by providing the FileName field with the "\PIPE\" prefix removed as input parameter. If the event returns FALSE, indicating that no matching named pipe is found that allows an anonymous user, the server MUST fail the request with STATUS_ACCESS_DENIED and MUST increase Server.Statistics.sts0_permerrors by 1. Otherwise, the server MUST continue the create processing.
2016/09/26	In two sections, clarified ANDX batch processing in terms of carrying forward values and expected returns. In Section 2.2.4.41, SMB_COM_OPEN_ANDX (0x2D), removed the following sentence from the second paragraph: "If the command is successful, the server response MUST include a valid FID. The client MUST supply the FID in subsequent operations on the object." In Section 3.3.5.2.4, Receiving any Batched ("AndX") Request, changed from: When a server receives an AndX Request message, the server MUST process the batched requests sequentially. Changed to: When a server receives an AndX Request message, the server MUST process the batched requests sequentially. For the first operation, the identifiers for the FID, SID, and TID, if any, MUST be taken from the received operation. For every subsequent operation in the current batch, the values used for FID, SID, and TID MUST be either those in first operation or those generated by the previous operation.
2016/09/26	In Section 3.3.5.30, Receiving an SMB_COM_LOCKING_ANDX Request, updated the rules for byte-range locks processing. Changed from: Locking a range of bytes MUST fail with STATUS_LOCK_NOT_GRANTED(ERRDOS/ERRlock) if any subranges or overlapping ranges are locked, even if they are currently locked by the PID requesting the new lock. Changed to:

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Errata Published*	Description
	Locking a range of bytes SHOULD<290> fail with STATUS_LOCK_NOT_GRANTED(ERRDOS/ERRlock) if any subranges or overlapping ranges are locked, even if they are currently locked by the PID requesting the new lock. <290> Section 3.3.5.30: After failing the lock byte range request with STATUS_LOCK_NOT_GRANTED, if a client attempts to lock the same range of locked bytes, subranges, or overlapping ranges, Windows servers fail the lock request with STATUS_FILE_LOCK_CONFLICT (ERRDOS/ERRlock).

*Date format: YYYY/MM/DD

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[MS-CMRP]: Failover Cluster: Management API (ClusAPI) Protocol

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Errata below are for Protocol Document Version V32.0 – 2016/07/14.

Errata Published*	Description
2016/11/21	In Section 2.2.3.43, OS_AND_OS_VERSION_INFO, in the bit table, changed the name of the field OS_(variable) to OS (variable) and changed its description from: OS_(variable) (4 bytes): Specifies the location where the null-terminated Unicode operating system string starts. A null-terminated string that represents the operating system version immediately follows the null termination of the operating system string. Changed to: OS (variable): Specifies the location where the null-terminated Unicode operating system string starts. A null-terminated string that represents the operating system version immediately follows the null termination of the operating system string.
2016/09/26	Added a new section to define the HGENERIC_RPC data type: Section 2.2.1.10 HGENERIC_RPC HGENERIC_RPC is an RPC context handle as specified in [MS-RPCE]. It represents the server context for the operations of a client. An HGENERIC_RPC is obtained as specified in section 3.1.4.2.137. ClusAPI Protocol version 2.0 servers do not support this data type. This type is declared as follows: typedef [context_handle] void* HGENERIC_RPC;

*Date format: YYYY/MM/DD

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[MS-COMA]: Component Object Model Plus (COMplus) Remote Administration Protocol

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Errata below are for Protocol Document Version V9.0 – 2016/07/14.

Errata Published*	Description
2016/12/05	In Section 2.2.2.23, ActivationTypeProperty, corrected the name of a field in a Product Behavior Note. Changed from: Server validation: Servers SHOULD<28> enforce validity constraints. <28> Section 2.2.2.23: Windows servers do not enforce constraints on values of type DefaultAuthenticationLevelProperty. Windows clients never pass invalid values of this type. Changed to: Server validation: Servers SHOULD<28> enforce validity constraints. <28> Section 2.2.2.23: Windows servers do not enforce constraints on values of type ActivationTypeProperty. Windows clients never pass invalid values of this type.

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[MS-CSRA]: Certificate Services Remote Administration Protocol

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[MS-CSSP]: Credential Security Support Provider (CredSSP) Protocol

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Errata below are for Protocol Document Version V13.0 – 2016/07/14.

Errata Published*	Description
2017/02/20	In Section 4, Protocol Examples, added a new figure that shows an unencrypted dump of the TSRequest.authInfo structure and the transformed structure. Changed from: … Step 9: The client sends its credentials to the target server that is protected under SPNEGO and TLS encryption. Changed to: … Step 9: The client sends its credentials to the target server that is protected under SPNEGO and TLS encryption. The following figure shows a sample unencrypted dump (ASN.1DER encoded) of the TSRequest.authInfo structure. This is encrypted on the wire. 30 82 01 0f a0 03 02 01-02 a1 82 01 06 04 82 01 0..... 02 30 81 ff a0 1a 04 18-62 00 62 00 62 00 62 00 .0.....b.b.b.b. 62 00 62 00 62 00 62 00-62 00 62 00 62 00 62 00 b.b.b.b.b.b.b.b. a1 81 e0 30 81 dd a0 03-02 01 01 a2 2e 04 2c 4f ...0.....,O 00 4d 00 4e 00 49 00 4b-00 45 00 59 00 20 00 43 .M.N.I.K.E.Y. .C 00 61 00 72 00 64 00 4d-00 61 00 6e 00 20 00 33 .a.r.d.M.a.n. .3 00 78 00 32 00 31 00 20-00 30 00 a3 50 04 4e 6c .x.2.1. .0..P.Nl 00 65 00 2d 00 4d 00 53-00 53 00 6d 00 61 00 72 .e.-.M.S.S.m.a.r 00 74 00 63 00 61 00 72-00 64 00 55 00 73 00 65 .t.c.a.r.d.U.s.e 00 72 00 2d 00 38 00 62-00 64 00 61 00 30 00 31 .r.-.8.b.d.a.0.1 00 39 00 66 00 2d 00 31-00 32 00 36 00 36 00 2d .9.f.-.1.2.6.6.- 00 2d 00 35 00 33 00 32-00 36 00 38 00 a4 54 04 .-.5.3.2.6.8..T. 52 4d 00 69 00 63 00 72-00 6f 00 73 00 6f 00 66 RM.i.c.r.o.s.o.f 00 74 00 20 00 42 00 61-00 73 00 65 00 20 00 53 .t. .B.a.s.e. .S 00 6d 00 61 00 72 00 74-00 20 00 43 00 61 00 72 .m.a.r.t. .C.a.r 00 64 00 20 00 43 00 72-00 79 00 70 00 74 00 6f .d. .C.r.y.p.t.o 00 20 00 50 00 72 00 6f-00 76 00 69 00 64 00 65 . .P.r.o.v.i.d.e 00 72 00 **Figure 2: Unencrypted dump of the TSRequest.authInfo structure** The transformed TSRequest.authinfo structure is as follows:

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Errata Published*	Description
	Total Size: 275 - - - - - - - - - - TSCredentials - - - - - - - - - - - - - - - tscredentials_len: 0X10F=271 credType: 0X2=2 creds_len: 0X106=262 - - - - - - - - - - TSSmartCardCreds - - - - - - - - - - - - - - - pin: [bbbbbbbbbbbb] csp_len: 0XE0=224 - - - - - - - - - - TSCspDataDetail - - - - - - - - - - - - - - - keySpec: 0X1=1 cardName not present readerName: [OMNIKEY CardMan 3x21 0] containerName: [le-MSSmartcardUser-8bda019f-1266--53268] cspName: [Microsoft Base Smart Card Crypto Provider] - - - - - - - - - - TSSmartCardCreds ctd - - - - - - - - - - - - - - - userHint not present domainHint not present Bytes Remaining: 275-275=0
2016/12/05	In Section 2.2.1.1, NegoData, changed the name of the field "NegoToken" to "negoToken" and removed the following product behavior note as it was redundant with existing text and not Windows specific. Deleted: <10> Section 2.2.1.1: This contains all Kerberos- or NTLM-specific messages as negotiated by SPNEGO.

*Date format: YYYY/MM/DD

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[MS-CSVP]: Failover Cluster: Setup and Validation Protocol (ClusPrep)

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[MS-DCOM]: Distributed Component Object Model (DCOM) Remote Protocol

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[MS-DFSC]: Distributed File System (DFS) Referral Protocol

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Errata below are for Protocol Document Version V25.0 – 2016/07/14.

Errata Published*	Description
2016/08/15	In Section 3.1.5.1, I/O Operation to Target Fails with STATUS_PATH_NOT_COVERED, the last paragraph was changed from: On a cache miss, it MUST issue a DFS link referral request, as specified in section 3.1.4.2, providing "LINK", the DFS root target server specified by TargetHint of ReferralCache entry corresponding to the DFS namespace, UserCredentials, MaxOutputSize, and Path as parameters. The Path parameter MUST be set to the path in the I/O operation issued to the DFS root target in step 8 of section 3.1.4.1. Process the DFS referral response as specified in section 3.1.5.4.3, which will update the ReferralCache.<9> The resulting ReferralCache entry MUST be used in further processing. Changed to: Otherwise, the client MUST obtain the file attributes of the DFS link as specified in [MS-CIFS] section 3.2.4.12 or [MS-SMB2] section 3.2.4.8 based on the protocol transport. If the file attributes include FILE_ATTRIBUTE_REPARSE_POINT, the client MUST issue a DFS link referral request, as specified in section 3.1.4.2, providing as parameters "LINK", the DFS root target server specified by the TargetHint of the ReferralCache entry corresponding to the DFS namespace, UserCredentials, MaxOutputSize, and Path. The Path parameter MUST be set to the path in the I/O operation issued to the DFS root target in step 8 of section 3.1.4.1. The client MUST process the DFS referral response as specified in section 3.1.5.4.3, which will update the ReferralCache.<9> The resulting ReferralCache entry, if any, MUST be used in further processing.

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[MS-DHCPM]: Microsoft Dynamic Host Configuration Protocol (DHCP) Server Management Protocol

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Errata below are for Protocol Document Version V30.0 – 2016/07/14.

Errata Published*	Description
2017/02/20	In Section 2.2.1.2.112, DHCP_STATELESS_PARAMS, updated the constant from DHCP_STATELESS_PARAMS to DHCPV6_STATELESS_PARAMS. Changed from: 2.2.1.2.112 DHCP_STATELESS_PARAMS The DHCP_STATELESS_PARAMS structure contains stateless settings for a DHCPv6 server. This structure is used with the R_DhcpV6SetStatelessStoreParams (section 3.2.4.117) and R_DhcpV6GetStatelessStoreParams (section 3.2.4.118) methods Changed to: 2.2.1.2.112 DHCPV6_STATELESS_PARAMS The DHCPV6_STATELESS_PARAMS structure contains stateless settings for a DHCPv6 server. This structure is used with the R_DhcpV6SetStatelessStoreParams (section 3.2.4.117) and R_DhcpV6GetStatelessStoreParams (section 3.2.4.118) methods
2017/02/20	In Section 2.2.1.1.25, DHCP_MAX_FREE_ADDRESSES_REQUESTED, updated the constant from DHCP_MAX_FREE_ADDRESSES_REQUIRED to DHCP_MAX_FREE_ADDRESSES_REQUESTED. Changed from: 2.2.1.1.25 DHCP_MAX_FREE_ADDRESSES_REQUIRED The DHCP_MAX_FREE_ADDRESSES_REQUIRED constant defines the maximum number of free IPv4 or IPv6 addresses that can be retrieved from the DHCP server in one call to R_DhcpV4GetFreeIpAddress (section 3.2.4.121) or R_DhcpV6GetFreeIpAddress (section 3.2.4.122) methods. This constant is declared as follows: #define DHCP_MAX_FREE_ADDRESSES_REQUIRED 1024 Changed to: 2.2.1.1.25 DHCP_MAX_FREE_ADDRESSES_REQUESTED The DHCP_MAX_FREE_ADDRESSES_REQUESTED constant defines the maximum number of free IPv4 or IPv6 addresses that can be retrieved from the DHCP server in one call to R_DhcpV4GetFreeIpAddress (section 3.2.4.121) or R_DhcpV6GetFreeIpAddress (section 3.2.4.122) methods. This constant is declared as follows: #define DHCP_MAX_FREE_ADDRESSES_REQUESTED 1024

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Errata Published*	Description

2017/02/20	In Section 6, Appendix A: Full IDL, added a line in the full IDL to match the definition in section 2.2.1.1.15.
	
	Changed from:
	
	`import "ms-dtyp.idl";`
	
	`typedef [handle] LPWSTR DHCP_SRV_HANDLE;`
	
	Changed to:
	
	`import "ms-dtyp.idl";`
	
	`#define LPWSTR [string] wchar_t*`
	`typedef [handle] LPWSTR DHCP_SRV_HANDLE;`

2017/02/20	In Section 3.1.4.20, R_DhcpDeleteClientInfo (Opnum 19), the field name was updated from ServerInfo to ClientInfo to match the description. Changed from: ServerInfo This is of type DHCP_SEARCH_INFO (section 2.2.1.2.18) structure, defining the key to be used to search the DHCPv4 client lease record that needs to be deleted on the DHCPv4 server. In case the SearchType member is DhcpClientName and there are multiple lease records with the same ClientName member, the server will delete the lease record for any of the clients with that client name. Changed to: ClientInfo This is of type DHCP_SEARCH_INFO (section 2.2.1.2.18) structure, defining the key to be used to search the DHCPv4 client lease record that needs to be deleted on the DHCPv4 server. In case the SearchType member is DhcpClientName and there are multiple lease records with the same ClientName member, the server will delete the lease record for any of the clients with that client name.
2017/02/06	In Section 2.2.1.2.83, DHCPV6_BIND_ELEMENT_ARRAY, updated that the Elements field of the DHCPV6_BIND_ELEMENT_ARRAY structure is an array of type DHCPV6_BIND_ELEMENT structure rather than type DHCP_BIND_ELEMENT structure. Changed from: Elements: This is a pointer to an array of type DHCP_BIND_ELEMENT (section 2.2.1.2.82) structure and length NumElements that contains information for interface bindings for a DHCPv6 server. Changed to: Elements: This is a pointer to an array of type DHCPV6_BIND_ELEMENT (section 2.2.1.2.82) structure and length NumElements that contains information for interface bindings for a DHCPv6 server.

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[MS-DNSP]: Domain Name Service (DNS) Server Management Protocol

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Errata below are for Protocol Document Version V31.0 – 2016/07/14.

<table>
<tr><th>Errata Published *</th><th>Description</th></tr>
<tr><td>2017/03/06</td><td>In Section 3.1.8.3, DNS Policy Validation, missing values were added and several other values were updated in the table in this section.

Changed from:
The DNS Policy configured at the server level has certain restrictions. The following table describes the valid settings:
<table>
<tr><th>DNS_RPC_POLICY_LEVEL</th><th>DNS_RPC_POLICY_TYPE allowed</th><th>DNS_RPC_POLICY_ACTION_TYPE allowed</th><th>DNS Policy Content</th></tr>
<tr><td>DnsPolicyServerLevel</td><td>DnsPolicyQueryProcessing</td><td>DnsPolicyDeny
DnsPolicyIgnore</td><td>There MUST be no DNS Policy content specified for DNS Policy at the server level.</td></tr>
<tr><td>DnsPolicyServerLevel</td><td>DnsPolicyRecursion</td><td>DnsPolicyDeny
DnsPolicyIgnore</td><td>There MUST be no DNS Policy content specified .</td></tr>
<tr><td>DnsPolicyServerLevel</td><td>DnsPolicyRecursion</td><td>DnsPolicyAllow</td><td>The DNS Policy content field MUST be populate</td></tr>
</table></td></tr>
</table>

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Errata Published *	Description

			d with server scopes.
DnsPolicyZoneLevel	DnsPolicyQueryProcessing	DnsPolicyDeny DnsPolicyIgnore	There MUST be no DNS Policy content specified.
DnsPolicyZoneLevel	DnsPolicyQueryProcessing	DnsPolicyAllow	The DNS Policy content field MUST be populated with zone scopes configured for the zone.
DnsPolicyZoneLevel		DnsPolicyDeny DnsPolicyIgnore	There MUST be no DNS Policy content specified.
DnsPolicyZoneLevel		DnsPolicyAllow	The DNS Policy content field MUST be populated with zone scopes configured for the zone from which Zone Transfer will take place.
DnsPolicyZoneLevel		DnsPolicyDeny DnsPolicyIgnore	There MUST be no DNS Policy content specified.

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Errata Published *	Description

DnsPolicyZoneLevel		DnsPolicyAllow	The DNS Policy content field MUST be populated with zone scopes configured for the zone on which update has to happen.

Changed to:

The DNS Policy configured at the server level has certain restrictions. The following table describes the valid settings:

DNS_RPC_POLICY_LEVEL	DNS_RPC_POLICY_TYPE allowed	DNS_RPC_POLICY_ACTION_TYPE allowed	DNS Policy Content
DnsPolicyZoneLevel	DnsPolicyQueryProcessing	DnsPolicyDeny DnsPolicyIgnore	There MUST be no DNS Policy content specified.
DnsPolicyZoneLevel	DnsPolicyQueryProcessing	DnsPolicyAllow	The DNS Policy content field MUST be populated with zone scopes configured for the zone.
DnsPolicyZoneLevel	DnsPolicyZoneTransfer	DnsPolicyDeny DnsPolicyIgnore	There MUST be no DNS Policy content specified.
DnsPolicyServerLevel	DnsPolicyQueryProcessing	DnsPolicyDeny DnsPolicyIgnore	There MUST be

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	<table><tr><td></td><td></td><td></td><td>no DNS Policy content specified for DNS Policy at the server level.</td></tr><tr><td>DnsPolicyServerLevel</td><td>DnsPolicyRecursion</td><td>DnsPolicyDeny DnsPolicyIgnore</td><td>There MUST be no DNS Policy content specified.</td></tr><tr><td>DnsPolicyServerLevel</td><td>DnsPolicyRecursion</td><td>DnsPolicyAllow</td><td>The DNS Policy content field MUST be populated with server scopes.</td></tr><tr><td>DnsPolicyServerLevel</td><td>DnsPolicyZoneTransfer</td><td>DnsPolicyDeny DnsPolicyIgnore</td><td>There MUST be no DNS Policy content specified.</td></tr><tr><td>DnsPolicyServerLevel</td><td>DnsPolicyDynamicUpdate</td><td>DnsPolicyDeny DnsPolicyIgnore</td><td>There MUST be no DNS Policy content specified.</td></tr><tr><td>DnsPolicyServerLevel</td><td>DnsRRLExceptionList</td><td>DnsPolicyDeny</td><td>There MUST be no DNS Policy content specified.</td></tr></table>
2017/02/20	In Section 6, Appendix A: Full IDL, updated the IDL to add *PDNS_RPC_ZONE_FLAGS to the definition of DNS_RPC_ZONE_FLAGS for consistency with the definition in section 2.2.5.2.2. Changed from:

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	...
	
	`//typedef struct _DnssrvRpcZoneFlags`
	`//{`
	`//  DWORD  Paused  : 1;`
	`//  DWORD  Shutdown  : 1;`
	`//  DWORD  Reverse  : 1;`
	`//  DWORD  AutoCreated  : 1;`
	`//  DWORD  DsIntegrated  : 1;`
	`//  DWORD  Aging  : 1;`
	`//  DWORD  Update  : 2;`
	`//  DWORD  ReadOnly  : 1;`
	`//  DWORD  UnUsed  : 23;`
	`//}`
	`//DNS_RPC_ZONE_FLAGS, *PDNS_RPC_ZONE_FLAGS;`
	
	`typedef DWORD DNS_RPC_ZONE_FLAGS;`
	
	...
	
	Changed to:
	...
	
	`//typedef struct _DnssrvRpcZoneFlags`
	`//{`
	`//  DWORD  Paused  : 1;`
	`//  DWORD  Shutdown  : 1;`
	`//  DWORD  Reverse  : 1;`
	`//  DWORD  AutoCreated  : 1;`
	`//  DWORD  DsIntegrated  : 1;`
	`//  DWORD  Aging  : 1;`
	`//  DWORD  Update  : 2;`
	`//  DWORD  ReadOnly  : 1;`
	`//  DWORD  UnUsed  : 23;`
	`//}`
	`//DNS_RPC_ZONE_FLAGS, *PDNS_RPC_ZONE_FLAGS;`
	
	`typedef DWORD DNS_RPC_ZONE_FLAGS, *PDNS_RPC_ZONE_FLAGS;`
	
	...
	
	...

2017/01/23	In Section 2.2.1.2.6, DNSSRV_RPC_UNION, updated the type names in the descriptions of two pointers. Changed from: ... ZoneInfoW2K: A pointer to a structure of type DNS_RPC_INFO_W2K (section 2.2.5.2.4). This structure is used to specify detailed DNS zone information. ... AutoConfigure: A pointer to a structure of type DNS_AUTOCONFIGURE (section 2.2.8.2.1). This structure is used to request DNS server autoconfiguration. ...

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	Changed to: ... ZoneInfoW2K: A pointer to a structure of type DNS_RPC_ZONE_INFO_W2K (section 2.2.5.2.4.1). This structure is used to specify detailed DNS zone information. ... AutoConfigure: A pointer to a structure of type DNS_RPC_AUTOCONFIGURE (section 2.2.8.2.1). This structure is used to request DNS server autoconfiguration. ... In Section 2.2.5.2.3.1, DNSSRV_RPC_ZONE_LIST_W2K, updated the type names in the description of one array. Changed from: ... ZoneArray: An array of structures of type DNS_RPC_ZONE (section 2.2.5.2.1.1). Each element of the array represents one zone. ... Changed to: ... ZoneArray: An array of structures of type DNS_RPC_ZONE_W2K (section 2.2.5.2.1.1). Each element of the array represents one zone. ...
2016/08/29	In two sections, revisions were made to the description of one field and one value to account for scenarios where virtualization instances are automatically created via the CreateVirtualizationInstance operation. In Section 2.2.5.2.2, DNS_RPC_ZONE_FLAGS, changed the description of the AutoCreated field from: … D (AutoCreated): If set to 1, indicates that zone was auto-created. A DNS server MAY automatically create certain zones at boot time which are flagged as "AutoCreated". Such zones are never written to persistent storage, and the DNS Server MUST NOT perform any DNS Server Management Protocol RPC operations on such zones.<38> … Changed to: … D (AutoCreated): If set to 1, indicates that zone was auto-created. A DNS server MAY automatically create certain zones at boot time or when a virtualization instance is created via the CreateVirtualizationInstance RPC operation (section 3.1.4.1), and flag these zones as "AutoCreated". Such zones are never written to persistent storage, and the DNS Server MUST NOT perform any DNS Server Management Protocol RPC operations on such zones.<38> … In Section 2.2.5.2.4.1, DNS_RPC_ZONE_INFO_W2K, revised the description of the fAutoCreated value from: …

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	fAutoCreated: A Boolean value that indicates whether this zone was autocreated by the DNS server at boot time. … Changed to: … fAutoCreated: A Boolean value that indicates whether this zone was autocreated by the DNS server at boot time or when a virtualization instance is created via the CreateVirtualizationInstance RPC operation (section 3.1.4.1). …
2016/08/15	In several sections, made updates to address inconsistencies between the IDL and the text in those sections. In Section 2.2.1.1.1, DNS_RPC_TYPEID, added DNSSRV_TYPEID_ANY to the list of enumeration values, and added a description for this value ("Type is invalid."). Changed from: … typedef enum _DnssrvRpcTypeId { DNSSRV_TYPEID_NULL = 0, DNSSRV_TYPEID_DWORD, ... Changed to: … typedef enum _DnssrvRpcTypeId { DNSSRV_TYPEID_ANY = (-1), DNSSRV_TYPEID_NULL = 0, DNSSRV_TYPEID_DWORD, ... In Section 2.2.12.1, Enumerations and Constants, updated the value for MAX_RECORD_TYPES row to reflect the correct number of record types from 0x0000001D to 0x00000020. In Section 2.2.15.1.1.5, DNS_RPC_POLICY_TYPE, added an entry for DnsPolicyMax to the list of values in the table for this enumeration: DnsPolicyMax Shows the maximum DNS policies supported. In Section 3.1.4.17, R_DnssrvQuery4 (Opnum 16), removed the hBindingHandle parameter to match the IDL. Changed from: … LONG R_DnssrvQuery4([in] handle_t hBindingHandle,

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	[in] DWORD dwClientVersion, [in] DWORD dwSettingFlags, ... Changed to: … LONG R_DnssrvQuery4([in] DWORD dwClientVersion, [in] DWORD dwSettingFlags, ... In Section 6, Appendix A: Full ID: ▪ Added "DNSSRV_TYPEID_ANY = (-1)" to the DnssrvRpcTypeId enumeration. ▪ Updated the value for the MAX_RECORD_TYPES definition in the DNS_ZONE_STATS_TYPE enumeration from 31 to 32. ▪ Removed the hBindingHandle parameter for the following methods in the DnsServer interface: R_DnssrvOperation R_DnssrvQuery R_DnssrvComplexOperation R_DnssrvEnumRecords R_DnssrvUpdateRecord R_DnssrvQuery2 R_DnssrvComplexOperation2 R_DnssrvEnumRecords2 R_DnssrvUpdateRecord2

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[MS-DPWSSN]: Devices Profile for Web Services (DPWS) Size Negotiation Extension

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Errata Published*	Description

2016/09/12	In Section 6, Appendix A: Full WSDL, added quotation marks missing from the value for the xmlns:lms attribute.
	
	Changed from:
	
	`<?xml version="1.0" encoding="UTF-8"?>`
	`<xs:schema`
	`targetNamespace="http://schemas.microsoft.com/windows/dpws/LargeMetadataSupport/2007/08"`
	`xmlns:lms=http://schemas.microsoft.com/windows/dpws/LargeMetadataSupport/2007/08 xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified">`
	`...`
	
	Changed to:
	
	`<?xml version="1.0" encoding="UTF-8"?>`
	`<xs:schema`
	`targetNamespace="http://schemas.microsoft.com/windows/dpws/LargeMetadataSupport/2007/08"`
	`xmlns:lms="http://schemas.microsoft.com/windows/dpws/LargeMetadataSupport/2007/08" xmlns:xs="http://www.w3.org/2001/XMLSchema"`
	`elementFormDefault="qualified">`
	`...`

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[MS-DRSR]: Directory Replication Service (DRS) Remote Protocol

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Errata Published*	Description

2017/05/01	In Section 4.1.10.2.22, PROPERTY_META_DATA, the llUnused member was added to the structure definition.
	
	Changed from:
	...
	The binary portion of the DNBinary value of the msDS-RevealedUsers attribute contains this structure.
	
	`typedef struct PROPERTY_META_DATA {`
	`  ATTRTYP attrType;`
	`  PROPERTY_META_DATA_EXT propMetadataExt;`
	`} PROPERTY_META_DATA;`
	`attrType:  ...`
	`propMetadataExt:  Stamp of revealed attribute value.`
	
	...
	
	Changed to:
	...
	The binary portion of the DNBinary value of the msDS-RevealedUsers attribute contains this structure.
	
	`typedef struct PROPERTY_META_DATA {`
	`  ATTRTYP attrType;`
	`  PROPERTY META DATA EXT propMetadataExt;`
	`  LONGLONG llUnused;`
	`} PROPERTY_META_DATA;`
	`attrType:  ...`
	`propMetadataExt:  The stamp of the revealed attribute value. See PROPERTY_META_DATA_EXT in section 5.155.`
	`llUnused:  An implementation-specific value. The specific value has no significance.`
	
	...

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	In Section 4.1.10.5.9, UpdateRevealedList, the llUnused member was included in the pseudocode.
	Changed from:
	...
	`AttrStamp(revealedObject, attribute)`
	`newRevealedObjectVal.binary := loophole(propMetadataCurrent, sequence of byte)`
	...
	Changed to:
	...
	`AttrStamp(revealedObject, attribute)`
	`propMetadataCurrent.llUnused := An implementation-specific value that is of no significance to the protocol.`
	`newRevealedObjectVal.binary := loophole(propMetadataCurrent, sequence of byte)`
	...

2017/03/20	In Section 4.1.30.2.2, ComposeKeyCredentialLinkForComputer, in the pseudocode, replaced instances of DSTIME with FILETIME.
	Changed from:
	...
	`keyDNBinary : DNBinary`
	`keyBinary: array of UCHAR`
	`keyBlob: KEYCREDENTIALLINK_BLOB`
	`keyEntry: KEYCREDENTIALLINK_ENTRY`
	`hashOffset: DWORD`
	`hashValueOffset: DWORD`
	`now: DSTIME`
	`now := Current time as DSTIME`
	...
	`// Add KeyApproximateLastLogonTimeStamp`
	`keyEntry!Length := sizeof(DSTIME)`
	`keyEntry!Identifier := KeyApproximateLastLogonTimeStamp`
	`keyEntry!Value := now`
	`keyBinary := keyBinary + keyEntry`
	`// Add KeyCreationTime`
	`keyEntry!Length := sizeof(DSTIME)`
	`keyEntry!Identifier := KeyCreationTime`
	`keyEntry!Value := now`

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Errata Published*	Description

	keyBinary := keyBinary + keyEntry
	
	Changed to:
	...
	keyDNBinary : DNBinary
	keyBinary: array of UCHAR
	keyBlob: KEYCREDENTIALLINK_BLOB
	keyEntry: KEYCREDENTIALLINK_ENTRY
	hashOffset: DWORD
	hashValueOffset: DWORD
	now: FILETIME
	
	now := Current time as FILETIME
	...
	// Add KeyApproximateLastLogonTimeStamp
	keyEntry!Length := sizeof(FILETIME)
	keyEntry!Identifier := KeyApproximateLastLogonTimeStamp
	keyEntry!Value := now
	
	keyBinary := keyBinary + keyEntry
	
	// Add KeyCreationTime
	keyEntry!Length := sizeof(FILETIME)
	keyEntry!Identifier := KeyCreationTime
	keyEntry!Value := now
	
	keyBinary := keyBinary + keyEntry
	...

2017/03/06	In Section 4.1.2.3, Server Behavior of the IDL_DRSAddSidHistory Method, updated srcCxt to srcCtx in the pseudocode. Changed from: srcCxt := ConnectToDCWithCreds(srcDomainController, Changed to: srcCtx := ConnectToDCWithCreds(srcDomainController,
2017/02/06	In Section 4.1.10.2.20, EXOP_ERR Codes, updated an EXOP_ERR error code from EXOP_ERR_PARAM_ERROR to EXOP_ERR_PARAM_ERR. Changed from: EXOP_ERR_PARAM_ERROR (0x00000010) Changed to:

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	EXOP_ERR_PARAM_ERR (0x00000010)
	
	In Section 4.1.10.5.12, ProcessFsmoRoleRequest, added and updated code fragments for the ProcessFsmoRoleRequest procedure.
	
	Changed from:
	`msgOut.ulExtendedRet := EXOP_ERR_OWNER_DELETED`
	
	Changed to:
	`msgOut.ulExtendedRet := EXOP_ERR_FSMO_OWNER_DELETED`
	
	Changed from:
	`clientComputerObj := serverObj!serverReference`
	`if clientComputerObj!rIDSetReference = null then`
	`clientRidSetObj := An implementation-defined DSName in the default NC such that not ObjExists(clientRidSetObj)`
	`Create object with DSName clientRidSetObject such that rIDSet in clientRidSetObject!objectClass`
	`/* Windows Behavior: Windows sets clientRidSetObj to be a child of clientComputerObj. */`
	`clientComputerObj!rIDSetReference := clientRidSetObj`
	`else`
	`clientRidSetObj := clientComputerObj!rIDSetReference`
	`endif`
	
	Changed to:
	`clientComputerObj := serverObj!serverReference`
	`if clientComputerObj!rIDSetReferences = null then`
	`clientRidSetObj := An implementation-defined DSName in the default NC such that not ObjExists(clientRidSetObj)`
	`Create object with DSName clientRidSetObj such that rIDSet in clientRidSetObj!objectClass`
	`/* Windows Behavior: Windows sets clientRidSetObj to be a child of clientComputerObj. */`
	`clientComputerObj!rIDSetReferences := clientRidSetObj`
	`else`
	`clientRidSetObj := clientComputerObj!rIDSetReferences`
	`endif`
	
	Changed from:
	`fsmoObj!rIDAvailablePool := ridAvailLoHi`
	`clientRidSetObj!rIDAllocationPool := ridAllocLoHi`
	`msgOut.liFsmoInfo := ridAllocLoHi`
	`endif`

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	Changed to:
	`fsmoObj!rIDAvailablePool := ridAvailLoHi`
	`clientRidSetObj!rIDAllocationPool := ridAllocLoHi`
	`clientRidSetObj!rIDPreviousAllocationPool := 0`
	`clientRidSetObj!rIDNextRID := 0`
	`/* Windows Behavior: rIDUsedPool [MS-ADA3] is not used anywhere,`
	`* but Windows always sets it to zero. */`
	`clientRidSetObj!rIDUsedPool := 0`
	
	`msgOut.liFsmoInfo := ridAllocLoHi`
	`endif`
	
	Changed from:
	`and RevealSecretsForUserAllowed(rodcObj, fsmoObj)`
	`and (not NTDSDSA_OPT_DISABLE_OUTBOUND_REPL_SECRET`
	`in DSAObj()!options`
	`or DRS_SYNC_FORCED in msgIn.ulFlags) then`
	`scope := {fsmoObj}`
	`else`
	`scope := {}`
	`endif`
	`else if EXOP_REPL_OBJ in msgIn.ulExtendedOp`
	`if AmILHServer() = true and`
	`NTDSDSA_OPT_DISABLE_OUTBOUND_REPL_OBJ in DSAObj()!options and`
	`not DRS_SYNC_FORCED in msgIn.ulFlags then`
	
	Changed to:
	`and RevealSecretsForUserAllowed(rodcObj, fsmoObj)`
	`and (not NTDSDSA_OPT_DISABLE_OUTBOUND_REPL`
	`in DSAObj()!options`
	`or DRS_SYNC_FORCED in msgIn.ulFlags) then`
	`scope := {fsmoObj}`
	`else`
	`scope := {}`
	`endif`
	`else if EXOP_REPL_OBJ in msgIn.ulExtendedOp`
	`if AmILHServer() = true and`
	`NTDSDSA_OPT_DISABLE_OUTBOUND_REPL in DSAObj()!options and`
	`not DRS_SYNC_FORCED in msgIn.ulFlags then`
	
	Changed from:
	`hDrs, o, ncRoot, msgIn.ulFlags, msgIn.ulExtendedOp, msgOut)`
	
	Changed to:
	`hDrs, o, GetObjectNC(msgIn.pNC^), msgIn.ulFlags, msgIn.ulExtendedOp, msgOut)`

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[MS-DTCO]: MSDTC Connection Manager: OleTx Transaction Protocol

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[MS-DSCPM]: Desired State Configuration Pull Model Protocol

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[MS-DTYP]: Windows Data Types

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<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td>2017/03/06</td><td>In Section 2.5.1.1, SDDL Syntax, corrected the values for the object-specific-rights-strings.

Changed from:
…
it is recommended that the reader consult a specific protocol for applicable values, if any, in that protocol.
<table>
<tr><th>String</th><th>Object type</th><th>Access right</th><th>Hex value</th></tr>
<tr><td>…</td><td></td><td></td><td></td></tr>
<tr><td>"FW"</td><td>File</td><td>File Write</td><td>0x00100116</td></tr>
<tr><td>"FR"</td><td>File</td><td>File Read</td><td>0x00120089</td></tr>
<tr><td>"KA"</td><td>Registry Key</td><td>Key All Access</td><td>0x00000019</td></tr>
<tr><td>"KR"</td><td>Registry Key</td><td>Key Read</td><td>0x0000003F</td></tr>
<tr><td>"KX"</td><td>Registry Key</td><td>Key Execute</td><td>0x00000019</td></tr>
<tr><td>"KW"</td><td>Registry Key</td><td>Key Write</td><td>0x00000006</td></tr>
<tr><td>…</td><td></td><td></td><td></td></tr>
</table>
Changed to:
it is recommended that the reader consult a specific protocol for applicable values, if any, in that protocol.
<table>
<tr><th>String</th><th>Object type</th><th>Access right</th><th>Hex value</th></tr>
<tr><td>…</td><td></td><td></td><td></td></tr>
<tr><td>"FW"</td><td>File</td><td>File Write</td><td>0x00120116</td></tr>
</table>
</td></tr>
</table>

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<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><td>"FR"</td><td>File</td><td>File Read</td><td>0x00120089</td></tr>
<tr><td>"KA"</td><td>Registry Key</td><td>Key All Access</td><td>0x000F003F</td></tr>
<tr><td>"KR"</td><td>Registry Key</td><td>Key Read</td><td>0x00020019</td></tr>
<tr><td>"KX"</td><td>Registry Key</td><td>Key Execute</td><td>0x00020019</td></tr>
<tr><td>"KW"</td><td>Registry Key</td><td>Key Write</td><td>0x00020006</td></tr>
<tr><td>…</td><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>2017/01/09</td><td>
In two sections, revised the descriptions for two SIDs.
In Section 2.4.2.4, Well-Known SID Structures, changed from:

<table>
<tr><th>Constant/value</th><th>Description</th></tr>
<tr><td>…</td><td>…</td></tr>
<tr><td>RAS_SERVERS S-1-5-21-<domain>-553</td><td>A domain local group for Remote Access Services (RAS) servers. Servers in this group have Read Account Restrictions and Read Logon Information access to User objects in the Active Directory domain local group.</td></tr>
<tr><td>…</td><td>…</td></tr>
<tr><td>RDS_REMOTE_ACCESS_SERVERS S-1-5-32-575</td><td>A group that allows members use of Remote Application Services resources.</td></tr>
<tr><td>…</td><td>…</td></tr>
</table>

Changed to

<table>
<tr><th>Constant/value</th><th>Description</th></tr>
<tr><td>…</td><td>…</td></tr>
<tr><td>RAS_SERVERS S-1-5-21-<domain>-553</td><td>A domain local group for Remote Access Services (RAS) servers. By default, this group has no members. Servers in this group have Read Account Restrictions and Read Logon Information access to User objects in the Active Directory domain local group</td></tr>
<tr><td>…</td><td>…</td></tr>
<tr><td>RDS_REMOTE_ACCESS_SERVERS S-1-5-32-575</td><td>Servers in this group enable users of RemoteApp programs and personal virtual desktops access to these resources. This group needs to be populated on servers running RD</td></tr>
</table>
</td></tr>
</table>

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	<table><tr><td></td><td>Connection Broker. RD Gateway servers and RD Web Access servers used in the deployment need to be in this group.</td></tr><tr><td>…</td><td>…</td></tr></table> In Section 2.5.1.1, Syntax, changed from: <table><tr><th>SDDL alias</th><th>Well-Known SID name</th></tr><tr><td>…</td><td>…</td></tr><tr><td>"RA"</td><td>REMOTE ACCESS SERVERS</td></tr><tr><td>…</td><td>…</td></tr></table> Changed to: <table><tr><th>SDDL alias</th><th>Well-Known SID name</th></tr><tr><td>…</td><td>…</td></tr><tr><td>"RA"</td><td>RDS_REMOTE_ACCESS_SERVERS</td></tr><tr><td>…</td><td>…</td></tr></table>

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[MS-DVRD]: Device Registration Discovery Protocol

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[MS-DVRE]: Device Registration Enrollment Protocol

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[MS-DVRJ]: Device Registration Join Protocol

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Errata below are for Protocol Document Version V1.0 – 2016/07/14.

Errata Published*	Description
2017/03/20	In Section 1.2.1, Normative References, the reference [MS-DRSR] was replaced with the reference [MS-DTYP]. Also, in Section 3.1.5.1.1.3, Processing Details, DSTIME format was replaced with FILETIME format. In Section 1.2.1, Normative References, changed from: ... [MS-ADTS] Microsoft Corporation, "Active Directory Technical Specification". [MS-DRSR] Microsoft Corporation, "Directory Replication Service (DRS) Remote 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 ... Changed to: ... [MS-ADTS] Microsoft Corporation, "Active Directory Technical Specification". [MS-DTYP] Microsoft Corporation, "Windows Data Types". [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 ... In Section 3.1.5.1.1.3, Processing Details, changed from: ... 6. The server sends a request to the directory server to set the following attributes on the device object: ... • The ms-DS-Approximate-Last-Logon-Time-Stamp attribute ([MS-ADA2] section 2.215) to a time that is generated by the server, represented in DSTIME format ([MS-DRSR] section 5.51). KEYCREDENTIALLINK_ENTRY identifier | Value ... | ...

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<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><td>KeyApproximateLastLogonTimestamp</td><td>MUST be set to a time that is generated by the server represented in DSTIME format ([MS-DRSR] section 5.51).</td></tr>
<tr><td>KeyCreationTime</td><td>MUST be set to a time that is generated by the server represented in DSTIME format.</td></tr>
</table>
Changed to:
...
6. The server sends a request to the directory server to set the following attributes on the device object:
...
• The ms-DS-Approximate-Last-Logon-Time-Stamp attribute ([MS-ADA2] section 2.215) to a time that is generated by the server, represented in FILETIME format ([MS-DTYP] section 2.3.3).
<table>
<tr><th>KEYCREDENTIALLINK_ENTRY identifier</th><th>Value</th></tr>
<tr><td>...</td><td>…</td></tr>
<tr><td>KeyApproximateLastLogonTimeStamp</td><td>MUST be set to a time that is generated by the server represented in FILETIME format.</td></tr>
<tr><td>KeyCreationTime</td><td>MUST be set to a time that is generated by the server represented in FILETIME format.</td></tr>
</table>
</td></tr>
</table>

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[MS-ECS]: Enterprise Client Synchronization Protocol

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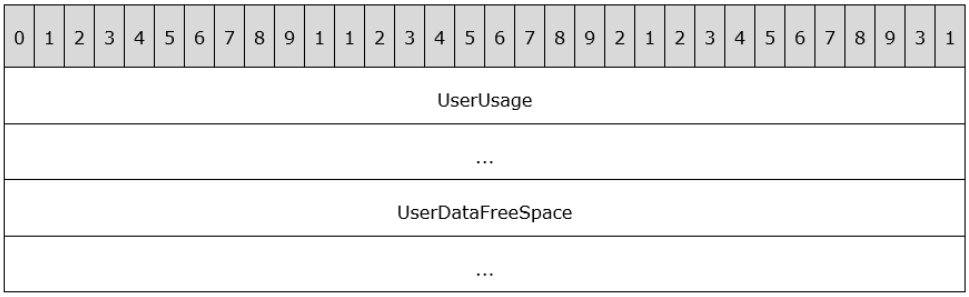
Errata below are for Protocol Document Version V6.0 – 2016/07/14.

Errata Published *	Description
2017/01/09	In Section 2.2.2.2, QUOTA_USAGE_ENTRY, in the bit table and in the description that follows, swapped the order of the UserUsage and UserDataFreeSpace fields. Changed from:  **UserUsage (8 bytes)**: A 64-bit unsigned integer that contains the amount of data, in bytes, in the user's share. **UserDataFreeSpace (8 bytes)**: A 64-bit unsigned integer that contains the amount of available free space, in bytes, in the user's share. Changed to:

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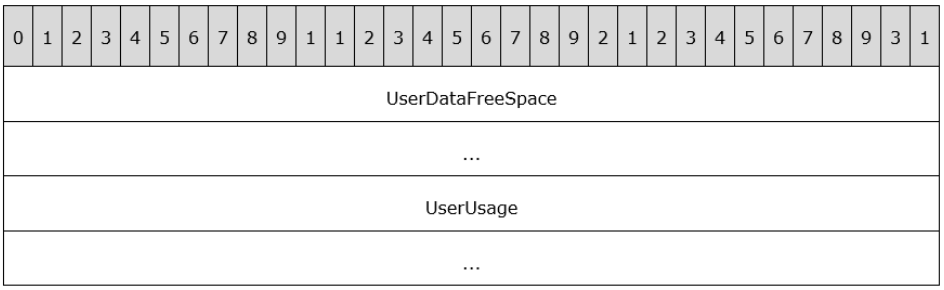
Errata Published *	Description
	 **UserDataFreeSpace (8 bytes)**: A 64-bit unsigned integer that contains the amount of available free space, in bytes, in the user's share. **UserUsage (8 bytes)**: A 64-bit unsigned integer that contains the amount of data, in bytes, in the user's share.

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[MS-EFSR]: Encrypting File System Remote (EFSRPC) Protocol

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[MS-EMF]: Enhanced Metafile Format

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Errata below are for Protocol Document Version V12.0 – 2016/07/14.

Errata Published*	Description
2017/04/17	In this document, a new section (3.1.1.2.1, Regions) that describes the ClippingRegion element in the abstract data model for playback was added. In addition, a reference to the ClippingRegion element was added to each instance of the current clipping region being referenced in the processing of an EMF record. For details on the changes, see the Diff PDF document at https://winprotocoldoc.blob.core.windows.net/productionwindowsarchives/MS-EMF/[MS-EMF]-170417-diff.pdf.

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[MS-EMFPLUS]: Enhanced Metafile Format Plus Extensions

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[MS-ERREF]: Windows Error Codes

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<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td>2017/03/06</td><td>In Section 2.2, Win32 Error Codes, added a new error code.

Changed from:

<table>
<tr><th>Win32 Error Codes</th><th>Description</th></tr>
<tr><td>…</td><td>…</td></tr>
<tr><td>0x00000BCA
ERROR_FAIL_REBOOT_INITIATED</td><td>The requested operation failed. A system reboot has been initiated to roll back changes made.</td></tr>
<tr><td>…</td><td>…</td></tr>
</table>

Changed to:
<table>
<tr><th>Win32 Error Codes</th><th>Description</th></tr>
<tr><td>…</td><td>…</td></tr>
<tr><td>0x00000BCA
ERROR_FAIL_REBOOT_INITIATED</td><td>The requested operation failed. A system reboot has been initiated to roll back changes made.</td></tr>
<tr><td>0x00000BCB
ERROR_PRINTER_DRIVER_DOWNLOAD_NEEDED</td><td>The specified printer driver was not found on the system and needs to be downloaded.</td></tr>
<tr><td>…</td><td>…</td></tr>
</table>
</td></tr>
</table>

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[MS-EVEN]: EventLog Remoting Protocol

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[MS-FASP]: Firewall and Advanced Security Protocol

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[MS-FRS2]: Distributed File System Replication Protocol

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[MS-FSA]: File System Algorithms

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Errata below are for Protocol Document Version V22.0 – 2016/07/14

Errata Published*	Description
2017/04/17	In Section 2.1.5.17, Server Requests an Oplock, the processing rules for if Type is LEVEL_TWO were changed from: Open.Stream.ByteRangeLockList is not empty. Changed to: Open.Stream.ByteRangeLockList is not empty. and Open.Stream.AllocationSize is greater than any ByteRangeLock.LockOffset in Open.Stream.ByteRangeLockList.<148> <148> Section 2.1.5.17: In Windows 2000, Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2, NTFS does not grant the oplock even when Open.Stream.AllocationSize is greater than any ByteRangeLock.LockOffset in Open.Stream.ByteRangeLockList. Also, in the same section above, the processing rules for if Type is LEVEL_GRANULAR were changed from: Open.Stream.ByteRangeLockList is not empty Changed to: Open.Stream.ByteRangeLockList is not empty. and Open.Stream.AllocationSize is greater than any ByteRangeLock.LockOffset in Open.Stream.ByteRangeLockList.<149> <149> Section 2.1.5.17: In Windows 2000, Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2, NTFS does not grant the oplock even when Open.Stream.AllocationSize is greater than any ByteRangeLock.LockOffset in Open.Stream.ByteRangeLockList.
2017/03/06	In Section 2.1.5.11.29, FileStreamInformation, a new bullet point was added to the second list.

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Errata Published*	Description
	Added: • If OutputBufferSize is smaller than sizeof(FILE_STREAM_INFORMATION), the operation MUST be failed with STATUS_INFO_LENGTH_MISMATCH. In Section 2.1.5.14.1, FileAllocationInformation, a new bullet point was added to the second list. Added: • If InputBufferSize is less than the size, in bytes, of the FILE_ALLOCATION_INFORMATION structure, the operation MUST be failed with STATUS_INFO_LENGTH_MISMATCH. In Section 2.1.5.14.3, FileDispositionInformation, a new bullet point was added to the first list. Added: • If InputBufferSize is less than the size, in bytes, of the FILE_DISPOSITION_INFORMATION structure, the operation MUST be failed with STATUS_INFO_LENGTH_MISMATCH. In Section 2.1.5.14.4, FileEndOfFileInformation, a new bullet point was added to the first list. • If InputBufferSize is less than the size, in bytes, of the FILE_END_OF_FILE_INFORMATION structure, the operation MUST be failed with STATUS_INFO_LENGTH_MISMATCH. In Section 2.1.5.14.6, FileLinkInformation, the first paragraph was changed from: InputBuffer is of type FILE_LINK_INFORMATION, as described in [MS-FSCC] section 2.4.21.<136>Open represents the pre-existing file to which a new link named in InputBuffer.FileName will be created. Changed to: InputBuffer is of type FILE_LINK_INFORMATION_TYPE_1, as described in [MS-FSCC] section 2.4.21.1, for 32-bit local clients; or of type FILE_LINK_INFORMATION_TYPE_2, as described in [MS-FSCC] section 2.4.21.2, for remote clients or 64-bit local clients. Open represents the pre-existing file to which a new link named in InputBuffer.FileName will be created. In Section 2.1.5.14.6, FileLinkInformation, a new bullet point was added to the first list. Added: • If InputBufferSize is less than the size, in bytes, of the FILE_LINK_INFORMATION_TYPE_1 structure (for 32-bit local clients) or the FILE_LINK_INFORMATION_TYPE_2 structure (for remote clients or 64-bit local clients), the operation MUST be failed with STATUS_INFO_LENGTH_MISMATCH. In Section 2.1.5.14.7, FileModeInformation, a new bullet point was added to the first list. • If InputBufferSize is less than the size, in bytes, of the FILE_MODE_INFORMATION structure, the operation MUST be failed with STATUS_INFO_LENGTH_MISMATCH. In Section 2.1.5.14.11, FileRenameInformation, the first paragraph was changed from:

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	InputBuffer is of type FILE_RENAME_INFORMATION, as described in [MS-FSCC] section 2.4.34.Open.FileName is the pre-existing file name that will be changed by this operation. Changed to: InputBuffer is of type FILE_RENAME_INFORMATION_TYPE_1, as described in [MS-FSCC] section 2.4.34.1, for 32-bit local clients; or of type FILE_RENAME_INFORMATION_TYPE_2, as described in [MS-FSCC] section 2.4.34.2, for remote clients or 64-bit local clients. Open.FileName is the pre-existing file name that will be changed by this operation. In Section 2.1.5.14.11, FileRenameInformation, a new bullet point was added to the second list. Added: • If InputBufferSize is less than the size, in bytes, of the FILE_RENAME_INFORMATION_TYPE_1 structure (for 32-bit local clients) or the FILE_RENAME_INFORMATION_TYPE_2 structure (for remote clients or 64-bit local clients), the operation MUST be failed with STATUS_INFO_LENGTH_MISMATCH. In Section 2.1.5.14.13, FileShortNameInformation, a new bullet point was added to the first list. Added: • If InputBufferSize is less than the size, in bytes, of the FILE_NAME_INFORMATION structure, the operation MUST be failed with STATUS_INFO_LENGTH_MISMATCH. In Section 2.1.5.14.14, FileValidDataLengthInformation, a new bullet point was added to the first list. • If InputBufferSize is less than the size, in bytes, of the FILE_VALID_DATA_LENGTH_INFORMATION structure, the operation MUST be failed with STATUS_INFO_LENGTH_MISMATCH. In Section 2.1.5.15.6, FileFsControlInformation, the status code in the first bullet point was changed from: STATUS_INVALID_INFO_CLASS Changed to: STATUS__INFO_LENGTH_MISMATCH
2017/01/09	In Section 2.6, File Attributes, added a paragraph about how unsupported attributes are handled. Changed from: The following attributes are defined for files and directories. They can be used in any combination unless noted in the description of the attribute's meaning. There is no file attribute with the value 0x00000000 because a value of 0x00000000 in the FileAttributes field means

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<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td></td><td>that the file attributes for this file MUST NOT be changed when setting basic information for the file.

Changed to:
The following attributes are defined for files and directories. They can be used in any combination unless noted in the description of the attribute's meaning. There is no file attribute with the value 0x00000000 because a value of 0x00000000 in the FileAttributes field means that the file attributes for this file MUST NOT be changed when setting basic information for the file.
Note: File systems silently ignore any attribute that is not supported by that file system. Unsupported attributes MUST NOT be persisted on the media. It is recommended that unsupported attributes be masked off when encountered.</td></tr>
<tr><td>2017/01/09</td><td>In Section 2.5.1, FileFsAttributeInformation, modified the Windows Product Behavior Note about EFS support.

Changed from:
<table><tr><th>Value</th><th>Meaning</th></tr><tr><td>…</td><td>…</td></tr><tr><td>FILE_SUPPORTS_ENCRYPTION
0x00020000</td><td>The file system supports the Encrypted File System (EFS).<136></td></tr><tr><td>…</td><td>…</td></tr></table><136> Section 2.5.1: Windows support for a volume formatted to NTFS version 3.0 or 3.1 is required for EFS use. NTFS versions 3.0 and 3.1 are supported on Windows 2000, Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2.

Changed to:
<table><tr><th>Value</th><th>Meaning</th></tr><tr><td>…</td><td>…</td></tr><tr><td>FILE_SUPPORTS_ENCRYPTION
0x00020000</td><td>The file system supports the Encrypted File System (EFS).<136></td></tr><tr><td>…</td><td>…</td></tr></table><136> Section 2.5.1: Windows support for a volume formatted to NTFS version 3.0 or 3.1 is required for EFS use. NTFS versions 3.0 and 3.1 are supported on Windows 2000 and later. Support for FAT and EXFAT was added in Windows 10 v1607 operating system and Windows Server 2016 and later.</td></tr>
<tr><td>2017/01/09</td><td>In Section 2.1.5.9.4, FSCTL_DUPLICATE_EXTENTS_TO_FILE, revised the pseudocode to add a new Windows Product Behavior Note to cover the situation when the source file handle is closed.

Changed from:
If InputBuffer.FileHandle does not represent an open Handle to a DataStream with FILE_READ_DATA | FILE_READ_ATTRIBUTES level access, the operation fails with STATUS_INVALID_PARAMETER.

Changed to:</td></tr>
</table>

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Errata Published*	Description
	If InputBuffer.FileHandle does not represent an open Handle to a DataStream with FILE_READ_DATA | FILE_READ_ATTRIBUTES level access, the operation SHOULD<70> fail with STATUS_INVALID_PARAMETER. <70> Section 2.1.5.9.4: Windows Server returns STATUS_INVALID_HANDLE if the source file handle is closed.
2017/01/09	In Section 2.1.5.1.2, Open of an Existing File, revised the processing rules when access checks fail with STATUS_SHARING_VIOLATION. Changed from: … • If FileTypeToOpen is DirectoryFile: … • Perform access checks as described in section 2.1.5.1.2.1. If this fails, the request MUST be failed with the same status. • EndIf … Changed to: … • If FileTypeToOpen is DirectoryFile: … • Perform access checks as described in section 2.1.5.1.2.1. If this fails, the request MUST be failed with the same status. • ElseIf this fails with any other status code: • The request MUST be failed with the same status. • EndIf …
2016/12/19	In section 2.1.5.9.4 FSCTL_DUPLICATE_EXTENTS_TO_FILE behavior notes have been added to the following paragraphs. Changed from: The object store MUST check for byte range lock conflicts on Open.Stream using the algorithm described in section 2.1.4.10 with ByteOffset set to InputBuffer.TargetFileOffset, Length set to InputBuffer.ByteCount, IsExclusive set to TRUE, LockIntent set to FALSE, and Open set to Open. If a conflict is detected, the operation MUST be failed with STATUS_FILE_LOCK_CONFLICT. The object store MUST check for byte range lock conflicts on Source using the algorithm described in section 2.1.4.10 with ByteOffset set to InputBuffer.SourceFileOffset, Length set to InputBuffer.ByteCount, IsExclusive set to FALSE, LockIntent set to FALSE, and Open set to InputBuffer.FileHandle. If a conflict is detected, the operation MUST be failed with STATUS_FILE_LOCK_CONFLICT. Changed to: The object store SHOULD<WBN1> check for byte range lock conflicts on Open.Stream using the algorithm described in section 2.1.4.10 with ByteOffset set to InputBuffer.TargetFileOffset, Length set to InputBuffer.ByteCount, IsExclusive set to TRUE, LockIntent set to FALSE, and Open set to Open. If a conflict is detected, the operation MUST be failed with STATUS_FILE_LOCK_CONFLICT.

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<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td></td><td>The object store SHOULD<WBN2> check for byte range lock conflicts on Source using the algorithm described in section 2.1.4.10 with ByteOffset set to InputBuffer.SourceFileOffset, Length set to InputBuffer.ByteCount, IsExclusive set to FALSE, LockIntent set to FALSE, and Open set to InputBuffer.FileHandle. If a conflict is detected, the operation MUST be failed with STATUS_FILE_LOCK_CONFLICT.

WBN1: The ReFS file system in Windows Server 2016 does not check for byte range lock conflicts on Open.Stream.
WBN2: The ReFS file system in Windows Server 2016 does not check for byte range lock conflicts on Source.</td></tr>
<tr><td>2016/11/21</td><td>In Section 2.2, Status Codes, removed status code FSCTL_SET_SHORT_NAME_BEHAVIOR.

Changed from:
A server SHOULD return a status of STATUS_INVALID_DEVICE_REQUEST when an FSCTL is not supported remotely or is not supported on the file system on which the file or directory handle specified by the FSCTL exists.<10><11>
<11> Section 2.2: The following table lists FSCTLs that are not supported remotely and that, if received by the object store, will respond with a status code other than STATUS_INVALID_DEVICE_REQUEST, as specified in section 2.2.
<table>
<tr><th>FSCTL name</th><th>FSCTL function number</th><th>Status Code</th></tr>
<tr><td>…</td><td></td><td></td></tr>
<tr><td>FSCTL_FILE_PREFETCH</td><td>0x90120</td><td>STATUS_INVALID_PARAMETER</td></tr>
<tr><td>FSCTL_SET_SHORT_NAME_BEHAVIOR</td><td>0x901B4</td><td>STATUS_ACCESS_DENIED</td></tr>
<tr><td>…</td><td></td><td></td></tr>
</table>
Changed to:
A server SHOULD return a status of STATUS_INVALID_DEVICE_REQUEST when an FSCTL is not supported remotely or is not supported on the file system on which the file or directory handle specified by the FSCTL exists.<10><11>
<11> Section 2.2: The following table lists FSCTLs that are not supported remotely and that, if received by the object store, will respond with a status code other than STATUS_INVALID_DEVICE_REQUEST, as specified in section 2.2.
<table>
<tr><th>FSCTL name</th><th>FSCTL function number</th><th>Status Code</th></tr>
<tr><td>…</td><td></td><td></td></tr>
<tr><td>FSCTL_FILE_PREFETCH</td><td>0x90120</td><td>STATUS_INVALID_PARAMETER</td></tr>
<tr><td>…</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>2016/11/21</td><td>In Section 2.1.5.9.15, FSCTL_IS_PATHNAME_VALID, changed from:

This operation always returns STATUS_SUCCESS.

Changed to:</td></tr>
</table>

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Errata Published*	Description
	The FSCTL_IS_PATHNAME_VALID structure is defined in [MS-FSCC] section 2.3.25. This operation always returns STATUS_SUCCESS. In Section 2.1.5.9.17, FSCTL_LMR_SET_LINK_TRACKING_INFORMATION, changed from: This operation MUST be failed with STATUS_INVALID_DEVICE_REQUEST. Changed to: The FSCTL_LMR_SET_LINK_TRACKING_INFORMATION structure is defined in [MS-FSCC] section 2.3.27.1. This operation MUST be failed with STATUS_INVALID_DEVICE_REQUEST.
2016/11/07	In Section 2.1.5.5.3, Directory Information Queries, the processing rules for an empty Open.QueryPattern were changed from: • If Open.QueryPattern is empty: If FileNamePattern is empty: Set FileNamePattern to "*". Else: If FileNamePattern is not a valid filename component as described in [MS-FSCC] section 2.1.5, with the exceptions that wildcard characters described in section 2.1.4.3 are permitted and the strings "." and ".." are permitted, the operation MUST be failed with STATUS_OBJECT_NAME_INVALID. EndIf Set Open.QueryPattern to FileNamePattern for use in subsequent queries. Else: FirstQuery = FALSE … Changed to: • If Open.QueryPattern is empty: FirstQuery = TRUE Else: FirstQuery = FALSE EndIf If FirstQuery is TRUE or (FileNamePattern is not empty and RestartScan is TRUE)<55> If FileNamePattern is empty: Set FileNamePattern to "*". Else: If FileNamePattern is not a valid filename component as described in [MS-FSCC] section 2.1.5, with the exceptions that wildcard characters described in section 2.1.4.3 are permitted and the strings "." and ".." are permitted, the operation MUST be failed with STATUS_OBJECT_NAME_INVALID. EndIf Set Open.QueryPattern to FileNamePattern for use in subsequent queries. Else: Set FileNamePattern to Open.QueryPattern. FirstQuery = FALSE

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Errata Published*	Description
	<55> Section 2.1.5.5.3: Windows Vista operating system with Service Pack 1 (SP1), Windows Server 2008, Windows 7, and Windows Server 2008 R2 execute this portion only when FirstQuery is TRUE; the remaining conditions are ignored. This means the query pattern for a given Open cannot be changed once it is set. …
2016/11/07	In Section 2.1.4.12, Algorithm to Check for an Oplock Break, the processing rules have been changed from: • Indicate that the operation associated with WaitingOpen can continue according to the algorithm in section 2.1.4.12.1, setting OpenToRelease equal to WaitingOpen. Changed to: • Indicate that the operation associated with WaitingOpen can continues according to the algorithm in section 2.1.4.12.1, setting OpenToRelease equal to WaitingOpen. In the processing rules shown below, the text in **bold** has been added: • The operation that called this algorithm MUST be made cancelable by inserting it into CancelableOperations.CancelableOperationList. **• Insert Open into Oplock.WaitList.** • The operation that called this algorithm waits until the oplock break is acknowledged, as specified in section 2.1.5.18, or the operation is canceled. • The operation that called this algorithm MUST be made cancelable by inserting it into CancelableOperations.CancelableOperationList. **• Insert Open into Oplock.WaitList.** • The operation that called this algorithm waits until the oplock break is acknowledged, as specified in section 2.1.5.18, or the operation is canceled. • EndIf **• EndCase** • Case (READ_CACHING|HANDLE_CACHING): • The operation that called this algorithm MUST be made cancelable by inserting it into CancelableOperations.CancelableOperationList. **• Insert Open into Oplock.WaitList.** • The operation that called this algorithm waits until the oplock break is acknowledged, as specified in section 2.1.5.18, or the operation is canceled.

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[MS-FSCC]: File System Control Codes

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<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td>2017/04/17</td><td>In Section 2.4.11, FileDispositionInformation, the following new error code was added:

<table><tr><td>Error code</td><td>Meaning</td></tr><tr><td>…</td><td>…</td></tr><tr><td>STATUS_DIRECTORY_NOT_EMPTY
0xC0000101</td><td>Indicates that the directory trying to be deleted is not empty.</td></tr></table></td></tr>
<tr><td>2017/02/20</td><td>In this document, Sections 2.1.5.9.16, FSCTL_LMR_GET_LINK_TRACKING_INFORMATION, and 2.1.5.17, FSCTL_LMR_SET_LINK_TRACKING_INFORMATION, were removed as those structures are not supported by SMB.</td></tr>
<tr><td>2017/01/09</td><td>Section 2.4.42, FileNotifyInformation, was located in the wrong section of the document. Created a new Section 2.7, Directory Change Notifications, and moved the information from Section 2.4.42, FileNotifyInformation, into that new section.

Added:
2.7 Directory Change Notifications
The following definitions are part of the Directory Change Notification algorithm defined in [MS-FSA] section 2.1.5.10.
2.7.1 FILE_NOTIFY_INFORMATION
The FILE_NOTIFY_INFORMATION structure contains the changes for which the client is being notified. The structure consists of the following:
…
FileName (variable): A Unicode string with the name of the file that changed.

As a consequence of this move, changed the reference in MS-FSA Section 2.1.1.9, Per NotifyEventEntry, to reference MS-FSCC section 2.7.1 instead of 2.4.42.

In Section 5.4, NTFS Stream Names, corrected one of the NTFS Internal Stream Names from $SII\$Secure:$SII:$INDEX_ALLOCATION to $SII.</td></tr>
</table>

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<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td>2017/01/09</td><td>In Section 2.3.8, FSCTL_DUPLICATE_EXTENTS_TO_FILE Reply, changed the description of error code STATUS_NOT_SUPPORTED from:

<table>
<tr><th>Error code</th><th>Meaning</th></tr>
<tr><td>STATUS_NOT_SUPPORTED 0xC00000BB</td><td>• The source and target destination ranges overlap on the same file.
• Target file is sparse, while source is a non-sparse file.
• The source range is beyond the source file's allocation size.
• The destination range extends beyond the target file's allocation size. The caller might need to increase the target's allocation size before using FSCTL_DUPLICATE_EXTENTS_TO_FILE.</td></tr>
</table>

Changed to:
<table>
<tr><th>Error code</th><th>Meaning</th></tr>
<tr><td>STATUS_NOT_SUPPORTED 0xC00000BB</td><td>• The source and target destination ranges overlap on the same file.
• Source file is sparse, while target is a non-sparse file.
• The source range is beyond the source file's allocation size.</td></tr>
</table>
</td></tr>
<tr><td>2016/12/19</td><td>In section 2.3.8 FSCTL_DUPLICATE_EXTENTS_TO_FILE Reply, the second paragraph was changed from:

Changed from:
The only data item this message returns is a status code, as specified in [MS-ERREF] section 2.3. The status code returned directly by the function that processes this FSCTL MUST be STATUS_SUCCESS or one of the following.

Changed to:
The only data item this message returns is a status code, as specified in [MS-ERREF] section 2.3. The status code returned directly by the function that processes this FSCTL SHOULD<WBN> be STATUS_SUCCESS or one of the following.
<WBN> Windows Server returns STATUS_INVALID_HANDLE if the source file handle is closed, and STATUS_FILE_CLOSED if the target file handle is closed.</td></tr>
<tr><td>2016/08/29</td><td>In Section 2.1.2.1, Reparse Tags, added a missing constant.

Added:
<table>
<tr><td>IO_REPARSE_TAG_NFS
0x80000014</td><td>Used by the Network File System (NFS) component. Server-side interpretation only, not meaningful over the wire.</td></tr>
</table>
</td></tr>
</table>

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[MS-FSRVP]: File Server Remote VSS Protocol

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Errata below are for Protocol Document Version V10.0 – 2016/07/14.

Errata Published*	Description
2017/02/20	In Section 3.1.4.12, DeleteShareMapping (Opnum 11), the processing rules have been changed from: If ShadowCopySet.Status is not "Recovered", the server MUST fail the call with FSRVP_E_BAD_STATE. Changed to: If ShadowCopySet.Status is not "Exposed" or "Recovered", the server MUST fail the call with FSRVP_E_BAD_STATE.
2017/01/23	In Section 3.1.4.12, DeleteShareMapping (Opnum 11), the second paragraph of the processing rules has been changed from: The server MUST look up the ShadowCopySet from GlobalShadowCopysetTable using the index ShadowCopySetId. If no shadow copy set is found, the server MUST fail the call with FSRVP_E_SHADOWCOPYSET_ID_MISMATCH. Changed to: The server MUST look up the ShadowCopySet from GlobalShadowCopysetTable using the index ShadowCopySetId. If no shadow copy set is found, the server MUST fail the call with FSRVP_E_OBJECT_NOT_FOUND.

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[MS-FSVCA]: File Set Version Comparison Algorithms

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[MS-GPPREF]: Group Policy: Preferences Extension Data Structure

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[MS-GPSB]: Group Policy: Security Protocol Extension

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[MS-GPOL]: Group Policy: Core Protocol

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Errata below are for Protocol Document Version V33.0 – 2016/07/14.

Errata Published*	Description
2016/12/19	The policy application process in Section 3.2.5.1 was modified: Changed from: Steps 3.2.5.1.3 through 3.2.5.1.7 SHOULD be performed while impersonating the policy target as specified in [MS-DTYP] section 2.7, Impersonation Abstract Interfaces. The successful completion of these steps ends with a Policy Application Notification. There is no Policy Application starting or failure notification. … Policy target impersonation proceeds as follows: 1. For Computer Policy Application Mode, the Policy Source Mode MUST be set to Normal. 2. The client application retrieves the primary token of the interactive user (the policy target) and passes it to the Start Impersonation abstract interface as specified in [MS-DTYP] section 2.7.1. 3. The client application establishes an LDAP connection to the directory server. An LDAP bind request ([RFC2251] section 4.2, Bind Operation) is sent to the directory server with the credentials of an administrator. Changed to: The steps in sections 3.2.5.1.3 through 3.2.5.1.7 are performed while impersonating the policy target as specified in [MS-DTYP] section 2.7, Impersonation Abstract Interfaces. The successful completion of these steps ends with a Policy Application Notification. There is no Policy Application starting or failure notification. … Policy target impersonation proceeds as follows: 1. For Computer Policy Application Mode, the Policy Source Mode MUST be set to Normal. 2. The client application retrieves the primary token of the interactive user (the policy target) during user policy application or retrieves the machine token of the computer (the policy target) during computer policy application. It then passes the token to the Start Impersonation abstract interface as specified in [MS-DTYP] section 2.7.1. 3. The client application establishes an LDAP connection to the directory server. An LDAP bind request ([RFC2251] section 4.2, Bind Operation) is sent to the directory server with the credentials of the policy target.

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[MS-GSSA]: Generic Security Service Algorithm for Secret Key Transaction Authentication for DNS (GSS-TSIG) Protocol Extension

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Errata below are for Protocol Document Version V8.0 – 2016/07/14.

Errata Published*	Description
2016/08/29	A new section, 3.1.5.4, Domain Name Compression, has been added to discuss domain name compression. Added: 3.1.5.4 Domain Name Compression As described in [RFC1123] section 6.1.2.4, name servers MUST use compression in responses. For TSIG resource record in DNS response messages, compression is not supported.

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[MS-HGSA]: Host Guardian Service: Attestation Protocol

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Errata below are for Protocol Document Version V1.0 – 2017/03/16.

Errata Published*	Description
2017/05/15	In Section 3.1.5.1.1.3, Processing Details, a missing structure type has been added. Changed from: If the policy evaluation is successful, the server MUST return the new AttestationHealthCertificate received from KPS to the client. Changed to: If the policy evaluation is successful, the server MUST return HealthCertificateReply with the new AttestationHealthCertificate to the client.

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[MS-HTTPE]: Hypertext Transfer Protocol (HTTP) Extensions

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[MS-HVRS]: Hyper-V Remote Storage Profile

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[MS-ICPR]: ICertPassage Remote Protocol

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[MS-IKEE]: Internet Key Exchange Protocol Extensions

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[MS-IPAMM2]: IP Address Management (IPAM) Management Protocol Version 2

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Errata below are for Protocol Document Version V6.0 – 2016/07/14.

<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td>2017/03/06</td><td>In this document, made numerous changes, including:

• Correcting type name mismatches and capitalization errors.
• Adding missing elements and tags.
• Correcting mismatches between the code snippets in Section 2 and the IDL in the Appendix.

For details on the changes, see the Diff PDF document at https://winprotocoldoc.blob.core.windows.net/productionwindowsarchives/MS-IPAMM2/[MS-IPAMM2]-170306-diff.pdf.</td></tr>
<tr><td>2017/02/06</td><td>In Section 3.5.4.8.1, Enumeration Processing Logic, removed parameter IPAuditEnumerationParameters, object type IPAudit, as the parameter is already described correctly in section 3.9.

Changed from:

<table><tr><th>Enumeration Parameter Type</th><th>Object Type</th></tr><tr><td>…</td><td>…</td></tr><tr><td>IpamProvisioningEnumerationParameters</td><td>Provisioning</td></tr><tr><td>IPAuditEnumerationParameters</td><td>IPAudit</td></tr><tr><td>IPBlockChildBlockEnumerationParameters</td><td>IPBlock</td></tr><tr><td>…</td><td>…</td></tr></table>
Changed to:

<table><tr><th>Enumeration Parameter Type</th><th>Object Type</th></tr><tr><td>…</td><td>…</td></tr></table></td></tr>
</table>

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<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><td>IpamProvisioningEnumerationParameters</td><td>Provisioning</td></tr>
<tr><td>IPBlockChildBlockEnumerationParameters</td><td>IPBlock</td></tr>
<tr><td>…</td><td>…</td></tr>
</table>
</td></tr>
<tr><td>2016/12/05</td><td>In Section 3.5.4.8.1, Enumeration Processing Logic, deleted one Enumeration Parameter Type and added 7 others as shown below (deletions shown as strikeouts, additions in bold font):
<table>
<tr><th>Enumeration Parameter Type</th><th>Object Type</th></tr>
<tr><td>…</td><td></td></tr>
<tr><td><s>DhcpScopeObjectSpecificEnumerationParameters</s></td><td><s>DhcpScope</s></td></tr>
<tr><td>…</td><td></td></tr>
<tr><td>DiscoverySubnetEnumerationParameters</td><td>DiscoveredSubnets</td></tr>
<tr><td>DnsConditionalForwarderEnumerationParameters</td><td>DnsConditionalForwarder</td></tr>
<tr><td>DnsResourceRecordEnumerationParameters</td><td>DnsResourceRecord</td></tr>
<tr><td>…</td><td></td></tr>
<tr><td>UnmappedIpamIPAddressForLogicalGroupEnumerationParameters</td><td>IPAddress</td></tr>
<tr><td>DhcpScopeObjectSpecificEnumerationParameters</td><td>DhcpScope</td></tr>
<tr><td>DhcpScopeByPrefixAndServerNameEnumerationParameters</td><td>DhcpScope</td></tr>
<tr><td>DhcpSuperscopeBySuperscopeAndServerNameEnumerationParameters</td><td>DHCPSuperscope</td></tr>
<tr><td>DnsConditionalForwarderByFiltersEnumerationParameters</td><td>DnsConditionalForwarder</td></tr>
<tr><td>DnsResourceRecordFilterEnumerationParameters</td><td>DnsResourceRecord</td></tr>
</table>
</td></tr>
</table>

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[MS-IRP]: Internet Information Services (IIS) Inetinfo Remote Protocol

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Errata below are for Protocol Document Version V7.0 – 2016/07/14.

Errata Published*	Description
2016/11/21	In Section 3.1.5.1, R_InetInfoGetVersion (Opnum 0), changed MAY to SHOULD regarding the value that is returned in the pdwVersion pointer and modified the corresponding product behavior note. Changed from: The value returned in pdwVersion MAY correspond to the version of the Internet protocol servers managed by the Internet Information Services (IIS) Inetinfo Remote Protocol server.<9>. <9> Section 3.1.5.1: The Windows implementation of R_InetInfoGetVersion returns Major Version = 5 and Minor Version = 1 for implementations of IIS released on Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7, Windows Server 2008 R2 operating system, Windows 8, Windows Server 2012, Windows 8.1, Windows Server 2012 R2, Windows 10, and Windows Server 2016. Changed to: The value returned in pdwVersion SHOULD<9> correspond to the version of the Internet protocol servers managed by the Internet Information Services (IIS) Inetinfo Remote Protocol server. <9> Section 3.1.5.1: The Windows implementation of R_InetInfoGetVersion does not return Major Version = 5 and Minor Version = 1 for implementations of IIS released on Windows NT 4.0, Windows 2000 Professional, and Windows 2000 Server. In Section 7, Appendix B: Product Behavior, changed references to the "Windows 2000 operating system" to "Windows 2000 Professional" and "Windows 2000 Server".

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[MS-KILE]: Kerberos Protocol Extensions

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[MS-KPP]: Key Provisioning Protocol

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Errata below are for Protocol Document Version V1.0 – 2016/07/14.

Errata Published*	Description
2017/03/20	In Section 1.2.1, Normative References, the reference [MS-DRSR] was replaced with the reference [MS-DTYP]. Also, in Section 3.1.5.1.1.3, Processing Details, DSTIME format was replaced with FILETIME in the KeyApproximateLastLogonTimeStamp and KeyCreationTime table descriptions. In Section 1.2.1, Normative References, changed from: ... [MS-ADTS] Microsoft Corporation, "Active Directory Technical Specification". [MS-DRSR] Microsoft Corporation, "Directory Replication Service (DRS) Remote 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 ... Changed to: ... [MS-ADTS] Microsoft Corporation, "Active Directory Technical Specification". [MS-DTYP] Microsoft Corporation, "Windows Data Types". [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 ... In Section 3.1.5.1.1.3, Processing Details, changed from: ... 4. The key provisioning server sends a request to the directory server, which adds an ms-DS-Key-Credential-Link object as an additional value in the ms-DS-Key-Credential-Link attribute on the User object located in step 3. If the directory request cannot be successfully completed, the server MUST respond with an HTTP response with the HTTP status code set to 400. The body of the response MUST contain an ErrorDetails object populated according to section 2.2.3.1. KEYCREDENTIALLINK_ENTRY Identifier | Value ... | ...

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<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><td>KeyApproximateLastLogonTimestamp</td><td>MUST be set to a time generated by the key provisioning server, represented in DSTIME format ([MS-DRSR] section 5.51).</td></tr>
<tr><td>KeyCreationTime</td><td>MUST be set to a time generated by the key provisioning server, represented in DSTIME format ([MS-DRSR] section 5.51).</td></tr>
</table>
Changed to:
...
4. The key provisioning server sends a request to the directory server, which adds an ms-DS-Key-Credential-Link object as an additional value in the ms-DS-Key-Credential-Link attribute on the User object located in step 3. If the directory request cannot be successfully completed, the server MUST respond with an HTTP response with the HTTP status code set to 400. The body of the response MUST contain an ErrorDetails object populated according to section 2.2.3.1.
<table>
<tr><th>KEYCREDENTIALLINK_ENTRY Identifier</th><th>Value</th></tr>
<tr><td>...</td><td></td></tr>
<tr><td>KeyApproximateLastLogonTimeStamp</td><td>MUST be set to a time generated by the key provisioning server, represented in FILETIME format ([MS-DTYP] section 2.3.3).</td></tr>
<tr><td>KeyCreationTime</td><td>MUST be set to a time generated by the key provisioning server, represented in FILETIME format.</td></tr>
</table>
</td></tr>
</table>

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[MS-KPS]: Key Protection Service Protocol

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Errata below are for Protocol Document Version V1.0 – 2017/03/16.

Errata Published*	Description
2017/05/15	In the table of types in Section 2.2.2, Complex Types, "CryptoParameters" was misspelled "CryptoPrameters". This has been corrected. In Section 2.2.2.6, WrappingCollection, we corrected an error: Changed from: WrappingCollection_T.Wrapping_T: List of all wrappings as defined in section 2.2.2.4. Changed to: WrappingCollection_T.Wrapping: List of all wrappings as defined in section 2.2.2.4. In Section 2.2.2.8, GuardianSignature, WrappingID was changed to WrappingId. Changed from: WrappingID: A 32-bit unsigned integer that contains a unique wrapping ID. Changed to: WrappingId: A 32-bit unsigned integer that contains a unique wrapping ID.

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[MS-LSAD]: Local Security Authority (Domain Policy) Remote Protocol

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Errata Published*	Description
2017/05/15	In Section 2.2.7.9, LSAPR_TRUSTED_DOMAIN_INFORMATION_EX, a note regarding [MSKB-3155495], the KB update for Privileged Identity Management (PIM), was added to the bitmapped value table for the TAPT (TRUST_ATTRIBUTE_PIM_TRUST) flag of the TrustAttrbutes field. Changed from: TAPT (TRUST_ATTRIBUTE_PIM_TRUST) | 0x00000400 | Windows 10 and Windows Server 2016 Changed to: TAPT (TRUST_ATTRIBUTE_PIM_TRUST) | 0x00000400 | Windows 10 and Windows Server 2016 (Also supported on Windows 8.1 and Windows Server 2012 R2 if [MSKB-3155495] is installed.) In Section 1.2.1, Normative References, changed from: [MSKB-3149090] Microsoft Corporation, "MS16-047: Description of the security update for SAM and LSAD remote protocols", April 2016, https://support.microsoft.com/en-us/kb/3149090 [RFC1088] McLaughlin III, L., "A Standard for the Transmission of IP Datagrams over NetBIOS Networks", RFC 1088, February 1989, http://www.ietf.org/rfc/rfc1088.txt Changed to: [MSKB-3149090] Microsoft Corporation, "MS16-047: Description of the security update for SAM and LSAD remote protocols", April 2016, https://support.microsoft.com/en-us/kb/3149090 [MSKB-3155495] Microsoft Corporation, "You can't use the Active Directory shadow principal groups feature for groups that are always filtered out in Windows", revision 2.0, May 2016, https://support.microsoft.com/en-us/kb/3155495

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Errata Published*	Description
	[RFC1088] McLaughlin III, L., "A Standard for the Transmission of IP Datagrams over NetBIOS Networks", RFC 1088, February 1989, http://www.ietf.org/rfc/rfc1088.txt

*Date format: YYYY/MM/DD

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[MS-LSAT]: Local Security Authority (Translation Methods) Remote Protocol

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<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td>2017/01/23</td><td>
In the following product behavior notes, added Windows XP to the product version information about the second flag (0x00000002) in three structures:

-- Behavior note <11> (for Section 2.2.21, LSAPR_TRANSLATED_NAME_EX)
-- Behavior note <13> (for Section 2.2.23, LSAPR_TRANSLATED_SID_EX)
-- Behavior note <15> (for Section 2.2.25, LSAPR_TRANSLATED_SID_EX2)

Changed from:
- -
<table>
<tr><th>Flag value</th><th>Windows version</th></tr>
<tr><td>...</td><td>...</td></tr>
<tr><td>0x00000002</td><td>Windows Server 2003</td></tr>
</table>
- -

Changed to:
- -
<table>
<tr><th>Flag value</th><th>Windows version</th></tr>
<tr><td>...</td><td>...</td></tr>
<tr><td>0x00000002</td><td>Windows XP, Windows Server 2003</td></tr>
</table>
- -
</td></tr>
</table>

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[MS-MDE]: Mobile Device Enrollment Protocol

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[MS-MDE2]: Mobile Device Enrollment Protocol Version 2

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[MS-MDM]: Mobile Device Management Protocol

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[MS-MWBE]: Microsoft Web Browser Federated Sign-On Protocol Extensions

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[MS-MWBF]: Microsoft Web Browser Federated Sign-On Protocol

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Errata below are for Protocol Document Version V11.0 – 2016/07/14.

Errata Published*	Description
2016/08/04 (updated) 2016/07/18	In three sections, added and updated information about the prompt URI parameter regarding its existing behavior and behavior that is modified through KB/QFE 3172614. In Section 1.2.1, Normative References, included the following reference: [MSKB-3172614] Microsoft Corporation, "July 2016 update rollup for Windows RT 8.1, Windows 8.1, and Windows Server 2012 R2", https://support.microsoft.com/en-us/kb/3172614 In Section 2.2.3, wsignin1.0 Request Message, changed from: … • prompt (optional): This query parameter is used in the same way as the prompt parameter defined in [OIDCCore] section 3.1.2.1, but the only accepted value for this parameter is "login".<20> Any other values are ignored. This parameter is used to interactively prompt the end-user for re-authentication. Error handling for this parameter follows the specification of section 3.1.5.2. … <20> Section 2.2.3: The prompt parameter is not supported on Windows Server 2003 R2, Windows Server 2008, Windows Server 2008 R2, Windows Server 2012, or Windows Server 2012 R2. Additionally, it is supported only in AD FS server with AD FS behavior level set to AD_FS_BEHAVIOR_LEVEL_2 or higher, and ignored otherwise. Changed to: … • prompt (optional): This query parameter is used in the same way as the prompt parameter defined in [OIDCCore] section 3.1.2.1, but the only accepted value for this parameter is "login".<20> Any other values are ignored. This parameter is used to interactively prompt the end-user for re-authentication. Error handling for this parameter follows the specification of section 3.1.5.2. … <20> Section 2.2.3: The prompt parameter is not supported on Windows Server 2003 R2, Windows Server 2008, Windows Server 2008 R2, or Windows Server 2012. It is also not supported on Windows Server 2012 R2 unless [MSKB-3172614] is installed. In Section 3.1.5.3.4, Message Transmission, changed from: … The following are recommended best practices:

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Errata Published*	Description
	• Upon forwarding the wsignin1.0 request, the resource IP/STS SHOULD use only the parameters that are supported by the requestor IP/STS behavior level. The resource IP/STS can track the requestor IP/STS behavior level and choose the forwarding behavior accordingly. Behavior-level tracking is implementation specific. • For a resource IP/STS with the ad_fs_behavior_level ADM element, as defined in [MS-OAPX] section 3.2.1.1 (hereafter referred to simply as the AD FS behavior level) set to AD_FS_BEHAVIOR_LEVEL_2 or higher, if it receives the prompt parameter and knows that the requestor IP/STS AD FS behavior level is lower than AD_FS_BEHAVIOR_LEVEL_2, the resource IP/STS SHOULD send a wsignin1.0 request using the protocol-specific parameters (for example, wfresh and wauth) to facilitate a fresh and interactive authentication.… Changed to: … The ad_fs_behavior_level ADM element is defined in [MS-OAPX] section 3.2.1.1 and is hereafter referred to simply as the AD FS behavior level. [MS-OAPX] section 3.2.1.1 also includes information about how the AD FS behavior level relates to product versions. The following are recommended best practices related to the AD FS behavior level: • Upon forwarding the wsignin1.0 request, the resource IP/STS SHOULD use only the parameters that are supported by the requestor IP/STS AD FS behavior level. The resource IP/STS can track the requestor IP/STS AD FS behavior level and choose the forwarding behavior accordingly. Behavior-level tracking is implementation specific. • If a resource IP/STS that supports the prompt parameter receives the prompt parameter and knows that the requestor IP/STS does not support the prompt parameter, the resource IP/STS SHOULD send a wsignin1.0 request using the protocol-specific parameters (for example, wfresh and wauth) to facilitate a fresh and interactive authentication. Note Support for the prompt parameter depends on the AD FS behavior level and the product version. See section 2.2.3 for support information. If the parameter is not supported by the AD FS server, it is ignored. …

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[MS-NCT]: Network Cost Transfer Protocol

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Errata below are for Protocol Document Version V1.0 – 2016/07/14.

Errata Published*	Description
2017/03/20	In Section 2.2.1, Network Cost IE, updated the value for the Reserved field of Network Cost IE from 0 to 2. Changed from: Reserved (1 byte): MUST be 0. Changed to: Reserved (1 byte): MUST be 2. In Section 2.2.2, Tethering Identifier IE, updated the OUI_Type value for the Tethering Identifier IE from 12 to 18 Changed from: OUI_Type (1 byte): A packet subtype within the universe specific to a particular OUI value. For the Tethering Identifier IE, the OUI Type MUST contain a value of 12. Changed to: OUI_Type (1 byte): A packet subtype within the universe specific to a particular OUI value. For the Tethering Identifier IE, the OUI Type MUST contain a value of 18 (0x12).
2017/03/20	In Section 4, Protocol Examples, updated hex values for the Network Cost IE conveyed in a Beacon or Probe Response frame for the over data limit cost flag. Changed from: the hex value for the Length field is 14. the hex value for the OUI_Type field is 11. Changed to: the hex value for the Length field is 0E. the hex value for the OUI_Type field is 12.
2017/02/20	In Section 2.2.1.1, Cost Flags, added the 0x00 cost flag value to the table. Changed from:

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<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><th>Value</th><th>Name</th><th>Description</th></tr>
<tr><td>0x01</td><td>Over Data Limit</td><td>Usage has exceeded the data limit of the metered network; different network costs or conditions might apply.</td></tr>
<tr><td>…</td><td>…</td><td>…</td></tr>
</table>
Changed to:
<table>
<tr><th>Value</th><th>Name</th><th>Description</th></tr>
<tr><td>0x00</td><td>Unknown</td><td>The usage is unknown or unrestricted.</td></tr>
<tr><td>0x01</td><td>Over Data Limit</td><td>Usage has exceeded the data limit of the metered network; different network costs or conditions might apply.</td></tr>
<tr><td>…</td><td>…</td><td>…</td></tr>
</table>
</td></tr>
</table>

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[MS-NFPB]: Near Field Proximity Bidirectional Services Protocol

This topic lists the Errata found in [MS-NFPB] since it was last published. Since this topic is updated frequently, we recommend that you subscribe to these RSS or Atom feeds to receive update notifications.

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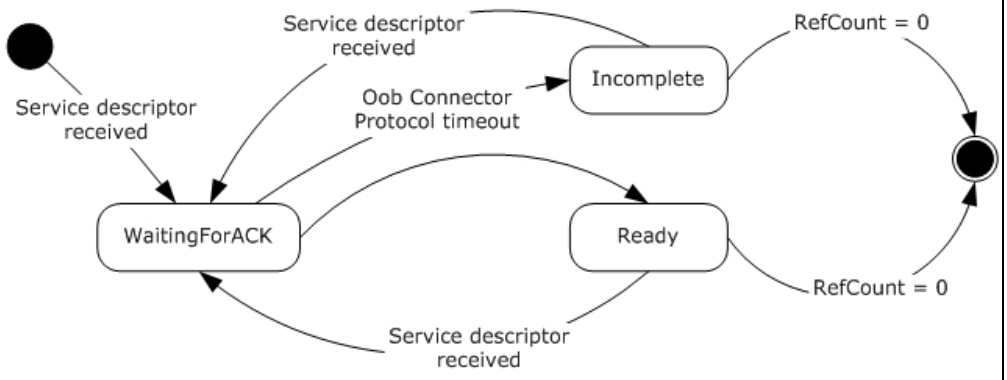
Errata below are for Protocol Document Version V7.0 – 2016/07/14.

Errata Published *	Description
2017/02/20	In Section 3.1.1.2 OOB, Connector Object, updated the OOB Connector state transitions: Connector role figure to show "WaitingForACK" transits to the state "Ready". Changed from:  **Figure 4: OOB Connector state transitions: Connector role** Changed to:

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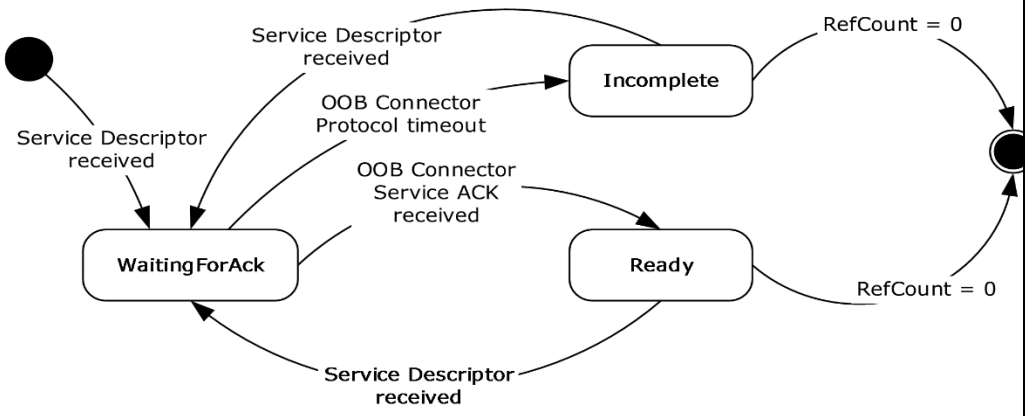
Errata Published *	Description
	 **Figure 4: OOB Connector state transitions: Connector role**
2016/12/05	In two sections, corrected a field name and an object name. In Section 2.2.3, Extension Structure, in the description for field ExtensionDataSize, changed "Extension Data" to "ExtensionData". In Section 2.2.12, Session Factory Service Activation Message, in the description for field ReplyChannelID, changed "SessionFactory" to "Session Factory".

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[MS-NFPS]: Near Field Proximity Sharing Protocol

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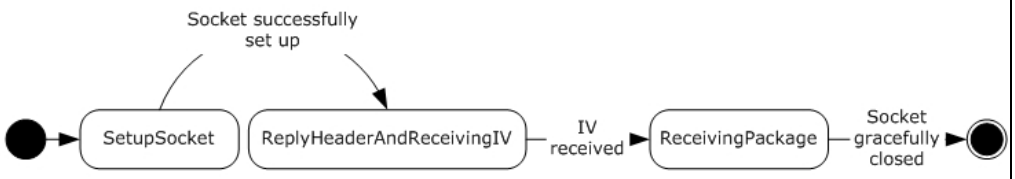
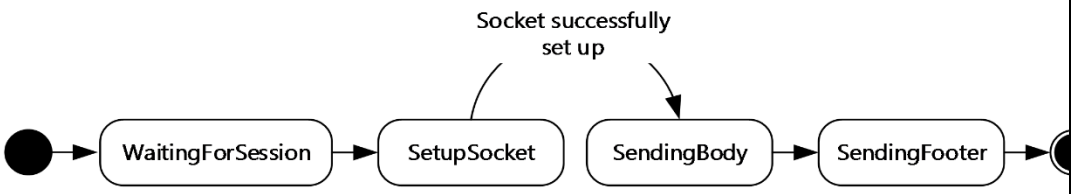
Errata below are for Protocol Document Version V3.0 – 2016/07/14.

Errata Published *	Description
2017/02/20	In Section 3.2.1, Abstract Data, updated the Share sender state transitions figure to match the State table. Changed from:  **Figure 3: Share sender state transitions** Changed to:  **Figure 3: Share sender state transitions**

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[MS-NKPU]: Network Key Protector Unlock Protocol

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Errata below are for Protocol Document Version V5.0 – 2016/07/14.

Errata Published*	Description
2017/05/15	Changes were made to two sections: 2.2.1.1 DHCPv6 Vendor Class Option Structure 2.2.1.4 DHCPv4 Vendor Specific Information Option Structure We clarified that 16 bytes of MAC precede 32 bytes of encrypted result in the Option-Data and Suboption Data field. Changed from: Option-Data: In a client request, this field contains the KP ADM element data. In a server response, this field contains the CK ADM element data that is encrypted with the SK ADM element content by using the AES-CCM [FIPS197] [RFC3610] mode of encryption without authentication data and the MAC containing the first 16 bytes of encrypted data. The nonce used is 12 bytes, all zeros, and is not transmitted. Suboption Data: In a client request, this field contains the first 128 bytes of the KP ADM element data. In a server response, this field contains the CK ADM element data that is encrypted with the SK ADM element data by using the AES-CCM [FIPS197] [RFC3610] mode of encryption without authentication data and the MAC containing the first 16 bytes of encrypted data. The nonce used is 12 bytes, all zeros, and is not transmitted. Changed to: Option-Data: In a client request, this field contains the KP ADM element data. In a server response, this field contains the CK ADM element data that is encrypted with the SK ADM element content by using the AES-CCM [FIPS197] [RFC3610] mode of encryption without authentication data and 16 bytes of MAC that precedes 32 bytes of encrypted result. The nonce used is 12 bytes, all zeros, and is not transmitted. Suboption Data: In a client request, this field contains the first 128 bytes of the KP ADM element data. In a server response, this field contains the CK ADM element data that is encrypted with the SK ADM element data by using the AES-CCM [FIPS197] [RFC3610] mode of encryption without authentication data and 16 bytes of MAC that precedes 32 bytes of encrypted result. The nonce used is 12 bytes, all zeros, and is not transmitted.
2016/10/10	In two sections, clarified the AES-CCM parameters for encryption in the Encrypted Buffer Suboption field. In Section 2.2.1.2, DHCPv6 Vendor Specific Information Option Structure, changed from: ...

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	Encrypted Buffer Suboption: Opt-Code (2 bytes): This field MUST be set to 2 (0x0002). Option-Len (2 bytes): In the client request, this field MUST be set to 256 (0x0100), which is the length of the KP ADM element data. In the server response, this field MUST be set to 32 (0x20), which is the length of the CK ADM element data encrypted with the SK ADM element content. Option-Data: In a client request, this field contains the KP ADM element data. In a server response, this field contains the CK ADM element data encrypted with the SK ADM element content. When both suboptions are present, the Certificate Thumbprint Suboption MUST come before the Encrypted Buffer Suboption. Changed to: ... Encrypted Buffer Suboption: Opt-Code (2 bytes): This field MUST be set to 2 (0x0002). Option-Len (2 bytes): In the client request, this field MUST be set to 256 (0x0100), which is the length of the KP ADM element data. In the server response, this field MUST be set to 32 (0x20), which is the length of the CK ADM element data encrypted with the SK ADM element content. Option-Data: In a client request, this field contains the KP ADM element data. In a server response, this field contains the CK ADM element data that is encrypted with the SK ADM element content by using the AES-CCM [FIPS197] [RFC3610] mode of encryption without authentication data and the MAC containing the first 16 bytes of encrypted data. The nonce used is 12 bytes, all zeros, and is not transmitted. When both suboptions are present, the Certificate Thumbprint Suboption MUST come before the Encrypted Buffer Suboption. In Section 2.2.1.4, DHCPv4 Vendor Specific Information Option Structure, changed from: ... Encrypted Buffer Suboption: Suboption Code (1 byte): This field MUST be set to 2 (0x02). Suboption Length (1 byte): In the client request, this field MUST be set to 128 (0x80), which is half the length of the KP ADM element data. In the server response, this field MUST be set to 32 (0x20), which is the length of the CK ADM element data encrypted with the SK ADM element content. Suboption Data: In a client request, this field contains the first 128 bytes of the KP ADM element data. In a server response, this field contains the CK ADM element data encrypted with the SK ADM element data. Changed to: ...

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Errata Published*	Description
	Encrypted Buffer Suboption: Suboption Code (1 byte): This field MUST be set to 2 (0x02). Suboption Length (1 byte): In the client request, this field MUST be set to 128 (0x80), which is half the length of the KP ADM element data. In the server response, this field MUST be set to 32 (0x20), which is the length of the CK ADM element data encrypted with the SK ADM element content. Suboption Data: In a client request, this field contains the first 128 bytes of the KP ADM element data. In a server response, this field contains the CK ADM element data that is encrypted with the SK ADM element data by using the AES-CCM [FIPS197] [RFC3610] mode of encryption without authentication data and the MAC containing the first 16 bytes of encrypted data. The nonce used is 12 bytes, all zeros, and is not transmitted.

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[MS-NLMP]: NT LAN Manager (NTLM) Authentication Protocol

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[MS-NNS]: .NET NegotiateStream Protocol

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Errata below are for Protocol Document Version V6.0 – 2016/07/14.

Errata Published*	Description
2016/07/18	In Section 2.2.2, Data Message, changed from: This section defines the structure of the data exchange messages. These messages are used to transfer application-specific data after the handshake phase is complete. The .NET NegotiateStream Protocol only frames application data using the format noted in the following table if the negotiation of security services during the handshake phase resulted in both the client and server agreeing to sign or encrypt and sign the data to be transferred. Thus, if the negotiated security context in the handshake phase results in a context that **does not support** message confidentiality or integrity, then the data transferred is not framed, and does not follow the format specified in this section (that is, application-supplied data is written directly to the underlying TCP stream). Changed to (change in **bold**): This section defines the structure of the data exchange messages. These messages are used to transfer application-specific data after the handshake phase is complete. The .NET NegotiateStream Protocol only frames application data using the format noted in the following table if the negotiation of security services during the handshake phase resulted in both the client and server agreeing to sign or encrypt and sign the data to be transferred. Thus, if the negotiated security context in the handshake phase results in a context that **supports neither** message confidentiality nor integrity, then the data transferred is not framed, and does not follow the format specified in this section (that is, application-supplied data is written directly to the underlying TCP stream). In Section 3.1.4.1, Application Invocation of the .NET NegotiateStream Protocol, changed from: … If the function returns any major_status other than GSS_S_COMPLETE, the implementation MUST notify the application of the failure without sending anything over the Underlying TCP Connection. Otherwise, the implementation MUST store the returned credential handle as the Client Credentials, and MUST set the Stream State to CreatingSecurityToken. The implementation MUST pass the Client Credentials to the GSS_Init_sec_context function ([RFC2743] section 2.2.1). The input_context_handle parameter MUST be GSS_C_NO_CONTEXT. The targ_name parameter MUST be the Target Name. The mech_type parameter MUST be the same as that passed to GSS_Acquire_cred. The deleg_req_flag MUST be true if and only if Allowed Impersonation Level is Delegation. The conf_req_flag MUST be true if and only if the Required Protection Level is EncryptAndSign. The integ_req_flag MUST be true if and only if the Required Protection Level is Sign or EncryptAndSign. The mutual_req_flag, replay_det_req_flag, and sequence_req_flag MUST be true. The anon_req_flag MUST be false. The chan_bindings parameter MUST be the Channel Binding Token. The input_token MUST be NULL, and the lifetime_req MUST be 0. Changed to: … If the function returns any major_status other than GSS_S_COMPLETE, the implementation MUST notify the application of the failure without sending anything over the Underlying TCP

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Errata Published*	Description
	Connection. Otherwise, the implementation MUST store the returned credential handle as the Client Credentials, and MUST set the Stream State to CreatingSecurityToken. The implementation MUST pass the Client Credentials to the GSS_Init_sec_context function ([RFC2743] section 2.2.1). The input_context_handle parameter MUST be GSS_C_NO_CONTEXT. The targ_name parameter MUST be the Target Name. The mech_type parameter MUST be the same as that passed to GSS_Acquire_cred. The deleg_req_flag MUST be true if and only if Allowed Impersonation Level is Delegation. The conf_req_flag MUST be true if and only if the Required Protection Level is EncryptAndSign. The integ_req_flag MUST be true if and only if the Required Protection Level is Sign or EncryptAndSign. The mutual_req_flag, replay_det_req_flag, and sequence_req_flag MUST be true. The anon_req_flag MUST be false. The chan_bindings parameter MUST be the Channel Binding Token. The input_token MUST be NULL, and the lifetime_req MUST be 0. If the conf_avail return value is true, the integ_avail return value MUST also be true, and the Negotiated Protection Level is EncryptAndSign. If the conf_avail return value is false and the integ_avail return value is true, the Negotiated Protection Level is Sign. Otherwise, the Negotiated Protection Level is None.

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[MS-NRPC]: Netlogon Remote Protocol

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[MS-NSPI]: Name Service Provider Interface (NSPI) Protocol

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Errata below are for Protocol Document Version V11.0 – 2016/07/14.

Errata Published*	Description
2017/03/20	In this document, added a product behavior note to describe the relationships between protocol roles and products in Section 1.3, Overview. Also added Microsoft Outlook and Microsoft Exchange Server product versions and removed Windows client product versions from the product behavior applicability list in Section 7, Appendix B: Product Behavior. In Section 1.3, Overview, changed from: Messaging clients that implement a browsable address book need a way to communicate with a data store that holds addressing data to access and manipulate that data. The NSPI Protocol enables communication between a messaging client and a data store. ... Changed to: Messaging clients that implement a browsable address book need a way to communicate with a data store that holds addressing data to access and manipulate that data. The NSPI Protocol enables communication between a messaging client and a data store.<1> <1> Section 1.3: The NSPI client is provided by Microsoft Outlook. The NSPI server is provided by Microsoft Exchange Server. ... In Section 7, Appendix B: Product Behavior, changed from: ... Windows Client • Windows 2000 operating system • Windows XP operating system • Windows Vista operating system • Windows 7 operating system • Windows 8 operating system • Windows 8.1 operating system • Windows 10 operating system Windows Server • Windows 2000 Server operating system • Windows Server 2003 operating system • Windows Server 2008 operating system • Windows Server 2008 R2 operating system

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Errata Published*	Description
	• Windows Server 2012 operating system • Windows Server 2012 R2 operating system • Windows Server 2016 operating system ... Changed to: ... Microsoft Outlook • Microsoft Office Outlook 2003 • Microsoft Office Outlook 2007 • Microsoft Outlook 2010 • Microsoft Outlook 2013 • Microsoft Outlook 2016 Microsoft Exchange Server • Microsoft Exchange Server 2003 • Microsoft Exchange Server 2007 • Microsoft Exchange Server 2010 • Microsoft Exchange Server 2013 • Microsoft Exchange Server 2016 Windows Server • Windows 2000 Server operating system • Windows Server 2003 operating system • Windows Server 2008 operating system • Windows Server 2008 R2 operating system • Windows Server 2012 operating system • Windows Server 2012 R2 operating system • Windows Server 2016 operating system

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[MS-OAPX]: OAuth 2.0 Protocol Extensions

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Errata below are for Protocol Document Version V4.0 – 2016/07/14.

Errata Published*	Description
2017/04/03	In this document, references for [MS-OAPXBC] and [MS-OIDCE] were added to Section 1.2.1. Also, a note clarifying that when using the OAuth 2.0 Protocol Extensions [MS-OAPX], the OAuth 2.0 Protocol Extensions for Broker Clients [MS-OAPXBC], and the OpenID Connect 1.0 Protocol Extensions [MS-OIDCE], all have to be running on the same AD FS server was added to Section 1.5. In Section 1.2.1, Normative References, added: [MS-OAPXBC] Microsoft Corporation, "OAuth 2.0 Protocol Extensions for Broker Clients". [MS-OIDCE] Microsoft Corporation, "OpenID Connect 1.0 Protocol Extensions". In Section 1.5, Prerequisites/Preconditions, added: The OAuth 2.0 Protocol Extensions (this document), the OAuth 2.0 Protocol Extensions for Broker Clients [MS-OAPXBC], and the OpenID Connect 1.0 Protocol Extensions [MS-OIDCE], if being used, MUST all be running on the same AD FS server.
2016/12/19	Revisions have been applied to MS-OAPX, and client applicability for this protocol has been added. Please see the following sections: Section 1.2.1 Added: [MSFT-WKPLJOIN] Microsoft Corporation, "Microsoft Workplace Join for non-Windows 10 computers", https://www.microsoft.com/en-us/download/details.aspx?id=53554 Section 1.6 Changed from: OAuth 2.0 clients that request authorization using the OAuth 2.0 protocol are required to implement the mandatory extensions defined in this protocol document. Changed to: OAuth 2.0 clients that request authorization using the OAuth 2.0 protocol are required to implement the mandatory extensions defined in this protocol document.<2> Appendix B Changed from: · Windows Server 2012 R2 operating system · Windows Server 2016 operating system Changed to:

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<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td></td><td>
The following tables show the relationships between Microsoft product versions or supplemental software and the roles they perform.
<table>
<tr><td>Windows Client</td><td>Client role</td><td>Server role</td></tr>
<tr><td>Windows 7 operating system</td><td>Yes</td><td>No</td></tr>
<tr><td>Windows 8 operating system</td><td>Yes</td><td>No</td></tr>
<tr><td>Windows 8.1 operating system</td><td>Yes</td><td>No</td></tr>
<tr><td>Windows 10 operating system</td><td>Yes</td><td>No</td></tr>
</table>
<table>
<tr><td>Windows Server</td><td>Client role</td><td>Server role</td></tr>
<tr><td>Windows Server 2008 operating system</td><td>Yes</td><td>No</td></tr>
<tr><td>Windows Server 2008 R2 operating system</td><td>Yes</td><td>No</td></tr>
<tr><td>Windows Server 2012 operating system</td><td>Yes</td><td>No</td></tr>
<tr><td>Windows Server 2012 R2 operating system</td><td>Yes</td><td>Yes</td></tr>
<tr><td>Windows Server 2016 operating system</td><td>Yes</td><td>Yes</td></tr>
</table>
Added:
<2> Section 1.6: OAuth 2.0 clients running on Windows 8.1 and later implement these mandatory extensions by default.
OAuth 2.0 clients running on Windows 7, Windows 8, Windows Server 2008, Windows Server 2008 R2, and Windows Server 2012 implement these mandatory extensions if [MSFT-WKPLJOIN] is installed. However, even with [MSFT-WKPLJOIN] installed, these products support only the resource and resource_params URI parameters.
Changed from:
<2> Section 2.2.2: The prompt parameter is not supported on Windows Server 2012 R2 unless [MSKB-3172614] is installed. Even with [MSKB-3172614] installed, the "none" value for the parameter is not supported on Windows Server 2012 R2.
Changed to:
<3> Section 2.2.2: The prompt parameter is not supported on Windows Server 2012 R2 unless [MSKB-3172614] is installed. Even with [MSKB-3172614] installed, the "none" value for the parameter is not supported on Windows Server 2012 R2.
The prompt parameter is not supported on Windows Server 2008, Windows Server 2008 R2, or Windows Server 2012.
</td></tr>
<tr><td>2016/08/04 (updated) 2016/07/18</td><td>
In several sections, added and updated information about the prompt URI parameter regarding its existing behavior and behavior that is modified through KB/QFE 3172614.

In Section 1.2.1, Normative References, included the following reference:
[MSKB-3172614] Microsoft Corporation, "July 2016 update rollup for Windows RT 8.1, Windows 8.1, and Windows Server 2012 R2", https://support.microsoft.com/en-us/kb/3172614.

In Section 2.2.2, Common URI Parameters, changed from:
<table>
<tr><th>URI parameter</th><th>Description</th></tr>
<tr><td>prompt</td><td>OPTIONAL. This query parameter is used in the same way as the prompt parameter defined in [OIDCCore] section 3.1.2.1. The AD</td></tr>
</table>
</td></tr>
</table>

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Errata Published*	Description

	FS server ignores this parameter unless its ad_fs_behavior_level is AD_FS_BEHAVIOR_LEVEL_2 or higher.

Changed to:

URI parameter	Description
prompt	OPTIONAL. This query parameter is used in the same way as the prompt parameter defined in [OIDCCore] section 3.1.2.1, but the only accepted values for this parameter are "none" and "login". This parameter and the accepted values specified above SHOULD<2> be supported for all values of ad_fs_behavior_level.

<2> Section 2.2.2: The prompt parameter is not supported on Windows Server 2012 R2 unless [MSKB-3172614] is installed. Even with [MSKB-3172614] installed, the "none" value for the parameter is not supported on Windows Server 2012 R2.

In Section 2.2.2.7, prompt, changed from:

…

The prompt query parameter is OPTIONAL, and can be specified by the client role of the OAuth 2.0 Protocol Extensions. This parameter has the same behavior as the prompt parameter defined in [OIDCCore] section 3.1.2.1, but can be specified regardless of whether the client role also requests the "openid" scope.

The AD FS server ignores this parameter unless its ad_fs_behavior_level is AD_FS_BEHAVIOR_LEVEL_2 or higher.

…

Changed to:

…

The prompt query parameter is OPTIONAL, and can be specified by the client role of the OAuth 2.0 Protocol Extensions. This parameter has the same behavior as the prompt parameter defined in [OIDCCore] section 3.1.2.1 (see section 2.2.2 for exceptions and support information), but can be specified regardless of whether the client role also requests the "openid" scope.

…

In Section 3.2.5.1.1, GET, changed from:

…

prompt: OPTIONAL. The client can choose to specify this optional query parameter. It is used in the same way as the prompt parameter defined in [OIDCCore] section 3.1.2.1.

…

Changed to:

…

prompt: OPTIONAL. The client can choose to specify this optional query parameter. It is used in the same way as the prompt parameter defined in [OIDCCore] section 3.1.2.1.

Note Support for the prompt parameter depends on the AD FS server's ad_fs_behavior_level and the product version. See section 2.2.2 for support information.

…

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	In Section 3.2.5.1.1.3, Processing Details, changed from: … • If the AD FS server's ad_fs_behavior_level is AD_FS_BEHAVIOR_LEVEL_2 or higher and the OAuth 2.0 client provided a value of "none" or "login" for the prompt query parameter, the AD FS server follows the behavior described for the prompt parameter in [OIDCCore] section 3.1.2.1. … Changed to: … • If the prompt query parameter is supported and the OAuth 2.0 client provided a value of "none" or "login" for the prompt query parameter, the AD FS server follows the behavior described for the prompt parameter in [OIDCCore] section 3.1.2.1. Note Support for the prompt parameter depends on the AD FS server's ad_fs_behavior_level and the product version. See section 2.2.2 for support information. … In Section 4.10, Authorization Code Request with prompt Parameter, changed from: Refer to [RFC6749] section 4.1.1 (Authorization Request). For more information on the prompt parameter, see [OIDCCore] section 3.1.2.1. … Changed to: Refer to [RFC6749] section 4.1.1 (Authorization Request). For more information on the prompt parameter, see section 2.2.2 and [OIDCCore] section 3.1.2.1. …

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[MS-OAPXBC]: OAuth 2.0 Protocol Extensions for Broker Clients

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Errata below are for Protocol Document Version V3.0 – 2016/07/14.

Errata Published*	Description
2017/04/03	In this document, a reference for [MS-OIDCE] was added to Section 1.2.1. Also, a note clarifying that when using the OAuth 2.0 Protocol Extensions [MS-OAPX], the OAuth 2.0 Protocol Extensions for Broker Clients [MS-OAPXBC], and the OpenID Connect 1.0 Protocol Extensions [MS-OIDCE], all have to be running on the same AD FS server was added to Section 1.5. In Section 1.2.1, Normative References, added: [MS-OIDCE] Microsoft Corporation, "OpenID Connect 1.0 Protocol Extensions". In Section 1.5, Prerequisites/Preconditions, added: The OAuth 2.0 Protocol Extensions [MS-OAPX], the OAuth 2.0 Protocol Extensions for Broker Clients (this document), and the OpenID Connect 1.0 Protocol Extensions [MS-OIDCE], if being used, MUST all be running on the same AD FS server.

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[MS-OIDCE]: OpenID Connect 1.0 Protocol Extensions

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Errata below are for Protocol Document Version V1.0 – 2016/07/14.

Errata Published*	Description
2017/05/15	OIDC client role support information for Windows 10 v1607 was added to the document. In Section 3.1.5.3, OpenID Provider Configuration endpoint (/.well-known/openid-configuration), OIDC client-role support information for Windows 10 v1607 was added to the product behavior note. Changed from: As defined in [OIDCDiscovery] section 4, the OpenID Provider Configuration endpoint serves the OpenID provider's configuration information as a JSON object. The following HTTP methods are allowed to be performed on this endpoint.<2> ... <2> Section 3.1.5.3: Windows Client operating systems (Windows 10 v1511 and later) do not implement the extensions to OpenID Connect Discovery. ... Changed to: As defined in [OIDCDiscovery] section 4, the OpenID Provider Configuration endpoint serves the OpenID provider's configuration information as a JSON object. The following HTTP methods are allowed to be performed on this endpoint.<2> ... <2> Section 3.1.5.3: Windows 10 v1511 and Windows 10 v1607 operating system do not use the extensions to OpenID Connect Discovery. ...
2017/04/03	In this document, a reference for [MS-OAPXBC] was added to Section 1.2.1. Also, a note clarifying that when using the OAuth 2.0 Protocol Extensions [MS-OAPX], the OAuth 2.0 Protocol Extensions for Broker Clients [MS-OAPXBC], and the OpenID Connect 1.0 Protocol Extensions [MS-OIDCE], all have to be running on the same AD FS server was added to Section 1.5. In Section 1.2.1, Normative References, added: [MS-OAPXBC] Microsoft Corporation, "OAuth 2.0 Protocol Extensions for Broker Clients". In Section 1.5, Prerequisites/Preconditions, added: The OAuth 2.0 Protocol Extensions [MS-OAPX], the OAuth 2.0 Protocol Extensions for Broker Clients [MS-OAPXBC], and the OpenID Connect 1.0 Protocol Extensions (this document), if being used, MUST all be running on the same AD FS server.

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<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td>2017/03/20</td><td>In Section 3.1.5.3, OpenID Provider Configuration endpoint (/.well-known/openid-configuration), changed from:

The following HTTP methods are allowed to be performed on this endpoint.

Changed to:

The following HTTP methods are allowed to be performed on this endpoint.<2>
<2> Section 3.1.5.3: Windows Client operating systems (Windows 10 v1511 and later) do not implement the extensions to OpenID Connect Discovery.

In Section 6, Appendix A: Product Behavior, changed from:

Windows Server 2016 operating system

Changed to:

In this section, if the phrase "and earlier" or "and later" is used with a product version, it refers to either all preceding versions or all subsequent versions, respectively. If the phrase "through" is used with two product versions, it refers to the range of versions, inclusive. Note that the versions for all applicable Microsoft products are presented in chronological order from earliest to latest in the lists or tables that follow.
The following tables show the relationships between Microsoft product versions or supplemental software and the roles they perform.
<table><tr><th>Windows Client</th><th>Client role</th><th>Server role</th></tr><tr><td>Windows 10 v1511 operating system</td><td>Yes</td><td>No</td></tr></table>
<table><tr><th>Windows Server</th><th>Client role</th><th>Server role</th></tr><tr><td>Windows Server 2016 operating system</td><td>Yes</td><td>Yes</td></tr></table>
Changed from:
<1> Section 1.6: Support for the OpenID Connect 1.0 protocol in AD FS is available in Windows Server 2016

Changed to:
<1> Section 1.6: Support for the OpenID Connect 1.0 protocol in AD FS is available in Windows 10 v1511 and later and in Windows Server 2016 and later.</td></tr>
</table>

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[MS-OTPCE]: One-Time Password Certificate Enrollment Protocol

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Errata below are for Protocol Document Version V4.0 – 2016/07/14.

Errata Published*	Description
2016/08/15	In Section 2.2.3, SignCert Response, revised the below code snippet to match the IDL: <xs:complexType name="SignCertResponse"> <xs:sequence> <xs:element name="IssuingCA" type="xs:anyURI" minOccurs="0" maxOccurs="unbounded" /> </xs:sequence> <xs:attribute name="statusCode" type="otpcep:SignCertStatusCode" use="required" /> <xs:attribute name="SignedCertRequest" type="otpcep:CertificateBase64Binary" use="optional" /> </xs:complexType> In Section 3.2.5.1, Processing A SignCert Request Message, specified that the SignedCertRequest and IssuingCA attributes are not set on failure. Also specified that Password Authentication Protocol [RFC1334] over RADIUM is used to validate OTP credentials.

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[MS-PAR]: Print System Asynchronous Remote Protocol

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Errata below are for Protocol Document Version V13.1 – 2016/07/14.

Errata Published*	Description
2017/03/20	In two sections, included references to INF files and printer INF files. In Section 1.2.2, Informative References, added the following informative references: [MSDN-INFS] Microsoft Corporation, "INF Files", https://msdn.microsoft.com/en-us/windows/hardware/drivers/install/inf-files [MSDN-PRNINF] Microsoft Corporation, "Printer INF Files", https://msdn.microsoft.com/en-us/windows/hardware/drivers/print/printer-inf-files In Section 3.1.4.2.7, RpcAsyncInstallPrinterDriverFromPackage, added the following paragraph: For general information about driver installation control files, see [MSDN-INFS]. For printer-specific information about printer-driver installation control files, see [MSDN-PRNINF].

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[MS-PEAP]: Protected Extensible Authentication Protocol (PEAP)

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[MS-PKAP]: Public Key Authentication Protocol

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Errata below are for Protocol Document Version V1.0 – 2016/07/14.

Errata Published*	Description
2017/04/17	In Section 6, Appendix A: Product Behavior, Windows 10 was removed from the applicability list, and SKU-to-role mapping information added for Windows Server. Please see: Changed from: … • Windows 10 operating system • Windows Server 2016 operating system … Changed to: The following table shows the relationships between Microsoft product versions or supplemental software and the roles they perform. Windows Server | Client role | Server role Windows Server 2016 operating system | No | Yes

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[MS-PSRDP]: PowerShell Remote Debugging Protocol

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[MS-PSRP]: PowerShell Remoting Protocol

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[MS-RA]: Remote Assistance Protocol

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[MS-RAI]: Remote Assistance Initiation Protocol

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[MS-RDPBCGR]: Remote Desktop Protocol: Basic Connectivity and Graphics Remoting

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Errata below are for Protocol Document Version V44.0 – 2017/03/16.

Errata Published *	Description
2017/04/17	In Section 2.2.13.1, Server Redirection Packet (RDP_SERVER_REDIRECTION_PACKET), the order of the fields in the packet were changed (the TargetNetAddressesLength and TargetNetAddresses fields were moved from beneath the TsvUrl field to beneath the TargetCertificate field). Changed from:

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Errata Published *	Description
	

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Errata Published *	Description
	TargetFQDN (variable) ... TargetNetBiosNameLength (optional) TargetNetBiosName (variable) ... TsvUrlLength (optional) TsvUrl (variable) ... TargetNetAddressesLength (optional) TargetNetAddresses (variable) ... RedirectionGuidLength (optional) Redirection (variable) ... TargetCertificateLength (optional) TargetCertificate (variable) ... Pad (optional) ... ... TsvUrl (variable): A variable-length array of bytes.<41> If the client has previously sent a TsvUrl field in the LoadBalanceInfo to the server in the expected format, then the server will return the same TsvUrl to the client in this field. The client verifies that it is the same as the one that it previously passed to the server and if they don't match, the client immediately disconnects the connection. TargetNetAddressesLength (4 bytes): A 32-bit unsigned integer. The length, in bytes, of the TargetNetAddresses field. TargetNetAddresses (variable): A variable-length array of bytes containing the target IP addresses of the server to connect against, stored in a Target Net Addresses structure (section 2.2.13.1.1).

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Errata Published *	Description
	RedirectionGuidLength (4 bytes): A 32-bit unsigned integer. The length, in bytes, of the RedirectionGuid field. RedirectionGuid (variable): A variable-length array of bytes containing a GUID ([MS-DTYP] section 2.3.2) that functions as a unique identifier for the redirected connection. TargetCertificateLength (4 bytes): A 32-bit unsigned integer. The length, in bytes, of the TargetCertificate field. TargetCertificate (variable): A variable-length array of bytes containing the X.509 certificate of the target server. Pad (8 bytes): An optional 8-element array of 8-bit unsigned integers. Padding. Values in this field MUST be ignored. Changed to:

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Errata Published *	Description
	

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	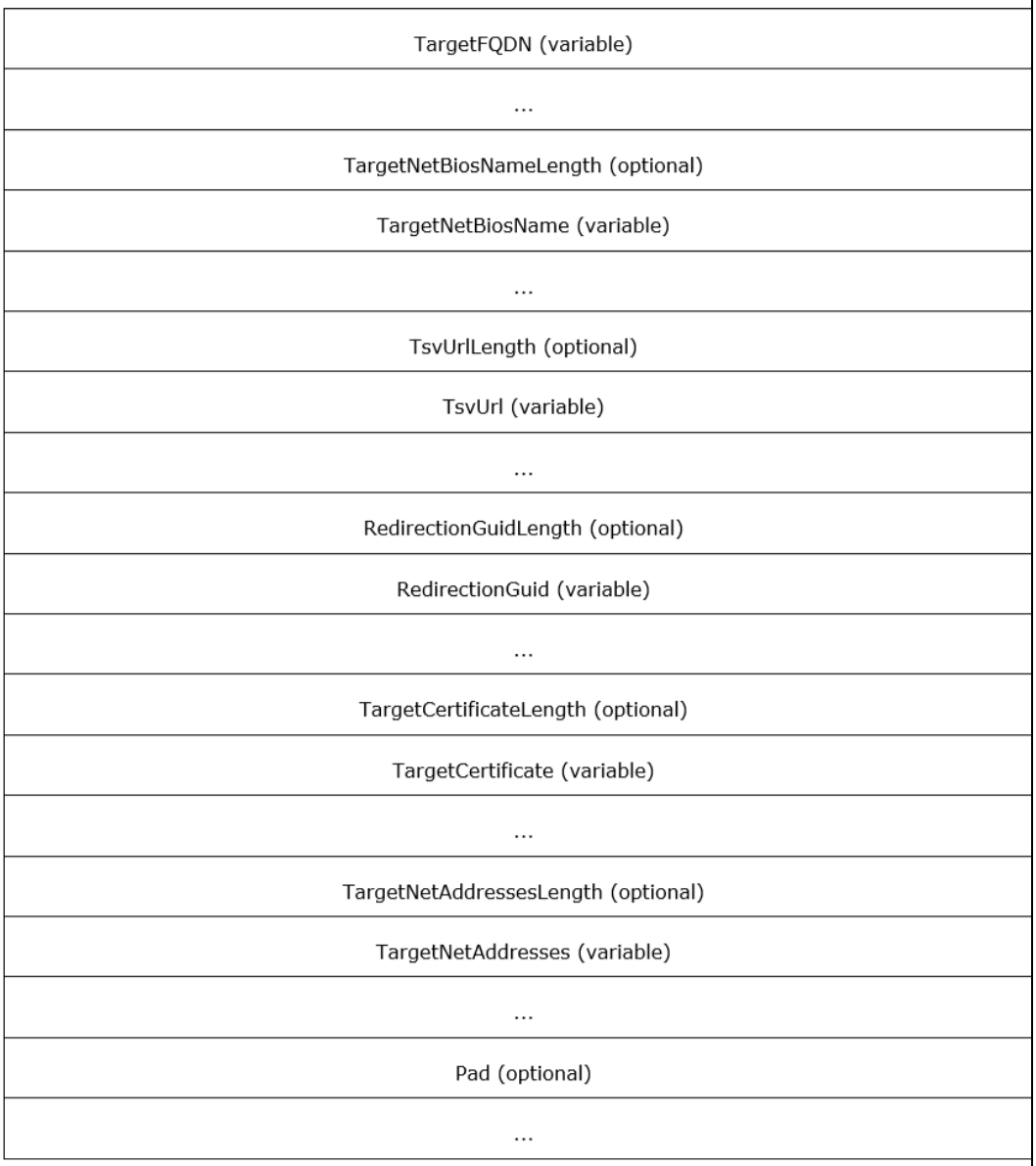 ... TsvUrl (variable): A variable-length array of bytes.<41> If the client has previously sent a TsvUrl field in the LoadBalanceInfo to the server in the expected format, then the server will return the same TsvUrl to the client in this field. The client verifies that it is the same as the one that it previously passed to the server and if they don't match, the client immediately disconnects the connection. RedirectionGuidLength (4 bytes): A 32-bit unsigned integer. The length, in bytes, of the RedirectionGuid field.

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Errata Published *	Description
	RedirectionGuid (variable): A variable-length array of bytes containing a GUID ([MS-DTYP] section 2.3.2) that functions as a unique identifier for the redirected connection. TargetCertificateLength (4 bytes): A 32-bit unsigned integer. The length, in bytes, of the TargetCertificate field. TargetCertificate (variable): A variable-length array of bytes containing the X.509 certificate of the target server. TargetNetAddressesLength (4 bytes): A 32-bit unsigned integer. The length, in bytes, of the TargetNetAddresses field. TargetNetAddresses (variable): A variable-length array of bytes containing the target IP addresses of the server to connect against, stored in a Target Net Addresses structure (section 2.2.13.1.1). Pad (8 bytes): An optional 8-element array of 8-bit unsigned integers. Padding. Values in this field MUST be ignored.

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[MS-RDPEA]: Remote Desktop Protocol: Audio Output Virtual Channel Extension

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[MS-RDPECLIP]: Remote Desktop Protocol: Clipboard Virtual Channel Extension

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[MS-RDPEDYC]: Remote Desktop Protocol: Dynamic Channel Virtual Channel Extension

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Errata below are for Protocol Document Version V15.0 – 2016/07/14.

Errata Published*	Description
2016/11/21	In Section 1.7, Versioning and Capability Negotiation, clarified that there are three versions of the Remote Desktop Protocol: Dynamic Channel Virtual Channel Extension. Changed from: ... There are two versions of the Remote Desktop Protocol: Dynamic Channel Virtual Channel Extension. ... Changed to: ... There are three versions of the Remote Desktop Protocol: Dynamic Channel Virtual Channel Extension. ... In Section 2.2.5.1, Soft-Sync Request PDU (DYNVC_SOFT_SYNC_REQUEST), added Length, Flags, and NumberOfTunnels fields to the Length definition. Changed from: ... Length (4 bytes): A 32-bit, unsigned integer indicating the total size, in bytes, of SoftSyncChannelLists field. ... Changed to: ... Length (4 bytes): A 32-bit, unsigned integer indicating the total size, in bytes, of the Length, Flags, NumberOfTunnels, and SoftSyncChannelLists fields. ...

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[MS-RDPEFS]: Remote Desktop Protocol: File System Virtual Channel Extension

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Errata below are for Protocol Document Version V23.0 – 2016/07/14.

Errata Published*	Description
2016/09/26	In Section 2.2.3.4.2, Client Drive Close Response (DR_DRIVE_CLOSE_RSP), updated the size of the DeviceCloseResponse field from 21 bytes to 20 bytes and added the 1 byte Padding field. Changed from: DeviceCloseResponse (21 bytes): Changed to: DeviceCloseResponse (20 bytes): Included the following field: Padding (1 byte): An 8-bit unsigned integer that is intended to allow the client minor flexibility in determining the overall packet length. This field is unused and MUST be ignored.
2016/09/26	In Section 2.2.2.3, Client Announce Reply (DR_CORE_CLIENT_ANNOUNCE_RSP), changed ClientID to ClientId in the ClientId field description. Changed from: ... ClientId (4 bytes): A 32-bit unsigned integer that the client MUST set to either the ClientID field,... Changed to: ... ClientId (4 bytes): A 32-bit unsigned integer that the client MUST set to either the ClientId field,...
2016/08/15	In Section 2.2.1.3, Device Announce Header (DEVICE_ANNOUNCE), clarified that the maximum device name length should be 7 characters to account for the null terminator in the PreferredDosName field description.

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Errata Published*	Description
	Changed from: ... PreferredDosName (8 bytes): A string of ASCII characters with a maximum length of eight characters that represent the name of the device as it appears on the client. This field MUST not be null-terminated if the device name is 8 characters long. The following characters are considered invalid for the PreferredDosName field: ... Changed to: ... PreferredDosName (8 bytes): A string of ASCII characters (with a maximum length of eight characters) that represents the name of the device as it appears on the client. This field MUST be null-terminated, so the maximum device name is 7 characters long. The following characters are considered invalid for the PreferredDosName field: ...

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[MS-RDPEGDI]: Remote Desktop Protocol: Graphics Device Interface (GDI) Acceleration Extensions

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[MS-RDPEGFX]: Remote Desktop Protocol: Graphics Pipeline Extension

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[MS-RDPEGT]: Remote Desktop Protocol Geometry Tracking Virtual Channel Protocol Extension

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Errata below are for Protocol Document Version V5.0 – 2016/07/14.

Errata Published*	Description
2017/03/06	In Section 2.2.1.1, MAPPED_GEOMETRY_PACKET Structure, described what happens when the nCount field is zero and the rectangles do not intersect with the rectangle specified in the rcBound field in the pGeometryBuffer description. Changed from: ... pGeometryBuffer (variable): Array of UINT8 ([MS-DTYP] section 2.2.47). This field contains a RGNDATA structure, as specified in [MSDN-WindowsGDI]. The rectangles in this structure are relative to the tracked rectangle, and represent the parts of the tracked rectangle that are visible. If window tracking mode is not in effect, the rcBound field in the RGNDATA structure MUST be ignored. The total number of bytes in this field is set in the cbGeometryBuffer field. ... Changed to: ... pGeometryBuffer (variable): Array of UINT8 ([MS-DTYP] section 2.2.47). This field contains a RGNDATA structure, as specified in [MSDN-WindowsGDI]. The rectangles in this structure are relative to the tracked rectangle, and represent the parts of the tracked rectangle that are visible. If window tracking mode is not in effect, the rcBound field in the RGNDATA structure MUST be ignored. If the nCount field of the RGNDATA structure is zero, or the rectangles in the RGNDATA buffer field do not intersect with the rectangle specified in the rcBound field, then the RGNDATA structure MUST be ignored. The total number of bytes in this field is set in the cbGeometryBuffer field. ...

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[MS-RDPEI]: Remote Desktop Protocol: Input Virtual Channel Extension

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[MS-RDPEMC]: Remote Desktop Protocol: Multiparty Virtual Channel Extension

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[MS-RDPEMT]: Remote Desktop Protocol: Multitransport Extension

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[MS-RDPEPC]: Remote Desktop Protocol: Print Virtual Channel Extension

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Errata below are for Protocol Document Version V8.0 – 2016/07/14.

Errata Published*	Description
2016/11/07	In Section 1.2.1, Normative References, added a reference to protocol [MS-RDPEXPS] and in Section 3.1.1.2, XPS Mode, added a dependency to reference [MS-RDPEXPS] when redirection of XPS data is used. In Section 1.2.1, Normative References, changed from: ... [MS-RDPESP] Microsoft Corporation, "Remote Desktop Protocol: Serial and Parallel Port Virtual Channel Extension". [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 Changed to: ... [MS-RDPESP] Microsoft Corporation, "Remote Desktop Protocol: Serial and Parallel Port Virtual Channel Extension". [MS-RDPEXPS] Microsoft Corporation, "Remote Desktop Protocol: XML Paper Specification (XPS) Print Virtual Channel Extension". [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 In Section 3.1.1.2, XPS Mode, changed from: When a client redirects printers, it adds a special flag (RDPDR_PRINTER_ANNOUNCE_FLAG_XPSFORMAT) if the client can handle the XPS format for the given printer. For these printers, the server MAY<2> choose to use either the XPS format or the printer driver-specific format. The server MUST notify the client with the message DR_PRN_USING_XPS (section 2.2.2.2) if it chooses to use the XPS format. When this type of message is received, the client marks the printer in XPS mode.

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Errata Published*	Description
	Changed to: When a client redirects printers, it adds a special flag (RDPDR_PRINTER_ANNOUNCE_FLAG_XPSFORMAT) if the client can handle the XPS format for the given printer. For these printers, the server MAY<2> choose to use either the XPS format or the printer driver-specific format. The server MUST notify the client with the message DR_PRN_USING_XPS (section 2.2.2.2) if it chooses to use the XPS format. When this type of message is received, the client marks the printer in XPS mode. Redirection of XPS data using the Remote Desktop Protocol: XML Paper Specification (XPS) Print Virtual Channel Extension is described in [MS-RDPEXPS].
2016/08/15	In Section 2.2.2.1, Client Device List Announce Request (DR_PRN_DEVICE_ANNOUNCE), updated the PreferredDosName field description to indicate mandatory usage of the "PRN" prefix. Changed from: ... PreferredDosName (8 bytes): This field is defined in [MS-RDPEFS] section 2.2.1.3. The PreferredDosName field MUST be set to the port name on which the printer is installed. ... Changed to: ... PreferredDosName (8 bytes): This field is defined in [MS-RDPEFS] section 2.2.1.3. The PreferredDosName field MUST be set to the port name on which the printer is installed. The first 3 characters MUST be "PRN" and the remainder MUST be digits. ...

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[MS-RDPEPNP]: Remote Desktop Protocol: Plug and Play Devices Virtual Channel Extension

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[MS-RDPERP]: Remote Desktop Protocol: Remote Programs Virtual Channel Extension

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Errata below are for Protocol Document Version V22.0 – 2016/07/14.

Errata Published*	Description
2016/09/26	In Section 1.5, Prerequisites/Preconditions, clarified that the CHANNEL_FLAG_SHOW_PROTOCOL (0x00000010) has to be set in the flags field of the Channel PDU Header in order for it to be visible for all data that flows over the RAIL virtual channel. Changed from: The Remote Programs Extensions for Remote Desktop Protocol has the assumption to operate in a fully operational RDP connection. A fully operational RDP connection is a connection that has passed the Connection Finalization phase, as specified in [MS-RDPBCGR] section 1.3.1.1. Changed to: The Remote Programs Extensions for Remote Desktop Protocol has the assumption to operate in a fully operational RDP connection. A fully operational RDP connection is a connection that has passed the Connection Finalization phase, as specified in [MS-RDPBCGR] section 1.3.1.1. The RAIL server endpoint expects that the Channel PDU Header ([MS-RDPBCGR] section 2.2.6.1.1) is visible for all data that flows over the RAIL virtual channel (sections 1.3.1 and 2.2.2). To ensure that this condition is met, the CHANNEL_FLAG_SHOW_PROTOCOL (0x00000010) flag has to be set in the flags field of the Channel PDU Header. In Section 2.2.2, Static Virtual Channel Protocol, clarified that the RAIL Static Virtual Channel is named "RAIL". Changed from: The RAIL Static Virtual Channel is responsible... Changed to:

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Errata Published*	Description
	The RAIL Static Virtual Channel (named "RAIL") is responsible...
2016/09/26	In Section 4.3.2, TS_RAIL_ORDER_EXEC_RESULT, changed RAIL_ORDER_EXEC_RESULT to TS_RAIL_ORDER_EXEC_RESULT. Changed from: The following is a network capture of the Server Execute Result PDU (RAIL_ORDER_EXEC_RESULT, as specified in 2.2.2.3.2). ... 80 00 -> TS_RAIL_PDU_HEADER::orderType = RAIL_ORDER_EXEC_RESULT(128) (2 Bytes) ... Changed to: The following is a network capture of the Server Execute Result PDU (TS_RAIL_ORDER_EXEC_RESULT, as specified in 2.2.2.3.2). ... 80 00 -> TS_RAIL_PDU_HEADER::orderType = TS_RAIL_ORDER_EXEC_RESULT(128) (2 Bytes) ...
2016/09/26	In Section 3.2.5.1.6, Processing Window Information Orders, clarified how the client will process the server window events of registration, deregistration, and updates on the edge of an application desktop toolbar. Changed from: Window Information Orders (section 2.2.1.3.1) inform the client of the following types of window events on the server: ... • Registration of a new or existing window as an application desktop toolbar. • Deregistration of an existing application desktop toolbar. ... Upon receipt of a Window Information Order for a deleted window, as specified in section 2.2.1.3.1.2.4, the client SHOULD locate the local RAIL window that corresponds to the WindowId reported in the Hdr field and destroy it. If no such window can be found, the client SHOULD ignore the order. Changed to: Window Information Orders (section 2.2.1.3.1) inform the client of the following types of window events on the server: ... • Registration of a new or existing window as an application desktop toolbar. • Deregistration of an existing application desktop toolbar.

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Errata Published*	Description
	• Updates on the edge to which the application desktop toolbar window is anchored. ... Upon receipt of a Window Information Order for a deleted window, as specified in section 2.2.1.3.1.2.4, the client SHOULD locate the local RAIL window that corresponds to the WindowId reported in the Hdr field and destroy it. If no such window can be found, the client SHOULD ignore the order. Upon receipt of a Window Information Order for the registration of a window as an application desktop toolbar, the client SHOULD locate the local RAIL window that corresponds to the WindowId reported in the Hdr field and register it as an application desktop toolbar. If no such window can be found, the client SHOULD ignore the order. Upon receipt of a Window Information Order for the deregistration of an application desktop toolbar window, the client SHOULD locate the local RAIL window that corresponds to the WindowId reported in the Hdr field and deregister the application desktop toolbar window. If no such window can be found, the client SHOULD ignore the order. Upon receipt of a Window Information Order for the edge of an application desktop toolbar window, the client SHOULD locate the local RAIL window that corresponds to the WindowId reported in the Hdr field and update the edge to which the window is anchored. If no such window can be found, the client SHOULD ignore the order.
2016/09/26	Added two Window Information Orders to match the client behavior in Section 3.3.5.1.6, Constructing Window Information Orders, and removed two Notification Icon Orders to match the client behavior in Section 3.3.5.1.7, Constructing Notification Icon Orders. In Section 3.3.5.1.6, Constructing Window Information Orders, changed from: The server generates Window Information Orders to inform the client of the following types of window events on the server: • Creation of a new window. • Updates on window properties for a new or existing window. • Updates on icons for a new or existing window. • Deletion of an existing window. ... Changed to: The server generates Window Information Orders to inform the client of the following types of window events on the server: • Creation of a new window. • Updates on window properties for a new or existing window. • Updates on icons for a new or existing window. • Deletion of an existing window. • Registration of a new or existing window as an application desktop toolbar. • Deregistration of an existing application desktop toolbar. ...

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Errata Published*	Description
	In Section 3.3.5.1.7, Constructing Notification Icon Orders, changed from: The server generates Notification Icon Information Orders to inform the client of the following types of notification icon events on the server. • Creation of a new notification icon. • Updates on properties for a new or existing notification icon. • Deletion of an existing notification icon. • Registration of a new or existing window as an application desktop toolbar. • Deregistration of an existing application desktop toolbar. ... Changed to: The server generates Notification Icon Information Orders to inform the client of the following types of notification icon events on the server. • Creation of a new notification icon. • Updates on properties for a new or existing notification icon. • Deletion of an existing notification icon. ...

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[MS-RDPESC]: Remote Desktop Protocol: Smart Card Virtual Channel Extension

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Errata below are for Protocol Document Version V11.0.1 – 2016/07/14.

Errata Published *	Description
2016/09/26	Multiple changes in various sections: • Added the dialect SCREDIR_VERSION_WINDOWS_8 to the protocol versions and the behavior note along with the build numbers for SCREDIR_VERSION_XP, SCREDIR_VERSION_LONGHORN, and SCREDIR_VERSION_WINDOWS_8 in Section 1.7, Versioning and Capability Negotiation. • Updated the function number for SCARD_IOCTL_RELEASETARTEDEVENT IOCTL to 57 and updated the behavior note to include Windows 7 and Windows Server 2008 R2 in Section 3.1.4, Message Processing Events and Sequencing Rules. In Section 1.7, Versioning and Capability Negotiation, changed from: This document covers versioning issues in the following areas: • Protocol Versions: Smart Card Redirection supports the explicit dialects "SCREDIR_VERSION_XP" and "SCREDIR_VERSION_LONGHORN". Multiple versions of the Smart Card Redirection Protocol exist. It was introduced in Remote Desktop Protocol version 5.1 and extended by adding additional calls in Remote Desktop Protocol version 6.0. The version of the protocol is determined on the server by querying the value of the TS client build number. • Capability Negotiation: The Smart Card Redirection protocol does not support negotiation of the dialect to use. Instead, an implementation is configured with the dialect to use. The dialect used is determined by the TS client's build number. The TS server determines the dialect to use by analyzing the client build number on device announce.<1> If the build number is at least 4,034, SCREDIR_VERSION_LONGHORN is assumed; otherwise, SCREDIR_VERSION_XP is to be used. Changed to: This document covers versioning issues in the following areas:

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<table>
<tr><th>Errata Published *</th><th>Description</th></tr>
<tr><td></td><td>
• Protocol Versions: Smart Card Redirection supports the dialects SCREDIR_VERSION_XP (1), SCREDIR_VERSION_LONGHORN (2), and SCREDIR_VERSION_WINDOWS_8 (3).

• Capability Negotiation: The Smart Card Redirection protocol does not support negotiation of the dialect to use. Instead, an implementation is configured with the dialect to use.

The TS server determines the dialect to use by analyzing the client build number on device announce as specified in [MS-RDPBCGR] section 2.2.1.3.2 using the following mapping.<1>

<table>
<tr><th>Build Number</th><th>Dialect</th></tr>
<tr><td>>= 7865</td><td>SCREDIR_VERSION_WINDOWS_8 (3)</td></tr>
<tr><td>>= 4034 and < 7865</td><td>SCREDIR_VERSION_LONGHORN (2)</td></tr>
<tr><td>< 4034</td><td>SCREDIR_VERSION_XP (1)</td></tr>
</table>

In Section 3.1.4, Message Processing Events and Sequencing Rules, changed from:

...
<table>
<tr><th>Function number</th><th>Value for IoControlCode</th><th>IRP_MJ_DEVICE_CONTROL request</th><th>Input packet, Output packet</th></tr>
<tr><td>56</td><td>0x000900E0</td><td>SCARD_IOCTL_ACCESSSTARTEDEVENT</td><td>ScardAccessStartedEvent_Call (section 2.2.2.30), Long_Return (section 2.2.3.3)</td></tr>
<tr><td>58</td><td>0x000900E8</td><td>SCARD_IOCTL_LOCATECARDSBYATRA</td><td>LocateCardsByATRA_Call (section 2.2.2.23), LocateCards_Return (section 2.2.3.5)</td></tr>
<tr><td>...</td><td></td><td></td><td></td></tr>
<tr><td>64</td><td>0x00090100</td><td>SCARD_IOCTL_GETTRANSMITCOUNT</td><td>GetTransmitCount_Call (section 2.2.2.29), GetTransmitCount_Return (section 2.2.3.13)</td></tr>
<tr><td>66</td><td>0x000900E4</td><td>SCARD_IOCTL_RELEASETARTEDEVENT</td><td>Not used.</td></tr>
<tr><td>67</td><td>0x00090104</td><td>SCARD_IOCTL_GETREADERICON</td><td>GetReaderIcon_Call (section 2.2.2.31), GetReaderIcon_Return (section 2.2.3.14)</td></tr>
<tr><td>68</td><td>0x00090108</td><td>SCARD_IOCTL_GETDEVICETYPEID</td><td>GetDeviceTypeId_Call (section 2.2.2.32), GetDeviceTypeId_Return (section 2.2.3.15)</td></tr>
</table>
</td></tr>
</table>

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<table>
<tr><th>Errata Published *</th><th>Description</th></tr>
<tr><td></td><td>
Changed to:

...
<table>
<tr><th>Function number</th><th>Value for IoControlCode</th><th>IRP_MJ_DEVICE_CONTROL request</th><th>Input packet, Output packet</th></tr>
<tr><td>56</td><td>0x000900E0</td><td>SCARD_IOCTL_ACCESSSTARTEDEVENT</td><td>ScardAccessStartedEvent_Call (section 2.2.2.30), Long_Return (section 2.2.3.3)</td></tr>
<tr><td>57</td><td>0x000900E4</td><td>SCARD_IOCTL_RELEASETARTEDEVENT</td><td>Not used.</td></tr>
<tr><td>58</td><td>0x000900E8</td><td>SCARD_IOCTL_LOCATECARDSBYATRA</td><td>LocateCardsByATRA_Call (section 2.2.2.23), LocateCards_Return (section 2.2.3.5)</td></tr>
<tr><td>...</td><td></td><td></td><td></td></tr>
<tr><td>64</td><td>0x00090100</td><td>SCARD_IOCTL_GETTRANSMITCOUNT</td><td>GetTransmitCount_Call (section 2.2.2.29), GetTransmitCount_Return (section 2.2.3.13)</td></tr>
<tr><td>65</td><td>0x00090104</td><td>SCARD_IOCTL_GETREADERICON</td><td>GetReaderIcon_Call (section 2.2.2.31), GetReaderIcon_Return (section 2.2.3.14)</td></tr>
<tr><td>66</td><td>0x00090108</td><td>SCARD_IOCTL_GETDEVICETYPEID</td><td>GetDeviceTypeId_Call (section 2.2.2.32), GetDeviceTypeId_Return (section 2.2.3.15)</td></tr>
</table>

In Section 7, Appendix B: Product Behavior, changed from:
<1> Section 1.7: The Windows XP and Windows Server 2003 versions always use SCREDIR_VERSION_XP. Windows Vista and Windows Server 2008 are always SCREDIR_VERSION_LONGHORN.
<2> Section 3.1.4: Windows XP and Windows Server 2003 implement function numbers 5 through 58. Windows Vista and Windows Server 2008 implement function numbers 5 through 64.

Changed to:
<1> Section 1.7: The Windows XP and Windows Server 2003 versions always use SCREDIR_VERSION_XP. Windows Vista and Windows Server 2008 are always SCREDIR_VERSION_LONGHORN. All other versions use SCREDIR_VERSION_WINDOWS_8.
</td></tr>
</table>

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	<2> Section 3.1.4: Windows XP and Windows Server 2003 implement function numbers 5 through 58. Windows Vista, Windows Server 2008, Windows 7, and Windows Server 2008 R2 implement function numbers 5 through 64. All other versions implement 5 through 66.

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[MS-RDPESP]: Remote Desktop Protocol: Serial and Parallel Port Virtual Channel Extension

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[MS-RDPEUDP]: Remote Desktop Protocol: UDP Transport Extension

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Errata below are for Protocol Document Version V9.0 – 2016/07/14.

Errata Published*	Description
2016/11/07 (updates errata entry originally published on 2016/08/15; additions to the original entry in **bold**, deletions in ~~strikeout~~)	**In Section 2.2.2.2, RDPUDP_FEC_PAYLOAD_HEADER Structure, changed from:** **...** **uRange (1 byte): An unsigned 8-bit value that, when added to snSourceStart, yields the range of packets that are contained in the FEC payload.** **...** **Changed to:** **...** **uRange (1 byte): An unsigned 8-bit value that, when added to snSourceStart, yields the last sequence number of a Source Packet that is contained in the FEC payload.** **...** **In Section 3.1.5.1.5, ACK and FEC Packets Data, changed from:** **...** **• The uRange variable MUST be set to the number of datagrams included in this FEC operation.** **...** **Changed to:** **...** **• The uRange variable MUST be set to the Source sequence number of the last datagram included in the FEC range minus snSourceStart.** **...** In Section 3.1.1.6.1.3, Logarithms and Exponents, clarified the modulo operation and indented the first line of syntax in the pseudo-code examples Changed from: ... Pseudo-code example:

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Errata Published*	Description

	reduction = 0x1d;
	m_ffExp2Poly[0] = 0x01;
	for (i = 1; i < m_fieldSize - 1; i++)
	...
	Where m_fieldSize is 256 for GF(28)
	
	Logarithms are the inverse of exponents, and can be easily calculated by reversing the previous operation as shown in the following pseudo-code example:
	
	m_ffPoly2Exp[0] = 2 * m_fieldSize; // no exponential representation, doesn't exist
	for (i = 0; i < m_fieldSize - 1; i++)
	...
	
	Changed to:
	...
	Pseudo-code example:
	
	reduction = 0x1d;
	m_ffExp2Poly[0] = 0x01;
	for (i = 1; i < m_fieldSize - 1; i++)
	...
	Where m_fieldSize is 256 for GF(28). Note that m_ffExp2Poly is modulo m_fieldSize – 1. In other words, m_ffExp2Poly[n] = m_ffExp2Poly[n + m_fieldSize – 1]. The
	pseudo-code in this document makes the assumption that m_ffExp2Poly is defined for at least m_fieldSize * 2 elements.
	
	Logarithms are the inverse of exponents, and can be easily calculated by reversing the previous operation as shown in the following pseudo-code example:
	
	m_ffPoly2Exp[0] = 2 * m_fieldSize; // no exponential representation, doesn't exist
	for (i = 0; i < m_fieldSize - 1; i++)
	...
	
	In Section 3.1.1.6.4, Selecting the Coefficients Matrix, replaced the source sequence number 0xf with 0xff in the Matrix coefficient calculation figure and in the pseudo-code.
	
	Changed from:
	If the Source sequence numbers (section 3.1.1.2) for packets S1, S2, S3 … Sn are s1, s2, s3 … sn, the coefficient matrix is calculated as follows.
	….
	Figure 12: Matrix coefficient calculation
	...
	Only the last byte of the Source sequence number is used in calculating the coefficient. The fecIndex field described in the following pseudo-code example is
	equivalent to the uFecIndex field, as specified in section 2.2.2.2. The value of the fecIndex field is updated using the following code prior to every call for

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	encoding an FEC Packet:
	
	if ((sn&0xf) >= (s1 &0xf) && ((fecIndex >= (s1 &0xf)) && (fecIndex <= (sn&0xf))) ||
	(sn&0xf) < (s1 &0xf) && ((fecIndex >= (s1 &0xf)) || (fecIndex <= (sn&0xf))))
	fecIndex = (sn+1) & 0xf;
	
	Pseudo-code example:
	...
	for (int i=0; i < cLength; i++, ucOrigStart++)
	{
	BYTE e = Div(1, (*pucFecIndex)^ucOrigStart);
	pbCoEfficientArray[i] = (BYTE)m_ffPoly2Exp[e];
	}
	...
	for (int i=0; i < cLength; i++, ucOrigStart++)
	{
	BYTE e = Div(1, fecIndex^ucOrigStart);
	pbCoefficientArray[i] = (BYTE)m_ffPoly2Exp[e];
	}
	...
	
	Changed to:
	If the Source sequence numbers (section 3.1.1.2) for packets S1, S2, S3 … Sn are s1, s2, s3 … sn, the coefficient matrix is calculated as follows.
	…
	Figure 12: Matrix coefficient calculation
	...
	Only the last byte of the Source sequence number is used in calculating the coefficient. The fecIndex field described in the following pseudo-code example is equivalent to the uFecIndex field, as specified in section 2.2.2.2. The value of the fecIndex field is updated using the following code prior to every call for encoding an FEC Packet:
	
	if ((sn & 0xff) >= (s1 & 0xff) && ((fecIndex >= (s1 & 0xff)) && (fecIndex <= (sn & 0xff))) ||
	(sn & 0xff) < (s1 & 0xff) && ((fecIndex >= (s1 & 0xff)) || (fecIndex <= (sn & 0xff))))
	fecIndex = (sn + 1) & 0xff;
	
	Pseudo-code example:
	...
	for (int i=0; i < cLength; i++, ucOrigStart++)
	{
	pbCoEfficientArray[i] = (BYTE)Div(1, (*pucFecIndex)^(ucOrigStart & 0xff));
	}
	...
	for (int i=0; i < cLength; i++, ucOrigStart++)

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<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td></td><td>
{
pbCoefficientArray[i] = (BYTE)Div(1, fecIndex^(ucOrigStart & 0xff));
}
...

In Section 4.2.2.1, Payload of an FEC Packet, updated the FEC Payload table values and the CoEff Array packet value.

Changed from:
The following is an example of an FEC Packet network payload.

<table>
<tr><th>Sequence number</th><th>Size</th><th>Value</th></tr>
<tr><td>...</td><td>…</td><td>…</td></tr>
<tr><td>FEC Payload</td><td></td><td>0 66 208 168 239 37 29 238 180 193 24 58 66 252 233 126 172 211 135 31 206 27</td></tr>
<tr><td>…</td><td>…</td><td>…</td></tr>
</table>

The following are FEC encoding internals; these packets are not transferred on the wire:
• CoEff Array [0 254 230 253 205]
...
• RDPUDP_FEC_PAYLOAD_HEADER:: uRange = 5
…

Changed to:
The following is an example of an FEC Packet network payload.

<table>
<tr><th>Sequence number</th><th>Size</th><th>Value</th></tr>
<tr><td>...</td><td>…</td><td>…</td></tr>
<tr><td>FEC Payload</td><td></td><td>0 203 146 55 209 198 69 147 95 141 120 66 86 91 174 141 153 99 169 49 31 14</td></tr>
</table>

The following are FEC encoding internals; these packets are not transferred on the wire:
• CoEff Array [1 142 244 71 167]
…
<s>• RDPUDP_FEC_PAYLOAD_HEADER:: uRange = 5</s>
• RDPUDP_FEC_PAYLOAD_HEADER:: uRange = 4

...
</td></tr>
</table>

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[MS-RDPEV]: Remote Desktop Protocol: Video Redirection Virtual Channel Extension

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[MS-RDPEVOR]: Remote Desktop Protocol: Video Optimized Remoting Virtual Channel Extension

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Errata below are for Protocol Document Version V8.0 – 2016/07/14.

Errata Published*	Description
2017/01/09	Moved the description of effective utilization of transport from Section 2.1, Transport, to Section 1.5, Prerequisites/Preconditions. In Section 1.5, Prerequisites/Preconditions, changed from: ... The Remote Desktop Protocol: Video Optimized Remoting Virtual Channel is dependent on the Microsoft::Windows::RDS::Graphics protocol, as defined in [MS-RDPEGFX]. The graphics channel MUST be opened before the Video Optimized Remoting Virtual channel is opened. This protocol is message-based. It assumes preservation of the packet as a whole and does not allow for fragmentation. Some messages can be lost and are described in section 2. Changed to: ... The Remote Desktop Protocol: Video Optimized Remoting Virtual Channel is dependent on the Microsoft::Windows::RDS::Graphics protocol, as defined in [MS-RDPEGFX]. The graphics channel MUST be opened before the Video Optimized Remoting Virtual channel is opened. To ensure high-quality graphics content and effective utilization of the transport, continuous network characteristics detection SHOULD be enabled (as specified in [MS-RDPBCGR] sections 1.3.9 and 2.2.14) and the client SHOULD send the Client Multitransport Channel Data ([MS-RDPBCGR] section 2.2.1.3.8) to the server. This protocol is message-based. It assumes preservation of the packet as a whole and does not allow for fragmentation. Some messages can be lost and are described in section 2. In Section 2.1, Transport, changed from: ... All PDUs except TSMM_VIDEO_DATA flow on the control channel, whereas TSMM_VIDEO_DATA flows on the data channel.

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Errata Published*	Description
	To ensure that the transport is utilized effectively, continuous network characteristics detection SHOULD be enabled (as specified in [MS-RDPBCGR] sections 1.3.9 and 2.2.14) and the client SHOULD send the Client Multitransport Channel Data ([MS-RDPBCGR] section 2.2.1.3.8) to the server. Changed to: ... All PDUs except TSMM_VIDEO_DATA flow on the control channel, whereas TSMM_VIDEO_DATA flows on the data channel.

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[MS-RDPEXPS]: Remote Desktop Protocol: XML Paper Specification (XPS) Print Virtual Channel Extension

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[MS-RDPRFX]: Remote Desktop Protocol: RemoteFX Codec Extension

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Errata below are for Protocol Document Version V17.0 – 2016/07/14.

Errata Published*	Description
2016/08/15	In Section 3.1.8.2.5, Color Conversion (YCbCr to RGB), updated the figure with new color conversion (YCbCr to RGB) values: -3.43730 changed to -0.343730; 0.0 in the lower right element changed to 0.000013. Changed from: $[R\,G\,B] = [Y\ Cb\ Cr] \begin{bmatrix} 1.0 & 1.0 & 1.0 \\ 0.0 & -3.43730 & 1.769905 \\ 1.402525 & -0.71440 & 0.0 \end{bmatrix}$ Changed to: $[R\,G\,B] = [Y\ Cb\ Cr] \begin{bmatrix} 1.0 & 1.0 & 1.0 \\ 0.0 & -0.343730 & 1.769905 \\ 1.402525 & -0.714401 & 0.000013 \end{bmatrix}$

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[MS-RMPR]: Rights Management Services (RMS): Client-to-Server Protocol

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Errata below are for Protocol Document Version V35.0 – 2016/07/14.

Errata Published*	Description
2016/10/24	In Section 3.1.4.4, Service Connection Point, added missing versions of Windows Server. Changed from: To facilitate the discovery of an RMS server, a service connection point (SCP) MAY<33> be defined in Active Directory. RMS clients and servers MAY<34> use the SCP to locate an RMS server that is capable of servicing requests for that directory. … <34> Section 3.1.4.4: Windows RMS clients will search Active Directory for the SCP unless one of the following registry keys is present. • "HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\MSDRM\ServiceLocation\Activation" can be used to specify the location of the certification service, http(s)://servername/_wmcs/certification. • "HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\MSDRM\ServiceLocation\EnterprisePublishing" can be used to specify the location of the licensing service, http(s)://servername/_wmcs/licensing. In addition applications can specify an alternate service URL when invoking Windows APIs that would normally search Active Directory for the SCP. Windows RMS servers will search Active Directory for the SCP unless the GICURL value of one of the following registry keys contains the location of the certification service, http(s)://servername/_wmcs/certification. • For RMS 1.0 SP2 or earlier, the registry key is "HKEY_LOCAL_MACHINE\Software\Microsoft\DRMS\1.0". • For Windows Server 2008, the registry key is "HKEY_LOCAL_MACHINE\Software\Microsoft\DRMS\2.0". • For Windows Server 2008 R2, the registry key is "HKEY_LOCAL_MACHINE\Software\Microsoft\DRMS". Changed to:

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Errata Published*	Description
	To facilitate the discovery of an RMS server, a service connection point (SCP) MAY<31> be defined in Active Directory. RMS clients and servers MAY<32> use the SCP to locate an RMS server that is capable of servicing requests for that directory. … <32> Section 3.1.4.4: Windows RMS clients search Active Directory for the SCP unless one of the following registry keys is present. • "HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\MSDRM\ServiceLocation\Activation" can be used to specify the location of the certification service, http(s)://servername/_wmcs/certification. • "HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\MSDRM\ServiceLocation\EnterprisePublishing" can be used to specify the location of the licensing service, http(s)://servername/_wmcs/licensing. In addition, applications can specify an alternate service URL when invoking Windows APIs that would normally search Active Directory for the SCP. Windows RMS servers search Active Directory for the SCP unless the GICURL value of one of the following registry keys contains the location of the certification service, http(s)://servername/_wmcs/certification. • For RMS 1.0 SP2 or earlier, the registry key is "HKEY_LOCAL_MACHINE\Software\Microsoft\DRMS\1.0". • For Windows Server 2008, the registry key is "HKEY_LOCAL_MACHINE\Software\Microsoft\DRMS\2.0". • For Windows Server 2008 R2, Windows Server 2012, Windows Server 2012 R2, and Windows Server 2016, the registry key is "HKEY_LOCAL_MACHINE\Software\Microsoft\DRMS".
2016/08/01	In several places in Section 2, added double quotation marks around element attribute values. In Section 2.2.9.7.5, OWNER, changed from: <ID type=[[- type -]] /> Changed to: <ID type="[[- type -]]" /> In Section 2.2.9.8, Encrypted Rights Data, changed from: <BODY type=[[- erdtype -]] > Changed to: <BODY type="[[- erdtype -]]" > In Section 2.2.9.8.5.1, METADATA, changed from: <ID type=[[- type -]] /> Changed to: <ID type="[[- type -]]" /> In Section 2.2.9.8.5.3, RIGHT, changed from: <RIGHT name=[[- rightname -]] >

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Errata Published*	Description
	Changed to: <RIGHT name="[[- rightname -]]" > In Section 2.2.9.9.5, OWNER, changed from: <ID type=[[- type -]] /> Changed to: <ID type="[[- type -]]" /> In Section 2.2.9.9.6, RIGHT, changed from: <RIGHT name=[[- rightname -]] > Changed to: <RIGHT name="[[- rightname -]]" > In Section 2.2.9.10.4.2.1, RIGHT, changed from: <RIGHT name=[[- rightname -]] > Changed to: <RIGHT name="[[- rightname -]]" >

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[MS-RMSOD]: Rights Management Services Protocols Overview

This topic lists the Errata found in [MS-RMSOD] since it was last published. Since this topic is updated frequently, we recommend that you subscribe to these RSS or Atom feeds to receive update notifications.

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Errata below are for Protocol Document Version V8.0 – 2016/09/26.

Errata Published*	Description
2017/03/06	In Section 3.4, Example 4: Consuming Protected Content, added a note explaining that the Certify and FindService LocationsForUser are interchangeable. Added: Note In the preceding diagram, the Certify and FindServiceLocationsForUser calls are interchangeable. It is possible to call FindServiceLocationsForUser (to get the service location for GetClientLicensorCert) before calling Certify as long as both requests are completed before calling AcquireLicense. In Section 3.4.1.1, Activate the Computer, added the following text: In this example, activating the computer for client bootstrapping is the same as in Example 2. See section 3.2.1.1 for more details. Added a new section for finding service locations. Added: 3.4.1.3 Find Service Locations In this example, finding service locations for client bootstrapping is the same as in Example 2. See section 3.2.1.2 for details.

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[MS-RPCE]: Remote Procedure Call Protocol Extensions

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Errata below are for Protocol Document Version V28.0 – 2016/07/14.

Errata Published*	Description
2017/01/23	In Section 2.2.1.2.5, ept_map Method, the description of the obj field has been changed from: obj: Optionally specifies an object UUID. A value of NULL indicates that no object UUID is specified. Changed to: obj: Optionally specifies an object UUID. A value of NULL indicates that no object UUID is specified. Interfaces registered with a NULL object UUID will match any object UUID supplied here.

*Date format: YYYY/MM/DD

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[MS-RPCH]: Remote Procedure Call over HTTP Protocol

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[MS-RPRN]: Print System Remote Protocol

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Errata below are for Protocol Document Version V28.0 – 2016/07/14.

<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td>2017/05/01</td><td>In Section 3.1.4, Message Processing Events and Sequencing Rules, the locally used opnum table was revised, removing Opnum 102 and 104; these opnums are currently active.

Changed from:.

<table>
<tr><th>Method</th><th>Description</th></tr>
<tr><td>…</td><td>…</td></tr>
<tr><td>Opnum102NotUsedOnWire</td><td>Reserved for local use.
Opnum: 102</td></tr>
<tr><td>…</td><td>…</td></tr>
<tr><td>Opnum103NotUsedOnWire</td><td>Reserved for local use.
Opnum: 103</td></tr>
<tr><td>Opnum104NotUsedOnWire</td><td>Reserved for local use.
Opnum: 104</td></tr>
<tr><td>RpcGetPrinterDriverPackagePath</td><td>RpcGetPrinterDriverPackagePath gets the path to the specified printer driver package.
Opnum: 104</td></tr>
<tr><td>Opnum105NotUsedOnWire</td><td>Reserved for local use.
Opnum: 105</td></tr>
</table>
In the preceding table, the term "Reserved for local use" means that the client MUST NOT send the opnum, and server behavior is undefined since it does not affect interoperability.<239>
<239>The following table lists the opnums that are only used locally by Windows, never remotely.
<table>
<tr><th>Opnum number</th><th>Method</th></tr>
<tr><td>…</td><td>…</td></tr>
</table></td></tr>
</table>

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<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><td>102</td><td>Only used locally by Windows, never remotely.</td></tr>
<tr><td>Opnum: 103</td><td>Opnum103NotUsedOnWire</td></tr>
<tr><td>104</td><td>Only used locally by Windows, never remotely.</td></tr>
<tr><td>Opnum: 105</td><td>Opnum105NotUsedOnWire</td></tr>
</table>
Changed to:
<table>
<tr><th>Method</th><th>Description</th></tr>
<tr><td>…</td><td>…</td></tr>
<tr><td>Opnum103NotUsedOnWire</td><td>Reserved for local use.
Opnum: 103</td></tr>
<tr><td>RpcGetPrinterDriverPackagePath</td><td>RpcGetPrinterDriverPackagePath gets the path to the specified printer driver package.
Opnum: 104</td></tr>
<tr><td>Opnum105NotUsedOnWire</td><td>Reserved for local use.
Opnum: 105</td></tr>
</table>
In the preceding table, the term "Reserved for local use" means that the client MUST NOT send the opnum, and server behavior is undefined since it does not affect interoperability.<239>
<239>The following table lists the opnums that are only used locally by Windows, never remotely.
<table>
<tr><th>Opnum number</th><th>Method</th></tr>
<tr><td>…</td><td>…</td></tr>
<tr><td>Opnum: 103</td><td>Opnum103NotUsedOnWire</td></tr>
<tr><td>Opnum: 105</td><td>Opnum105NotUsedOnWire</td></tr>
</table>
</td></tr>
<tr><td>2017/04/03</td><td>
In Section 2.2.1.10.1, PRINTER_INFO_STRESS, corrected the value for processor type PROCESSOR_AMD_X8664.
Changed from:
…
dwProcessorType: An implementation-specific value that identifies the type of processor in the computer.<54>
<54> Section 2.2.1.10.1: Windows uses the following values:
<table>
<tr><th>Value</th><th>Meaning</th></tr>
<tr><td>…</td><td>…</td></tr>
</table>
</td></tr>
</table>

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<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><td>PROCESSOR_AMD_X8664
0x000022A0</td><td>AMD x64 compatible</td></tr>
<tr><td>…</td><td>…</td></tr>
</table>

Changed to:
…
dwProcessorType: An implementation-specific value that identifies the type of processor in the computer.<54>
<54> Section 2.2.1.10.1: Windows uses the following values:
<table>
<tr><th>Value</th><th>Meaning</th></tr>
<tr><td>…</td><td>…</td></tr>
<tr><td>PROCESSOR_AMD_X8664
0x000021D8</td><td>AMD x64 compatible</td></tr>
<tr><td>…</td><td>…</td></tr>
</table>
</td></tr>
</table>

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[MS-RRASM]: Routing and Remote Access Server (RRAS) Management Protocol

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[MS-RSMC]: Remote Session Monitoring and Control Protocol

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Errata below are for Protocol Document Version V3.0 – 2016/07/14.

Errata Published*	Description
2017/01/09	In this document: • Replaced "InputMessage" with "OutputMessage" in the WSDL message names in Sections 3.6.4.13.1.2, IMultiPointServer_Shutdown_OutputMessage Message, and 3.7.4.10.1.2, IMultiPointSession_GetThumbnailBits_OutputMessage Message • Updated section titles from 'GetSessionFlagsSession' to 'GetSessionFlags' in Section 3.7.4.12.2.1, GetSessionFlags, and 'GetSessionFlagsSessionResponse' to 'GetSessionFlagsResponse' in Section 3.7.4.12.2.2, GetSessionFlagsResponse. In Section 3.6.4.13.1.2, IMultiPointServer_Shutdown_OutputMessage Message, changed from: A WSDL message containing the request for the Shutdown WSDL operation. The SOAP action value is: http://MultiPoint/RemoteManagement/IMultiPointServer/Shutdown <wsdl:message name="IMultiPointServer_Shutdown_InputMessage"> <wsdl:part name="Shutdown" element="tns:Shutdown"/> </wsdl:message> Changed to: A WSDL message containing the request for the Shutdown WSDL operation. The SOAP action value is: http://MultiPoint/RemoteManagement/IMultiPointServer/Shutdown <wsdl:message name="IMultiPointServer_Shutdown_OutputMessage"> <wsdl:part name="Shutdown" element="tns:Shutdown"/> </wsdl:message>

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Errata Published*	Description
	In Section 3.7.4.10.1.2, IMultiPointSession_GetThumbnailBits_OutputMessage Message, changed from: A WSDL message containing the request for the GetThumbnailBits WSDL operation. The SOAP action value is: http://MultiPoint/RemoteManagement/IMultiPointSession/GetThumbnailBits <wsdl:message name="IMultiPointSession_GetThumbnailBits_InputMessage"> <wsdl:part name="GetThumbnailBits" element="tns:GetThumbnailBits"/> </wsdl:message> Changed to: A WSDL message containing the request for the GetThumbnailBits WSDL operation. The SOAP action value is: http://MultiPoint/RemoteManagement/IMultiPointSession/GetThumbnailBits <wsdl:message name="IMultiPointSession_GetThumbnailBits_OutputMessage"> <wsdl:part name="GetThumbnailBits" element="tns:GetThumbnailBits"/> </wsdl:message> Updated the title of Section 3.7.4.12.2.1, GetSessionFlagsSession, to 3.7.4.12.2.1, GetSessionFlags. Updated the title of Section 3.7.4.12.2.2, GetSessionFlagsSessionResponse, to 3.7.4.12.2.2 GetSessionFlagsResponse.

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[MS-RSVD]: Remote Shared Virtual Disk Protocol

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Errata below are for Protocol Document Version V9.0 – 2017/03/16.

Errata Published*	Description
2017/05/15	In the following sections the Padding field has been renamed to Reserved. 2.2.4.17 SVHDX_META_OPERATION_START_REQUEST Structure 2.2.4.17.2 SVHDX_META_OPERATION_EXTRACT Structure 2.2.4.25 SVHDX_CHANGE_TRACKING_GET_PARAMETERS_RESPONSE Structure In Section 2.2.4.20, SVHDX_TUNNEL_VHDSET_QUERY_INFORMATION_SNAPSHOT_LIST_RESPONSE Structure, the Padding field was renamed to Reserved1 and the Reserved field was renamed to Reserved2. In Section 2.2.4.21, SVHDX_TUNNEL_VHDSET_QUERY_INFORMATION_SNAPSHOT_ENTRY_RESPONSE Structure, the Reserved field was added: Reserved (4 bytes): This field is set to any value by the server and MUST be ignored by the client. In Section 2.2.4.22, SVHDX_TUNNEL_VHDSET_QUERY_INFORMATION_OPTIMIZE_RESPONSE Structure, the Reserved field was added: Reserved (4 bytes): This field is set to any value by the server and MUST be ignored by the client. In Section 2.2.4.25, SVHDX_CHANGE_TRACKING_GET_PARAMETERS_RESPONSE Structure, the length of the ChangeTrackingStatus field was changed from 8 to 4 bytes. In Section 2.2.4.27, SVHDX_CHANGE_TRACKING_START_REQUEST Structure, the Padding field was renamed to Reserved the description was changed from:

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Errata Published*	Description
	Padding (4 bytes): This field MUST be set to 0. Changed to: Reserved (4 bytes): This field MUST be set to 0 by the client and MUST be ignored by the server.
2017/05/01	In Section 2.2.4.11, SVHDX_TUNNEL_OPERATION_HEADER Structure, the description of the Status field has been changed from: Status (4 bytes): The client SHOULD set this field to zero, and the server MUST ignore it on receipt. Changed to: Status (4 bytes): For a request, the client SHOULD set this field to zero, and the server MUST ignore it on receipt. For a response, this field indicates the status of the tunnel operation, and the server MUST set this field to one of the error codes specified in section 2.2.3.
2017/04/17	In Section 2.2.4.21, SVHDX_TUNNEL_VHDSET_QUERY_INFORMATION_SNAPSHOT_ENTRY_RESPONSE Structure, the description of VHDSetInformationType was changed from: VHDSetInformationType (4 bytes): The information type. The server MUST set this to SvhdxSetInformationTypeSnapshotEntry. Changed to: VHDSetInformationType (4 bytes): The information type. The server MUST set this to SvhdxVHDSetInformationTypeSnapshotEntry.

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[MS-SAMR]: Security Account Manager (SAM) Remote Protocol (Client-to-Server)

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Errata below are for Protocol Document Version V37.0 – 2016/07/14.

Errata Published*	Description
2017/01/23	In Section 3.1.4.2, Default Accounts, added Windows 2000 Server to the product version information about the Group Policy Creator Owners group. Changed from: The following accounts MUST be present in a server's database.<36> <36> Section 3.1.4.2: The following tables list the Windows versions in which various accounts were introduced. … DC configuration, group accounts. Name | Revision introduced … | … Group Policy Creator Owners | Windows XP … | … - Changed to: The following accounts MUST be present in a server's database.<36> <36> Section 3.1.4.2: The following tables list the Windows versions in which various accounts were introduced. … DC configuration, group accounts. Name | Revision introduced … | …

[MS-WINERRATA] - v20150630
Windows Protocols Errata
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<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><td>Group Policy Creator Owners</td><td>Windows 2000 Server
Windows XP</td></tr>
<tr><td>…</td><td>…</td></tr>
</table>
- -
</td></tr>
<tr><td>2016/08/01</td><td>
Updated three sections with additional information about USER_PROPERTY elements.

In Section 2.2.10.1, USER_PROPERTIES, changed from:

PropertyCount (2 bytes): The number of USER_PROPERTY elements in the UserProperties field.

Changed to:
PropertyCount (2 bytes): The number of USER_PROPERTY elements in the UserProperties field. When there are zero USER_PROPERTY elements in the UserProperties field, this field MUST be omitted; the resultant USER_PROPERTIES structure has a constant size of 0x6F bytes.

In Section 3.1.1.8.10, userAccountControl, changed from:
…
6. If the UF_SMARTCARD_REQUIRED bit is set and is NOT present in the previous value, the dBCSPwd and unicodePwd attributes MUST be updated with 16 bytes of random bytes, and the supplementalCredentials attribute MUST be removed.

Changed to:
…
6. If the UF_SMARTCARD_REQUIRED bit is set and is NOT present in the previous value, the dBCSPwd and unicodePwd attributes MUST be updated with 16 bytes of random bytes, and all USER_PROPERTY elements MUST be removed from the supplementalCredentials attribute.

In Section 3.1.1.8.11.1.1, USER_PROPERTIES Processing, included the following paragraph in the section:
When the last property-value pair is removed, the PropertyCount field is no longer included in the USER_PROPERTIES structure. In this state, the absence of any user properties MUST be inferred from the structure’s total length (0x6F bytes).
</td></tr>
</table>

*Date format: YYYY/MM/DD

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[MS-SAMS]: Security Account Manager (SAM) Remote Protocol (Server-to-Server)

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Errata below are for Protocol Document Version V12.0 – 2016/07/14.

Errata Published*	Description
2017/05/15	Updated Section 3.3.5.3.2, Normative Specification, to specify how the responder should process a ResetBadPwdCount request message if the requestor is an RODC that is not allowed to cache credentials for the target user account. In Section 1.2.1, Normative References, a reference to [MSKB-2641192] was added: [MSKB-2641192] Microsoft Corporation, "The badPwdCount attribute is not reset to 0 on a Windows Server 2008 R2-based or Windows Server 2008-based PDC when the reset request is sent from an RODC", https://support.microsoft.com/en-us/help/2641192/the-badpwdcount-attribute-is-not-reset-to-0-on-a-windows-server-2008-r2-based-or-windows-server-2008-based-pdc-when-the-reset-request-is-sent-from-an-rodc In Section 3.3.5.3.2, Normative Specification, the processing for a ResetBadPwdCount request message was updated, including a new product behavior note. Changed from: Upon receiving this message, the responder SHOULD<15> return STATUS_NOT_SUPPORTED if either the responder is not the PDC or the requestor is an RODC. Otherwise, if there is an object in the database that has an objectGUID attribute value that corresponds to the value in the Message.ResetBadPwdCount.Guid field, the responder MUST update the badPwdCount attribute to zero. ... <15> Section 3.3.5.3.2: Windows 2000 Server, Windows Server 2003, and Windows Server 2008 return STATUS_ACCESS_DENIED if either the responder is not the PDC or the requestor is an RODC. Changed to: Upon receiving this message, the responder SHOULD<15> return STATUS_NOT_SUPPORTED if the responder is not the PDC. Otherwise, the responder SHOULD<16> process the message as shown below. This message is processed as follows. If the requestor is an RODC that is not allowed to cache credentials for the target user account, as specified in [MS-DRSR] section 4.1.10.5.15, the responder MUST return STATUS_ACCESS_DENIED. Otherwise, if there is an object in the database that has an objectGUID attribute value that corresponds to the value in the Message.ResetBadPwdCount.Guid field, the responder MUST update the badPwdCount attribute to zero. ...

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Errata Published*	Description
	<15> Section 3.3.5.3.2: Windows 2000 Server, Windows Server 2003, and Windows Server 2008 return STATUS_ACCESS_DENIED if the responder is not the PDC. <16> Section 3.3.5.3.2: In Windows 2000 Server and Windows Server 2003, and in Windows Server 2008 and Windows Server 2008 R2 that do not have [MSKB-2641192] installed, the PDC responder returns STATUS_ACCESS_DENIED if the requestor is an RODC.

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[MS-SFMWA]: Server and File Management Web APIs

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[MS-SMB]: Server Message Block (SMB) Protocol

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Errata below are for Protocol Document Version V45.0 – 2016/07/14.

Errata Published*	Description
2017/05/01	In Section 3.3.1.1, Global, moved the following ADM to Section 3.3.1.2, Per Share: Server.Snapshotlist: The list of available snapshots. In Section 3.3.1.6, Per Tree Connect, the following bullet point was changed from: TreeConnect.MaximalAccess: Access rights for the user that established the tree connect on TreeConnect.Share, in the format specified in section 2.2.1.4. Changed to: Server.TreeConnect.MaximalAccess: Access rights for the user that established the tree connect on Server.TreeConnect.Share, in the format specified in section 2.2.1.4. In Section 3.3.5.4, Receiving an SMB_COM_TREE_CONNECT_ANDX Request, the following paragraph was changed from: The computed MaxRights ACCESS_MASK MUST be placed in the SMB_Parameters.Words.MaximalShareAccessRights of the response. The server MUST set TreeConnect.MaximalAccess to MaximalShareAccessRights. If no access is granted for the client on this share, the server MUST fail the request with STATUS_ACCESS_DENIED and MUST increase ServerStatistics.sts0_permerrors by 1. Changed to: The computed MaxRights ACCESS_MASK MUST be placed in the SMB_Parameters.Words.MaximalShareAccessRights of the response. The server MUST set Server.TreeConnect.MaximalAccess to MaximalShareAccessRights. If no access is granted for the client on this share, the server MUST fail the request with STATUS_ACCESS_DENIED and MUST increase ServerStatistics.sts0_permerrors by 1. In Section 3.3.5.5, Receiving an SMB_COM_NT_CREATE_ANDX Request, the following bullet point was changed from:

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Errata Published*	Description
	Treeconnect.MaximalAccess does not include DELETE or GENERIC_ALL. Changed to: Server.Treeconnect.MaximalAccess does not include DELETE or GENERIC_ALL. In Section 3.3.5.11.1.1, Receiving an FSCTL_SRV_ENUMERATE_SNAPSHOTS Function Code, the content was changed from: This is a request to enumerate the available previous versions for a share.The server MUST return an enumeration of available previous versions, as specified in section 2.2.7.2.2. The NumberOfSnapshots MUST contain the total number of previous versions that are available for the volume and NumberOfSnapshotsReturned contains the number of entries that are returned in this enumeration. If MaxDataCount is not large enough to hold all of the entries, then the server SHOULD return zero entries. The value returned in SnapShotArraySize MUST be the size required to receive all of the available previous versions. If the MaxDataCount of the request is smaller than the size of an FSCTL_ENUMERATE_SNAPSHOTS response, then the server MUST fail the request with STATUS_INVALID_PARAMETER. When sending the response to the client, the server SHOULD NOT <137>include any additional data after NT_Trans_Data in the FSCTL_SRV_ENUMERATE_SNAPSHOTS response (as specified in section 2.2.7.2.2.1) and the client MUST ignore any additional data on receipt. If the server does not support this operation, then it SHOULD fail the request with STATUS_NOT_SUPPORTED. Changed to: This is a request to enumerate the available previous versions for a share. If the MaxDataCount of the request is smaller than the size of an FSCTL_SRV_ENUMERATE_SNAPSHOTS response, then the server MUST fail the request with STATUS_INVALID_PARAMETER. The server SHOULD<135> refresh the snapshot list by querying the timestamps of available previous versions of the share. The server MUST construct a Server.Share.SnapshotList that contains only the snapshots that are active. The NumberOfSnapshots MUST contain: • The total number of previous versions that are available for the volume. • The NumberOfSnapshotsReturned contains the number of entries that are returned in this enumeration. The value returned in SnapShotArraySize MUST be the size required to receive the number of previous versions of the file available in the listed snapshots in Server.Share.SnapshotList constructed previously. If there are no previous versions of the file available or if the size required in bytes is greater than the MaxDataCount received in the NT_TRANSACT_IOCTL request, the server MUST set the following values: • NumberOfSnapShots MUST be set to the number of previous versions of the file available in the listed snapshots in Server.Share.SnapshotList. • NumberOfSnapShotsReturned MUST be set to 0. • SnapShotArraySize SHOULD<136> be set to the size, in bytes, required to receive all of the previous version timestamps of the file listed in Server.Share.SnapshotList. Otherwise, • NumberOfSnapShots MUST be set to the number of previous versions of the file available in the listed snapshots in Server.Share.SnapshotList.

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	• NumberOfSnapShotsReturned MUST be set to the number of previous version timestamps being returned in the SnapShotMultiSZ array. • SnapShotArraySize MUST be set to the size, in bytes, of the SnapShotMultiSZ array. • The SnapShotMultiSZ array MUST list the time stamps in textual GMT format for all the previous version timestamps listed in Server.Share.SnapshotList, as specified in section 2.2.7.2.2.1. When sending the response to the client, the server SHOULD NOT <137>include any additional data after NT_Trans_Data in the FSCTL_SRV_ENUMERATE_SNAPSHOTS response (as specified in section 2.2.7.2.2.1) and the client MUST ignore any additional data on receipt.
2017/01/09	In Section 3.3.1.1, Global, added: Server.Snapshotlist: The list of available snapshots. In Section 3.3.3, Initialization, added: Server.Snapshotlist MUST be set to zero. In Section 3.3.5.11.1.1, Receiving an FSCTL_SRV_ENUMERATE_SNAPSHOTS Function Code, the second sentence was changed to: The server SHOULD<135> refresh the Server.Snapshotlist and return an enumeration of available previous versions, as specified in section 2.2.7.2.2. FSCTL_ENUMERATE_SNAPSHOTS was changed to FSCTL_SRV_ENUMERATE_SNAPSHOTS. In Section 6, Appendix A: Product Behavior, a PBN was added: <135> Section 3.3.5.11.1.1: If MaxDataCount is not 0x10, Windows servers do not refresh the Server.Snapshotlist.
2016/11/07	In Section 3.3.5.11.2, Receiving an NT_TRANS_QUERY_QUOTA Request, the second paragraph has been changed from: The server MUST return as much of the available quota information that is able to fit in the maximum response buffer size denoted by MaxDataCount. If the entire quota information cannot fit in the response buffer, then the server MUST return a status of STATUS_BUFFER_TOO_SMALL. Otherwise, the server MUST return STATUS_SUCCESS. The format of the request determines which entries need to be returned, as specified in section 2.2.7.5.1. The server MUST place the quota information in the response, as specified in section 2.2.7.5.2, and send the response back to the client. Changed to: The format of the request determines which entries need to be returned, as specified in section 2.2.7.5.1. The server MUST place the quota information in the response, as specified in section 2.2.7.5.2, and send the response back to the client.
2016/10/24	In various sections, added information on a missing flag and field. In Section 2.2.4.9.1, Client Request Extensions, made two changes. Added the following bullet point:

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<table>
<tr><th>Errata Published*</th><th>Description</th></tr>
<tr><td></td><td>
• An additional flag bit is added to the CreateOptions field. The additional flag, FILE_OPEN_REPARSE_POINT, is used to open a reparse point file itself.

Added a definition for the CreateOptions field:
CreateOptions (4 bytes): A 32-bit field containing flag options for creating a file or directory. In addition to the flags specified in [MS-CIFS] section 2.2.4.64, the following modifications and extensions apply to the CreateOptions field. FILE_OPEN_REPARSE_POINT is a new flag to SMB. The CreateOptions field MUST be set to 0x00000000 or to a combination of the flags specified in the [MS-CIFS] section 2.2.4.64 CreateOptions table and the following table. Unused bit fields SHOULD be set to 0 when sent and MUST be ignored on receipt. Server implementations SHOULD reserve all bits not specified in the [MS-CIFS] section 2.2.4.64 CreateOptions table and the following table.
<table>
<tr><th>Name and bitmask</th><th>Meaning</th></tr>
<tr><td>FILE_OPEN_REPARSE_POINT
0x00200000</td><td>If the file or directory being opened is a reparse point, open the reparse point itself rather than the target that the reparse point references.</td></tr>
</table>
In Section 2.2.7.1.1, Client Request Extensions, made two changes.
Added the following bullet point:
• An additional flag bit is added to the CreateOptions field. The additional flag, FILE_OPEN_REPARSE_POINT, is used to open a reparse point file itself.

Added a definition for the CreateOptions field:
CreateOptions (4 bytes): A 32-bit field containing flag options for creating a file or directory. In addition to the flags specified in [MS-CIFS] section 2.2.4.64, the following modifications and extensions apply to the CreateOptions field. FILE_OPEN_REPARSE_POINT is a new flag to SMB. The CreateOptions field MUST be set to 0x00000000 or to a combination of the flags specified in the [MS-CIFS] section 2.2.4.64 CreateOptions table and the following table. Unused bit fields SHOULD be set to 0 when sent and MUST be ignored on receipt. Server implementations SHOULD reserve all bits not specified in the [MS-CIFS] section 2.2.4.64 CreateOptions table and the following table.
<table>
<tr><th>Name and bitmask</th><th>Meaning</th></tr>
<tr><td>FILE_OPEN_REPARSE_POINT
0x00200000</td><td>If the file or directory being opened is a reparse point, open the reparse point itself rather than the target that the reparse point references.</td></tr>
</table>
In Section 2.2.7.1.2, Server Response Extensions, added the following sentence:

If the FILE_OPEN_REPARSE_POINT flag bit is set in CreateOptions, and there is a symbolic link error, the server MUST return STATUS_STOPPED_ON_SYMLINK to the client.

In Section 3.3.5.5, Receiving an SMB_COM_NT_CREATE_ANDX Request, added the following paragraphs:

If any intermediate component of the path specified in the create request is a symbolic link, the server MUST return an error as specified in section 2.2.7.1.2. Symbolic links MUST NOT be evaluated by the server.
</td></tr>
</table>

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	If the final component of the path is a symbolic link, the server behavior depends on whether the flag FILE_OPEN_REPARSE_POINT is specified in the CreateOptions field of the request. If FILE_OPEN_REPARSE_POINT is specified, the server MUST open the underlying file or directory and return a handle to it. Otherwise, the server MUST return an error as specified in section 2.2.7.1.2.

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[MS-SMB2]: Server Message Block (SMB) Protocol Versions 2 and 3

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Errata below are for Protocol Document Version V51.0 – 2017/03/16.

Errata Published*	Description
2017/05/01	In Section 2.2.14.2.3, SMB2_CREATE_DURABLE_HANDLE_RESPONSE, the following paragraph was removed: If the server does not mark it for durable operation or the server does not implement durable handles, it MUST ignore this request. In Section 3.3.1.10, Per Open, the following was changed from: • Open.IsDurable: A Boolean that indicates whether this open has requested durable operation. Changed to: • Open.IsDurable: A Boolean that indicates whether the underlying object store supports durable operation for this Open. In Section 3.3.5.9.6, Handling the SMB2_CREATE_DURABLE_HANDLE_REQUEST Create Context, the following was changed from: The client is requesting that the open be marked for durable operation. Changed to: The client is requesting that the open be marked for durable operation. If the underlying object store does not support durable operation, the server MUST ignore the SMB2_CREATE_DURABLE_HANDLE_REQUEST create context. In that same section, the following was changed from:

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	In the "Successful Open Initialization" phase, the server MUST set Open.IsDurable to TRUE. This permits the client to use Open.DurableFileId to request a reopen of the file on a subsequent request as specified in section 3.3.5.9.7. The server MUST also set Open.DurableOwner to a security descriptor accessible only by the user represented by Open.Session.SecurityContext. Changed to: In the "Successful Open Initialization" phase, if the underlying object store does not grant durability, the server MUST ignore the SMB2_CREATE_DURABLE_HANDLE_REQUEST create context and skip the rest of the processing in this phase. Otherwise, the server MUST set Open.IsDurable to TRUE. This permits the client to use Open.DurableFileId to request a reopen of the file on a subsequent request as specified in section 3.3.5.9.7. The server MUST also set Open.DurableOwner to a security descriptor accessible only by the user represented by Open.Session.SecurityContext.
2017/05/01	In Section 3.3.5.2.12, Receiving an SVHDX operation Request, the following link for MS-RSVD was changed from: • The server MUST process the operation as specified in [MS-RSVD] section 3.2.4, passing the command name, Open.LocalOpen, and Request Parameters. Changed to: • The server MUST process the operation as specified in [MS-RSVD] section 3.2.5, passing the command name, Open.LocalOpen, and Request Parameters. In Section 3.3.5.15.15, Handling a Shared Virtual Disk Sync Tunnel Request, the following link for MS-RSVD was changed from: If Open.IsSharedVHDX is TRUE, the server MUST invoke the event as specified in [MS-RSVD] section 3.2.4.1 by providing the following input parameters: Changed to: If Open.IsSharedVHDX is TRUE, the server MUST invoke the event as specified in [MS-RSVD] section 3.2.5.5 by providing the following input parameters: In Section 3.3.5.15.16, Handling a Query Shared Virtual Disk Support Request, the following link for MS-RSVD was changed from: If IsSharedVHDSupported is TRUE, the server MUST invoke the event as specified in [MS-RSVD] section 3.2.4.2 by providing the following input parameters: Changed to: If IsSharedVHDSupported is TRUE, the server MUST invoke the event as specified in [MS-RSVD] section 3.2.5.6 by providing the following input parameters:

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[MS-SMBD]: SMB2 Remote Direct Memory Access (RDMA) Transport Protocol

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[MS-SPNG]: Simple and Protected GSS-API Negotiation Mechanism (SPNEGO) Extension

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[MS-SQOS]: Storage Quality of Service Protocol

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[MS-SSTP]: Secure Socket Tunneling Protocol (SSTP)

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[MS-SWN]: Service Witness Protocol

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[MS-TCC]: Tethering Control Channel Protocol

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[MS-TDS]: Tabular Data Stream Protocol

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[MS-TLSP]: Transport Layer Security (TLS) Profile

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[MS-TPMVSC]: Trusted Platform Module (TPM) Virtual Smart Card Management Protocol

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[MS-TSCH]: Task Scheduler Service Remoting Protocol

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[MS-TSGU]: Terminal Services Gateway Server Protocol

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Errata below are for Protocol Document Version V36.0 – 2016/07/14.

Errata Published*	Description
2016/09/12	In several sections, updated the msgBytes range in the TSG_PACKET_STRING_MESSAGE structure. In Section 2.2.9.2.1.9.1.1, TSG_PACKET_STRING_MESSAGE, changed from: The TSG_PACKET_STRING_MESSAGE structure contains either the Consent Signing Message or the Administrative Message that is being sent from the RDG server to the client. typedef struct _TSG_PACKET_STRING_MESSAGE { long isDisplayMandatory; long isConsentMandatory; [range(0,n)] unsigned long msgBytes; ... Changed to: The TSG_PACKET_STRING_MESSAGE structure contains either the Consent Signing Message or the Administrative Message that is being sent from the RDG server to the client. typedef struct _TSG_PACKET_STRING_MESSAGE { long isDisplayMandatory; long isConsentMandatory; [range(0,65536)] unsigned long msgBytes; ... In Section 4.1.1, Normal Scenario, changed from: ... Where the servicemessage is set as follows. typedef struct _TSG_PACKET_STRING_MESSAGE

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Errata Published*	Description

	{
	long isDisplayMandatory = 1;
	long isConsentMandatory = 1;
	[range(0, 12288)] unsigned long msgBytes = 4;
	...
	
	Changed to:
	...
	Where the servicemessage is set as follows.
	
	typedef struct _TSG_PACKET_STRING_MESSAGE
	{
	long isDisplayMandatory = 1;
	long isConsentMandatory = 1;
	[range(0, 65536)] unsigned long msgBytes = 4;
	...
	
	In Section 4.1.2, Pluggable Authentication Scenario with Consent Message Returned, changed from:
	
	...
	Where the consentMessage is set as follows.
	
	typedef struct _TSG_PACKET_STRING_MESSAGE
	{
	long isDisplayMandatory = 1;
	long isConsentMandatory = 1;
	[range(0, 12288)] unsigned long msgBytes = 7;
	...
	
	Changed to:
	...
	Where the consentMessage is set as follows.
	
	typedef struct _TSG_PACKET_STRING_MESSAGE
	{
	long isDisplayMandatory = 1;
	long isConsentMandatory = 1;
	[range(0, 65536)] unsigned long msgBytes = 7;
	...
	
	In Section 6, Appendix A: Full IDL, changed from:
	
	...
	typedef struct _TSG_PACKET_STRING_MESSAGE {
	long isDisplayMandatory;
	long isConsentMandatory;

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Errata Published*	Description
	[range(0,12288)] unsigned long msgBytes; ... Changed to: ... typedef struct _TSG_PACKET_STRING_MESSAGE { long isDisplayMandatory; long isConsentMandatory; [range(0,65536)] unsigned long msgBytes; ...

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[MS-TSTS]: Terminal Services Terminal Server Runtime Interface Protocol

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[MS-UAMG]: Update Agent Management Protocol

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Errata below are for Protocol Document Version V8.0 – 2016/07/14.

Errata Published*	Description

2016/10/10	In Section 6, Appendix A, Full IDL, removed the code for the ISearchJob interface.
	
	Removed:
	
	`[`
	`  object,`
	`  oleautomation,`
	`  dual,`
	`  nonextensible,`
	`  uuid(7366ea16-7a1a-4ea2-b042-973d3e9cd99b),`
	`  pointer_default(unique),`
	`]`
	`interface ISearchJob : IDispatch`
	`{`
	`  [`
	`  id(0x60020001),`
	`  propget`
	`  ]`
	`  HRESULT AsyncState(`
	`  [out, retval] VARIANT* retval);`
	
	`  [`
	`  id(0x60020002),`
	`  propget`
	`  ]`
	`  HRESULT IsCompleted(`
	`  [out, retval] VARIANT_BOOL* retval);`
	
	`  [`
	`  id(0x60020003),`
	`  ]`
	`  HRESULT CleanUp();`
	
	`  [`
	`  id(0x60020004),`
	`  ]`
	`  HRESULT RequestAbort();`
	`}`

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[MS-UCODEREF]: Windows Protocols Unicode Reference

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[MS-VAPR]: Virtual Application Publication and Reporting (App-V) Protocol

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Errata below are for Protocol Document Version V1.0 – 2016/07/14.

Errata Published*	Description

2017/03/20	In Section 3.1.5.1.1.2, Response Body, the XML Schema was updated to reflect that the Packages and Groups elements are both optional.
	
	Changed from:
	
	`<xs:element name="Packages">`
	`...`
	`<xs:element name="Groups">`
	
	Changed to:
	
	`<xs:element name="Packages" minOccurs="0">`
	`...`
	`<xs:element name="Groups" minOccurs="0">`
	
	Changed from:
	
	Publishing.Groups: The set of connection groups (described in [AppVCG]) being published by the protocol server to the client.
	
	Changed to:
	Publishing.Groups: The set of connection groups (described in [AppVCG]) being published by the protocol server to the client. This element is present only if there are connection groups to be published to the user.
	
	Added:
	
	Packages: The collection of packages that the protocol client can use. This element is present only if there are packages to be published to the user.

2017/03/20	In Section 3.2, SetReport Details, text was added to clarify that the XML format of the SetReport request is an encrypted payload not otherwise processed within the protocol. Changed from:

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Errata Published*	Description
	The SetReport request enables the protocol client to send a report of the virtual application usage to the protocol server. The SetReport request maps to an HTTP POST request in which the body of the POST request is an XML payload that describes virtual application usage since the last successful SetReport request. Changed to: The SetReport request enables the protocol client to send a report of the virtual application usage to the protocol server. The SetReport request maps to an HTTP POST request in which the body of the POST request is an XML payload that describes virtual application usage since the last successful SetReport request. The XML payload is UTF-16 encoded and does not contain any processing instruction.

2017/03/20	In Section 3.2.5.1.1.1, Request Body, for the XML schema element CLIENT_DATA.APP_RECORDS.APP_RECORD.ConnectionGroupVersion, changed from:
	
	`<xs:attribute name="ConnectionGroupVersion" type="xs:string" use="required" />`
	
	Changed to:
	
	`<xs:attribute name="ConnectionGroupVersion" type="xs:string" use="optional" />`
	
	For the XML schema element CLIENT_DATA.APP_RECORDS.APP_RECORD.Shutdown, changed from:
	
	`<xs:attribute name="Shutdown" type="xs:dateTime" use="required />`
	
	Changed to:
	
	`<xs:attribute name="Shutdown" type="xs:dateTime" use="optional" />`
	
	Changed from:
	CLIENT_DATA.APP_RECORDS.APP_RECORD.ConnectionGroupVersion: The version of the connection group (described in [AppVCG]) that the package belongs to in the form of a GUID without the curly braces.
	
	Changed to:
	CLIENT_DATA.APP_RECORDS.APP_RECORD.ConnectionGroupVersion: The version of the connection group (described in [AppVCG]) that the package belongs to in the form of a GUID without the curly braces. Note that this attribute need not be included if the launched package does not belong to a connection group.
	
	Changed from:

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Errata Published*	Description
	CLIENT_DATA.APP_RECORDS.APP_RECORD.Shutdown: The UTC time when the virtual application was shut down.<5> Changed to: CLIENT_DATA.APP_RECORDS.APP_RECORD.Shutdown: The UTC time when the virtual application was shut down.<5> This attribute need not be included when not reporting a process shutdown.

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[MS-VHDX]: Virtual Hard Disk v2 (VHDX) File Format

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Errata below are for Protocol Document Version V1.0 – 2016/07/14.

Errata Published*	Description
2016/11/21	In two sections, updated a field name. In Section 2.6.2, Known Metadata Items, changed from: Page 83 Data BECA12AB-B2E6-4523-93EF-C309E000C746 False True True Changed to: Virtual Disk ID BECA12AB-B2E6-4523-93EF-C309E000C746 False True True Changed the title of Section 3.5.2.3, Page 83 Data, to 3.5.2.3, Virtual Disk Id, and in that section changed the description of the field from: Page83Data (16 bytes): A GUID field. This item SHOULD be set to a value that is unique across all small computer system interface (SCSI) devices that properly support page 0x83. Changed to: VirtualDiskId (16 bytes): A GUID that specifies the identification of the disk.
2016/09/26	In Section 2.4, Blocks, updated a field name and a block size. Changed from: Payload blocks are the size of the BlockSize field defined by the VHDX file parameter field. … The number of sectors that can be described in each sector bitmap block is 223, so the number of bytes described by a single sector bitmap block is 223 times the logical sector size (see section 2.6.2.4 for more information on LogicalSectorSize). Changed to: Payload blocks are the size of the BlockSize field defined by the VHDX file File Parameters field. … The number of sectors that can be described in each sector bitmap block is 2^{23}, so the number of bytes described by a single sector bitmap block is 2^{23} times the logical sector size (see section 2.6.2.4 for more information on LogicalSectorSize).

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[MS-W32T]: W32Time Remote Protocol

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Errata below are for Protocol Document Version V17.0 – 2016/07/14.

Errata Published*	Description
2017/02/06	In this document: • Changed the prescriptive language for ulFlags from "SHOULD" to "MUST". • Removed the resulting unnecessary product behavior notes. • Added a product to the list of products that do not support a method. In Section 3.2.5.3, W32TimeQueryProviderStatus (Opnum 2), the description for ulFlags has been changed from: ulFlags: Reserved. This parameter SHOULD be set to zero and SHOULD be ignored on receipt.<40> Changed to: ulFlags: Reserved. This parameter MUST be set to zero and MUST be ignored on receipt. In Section 3.2.5.5, W32TimeQueryProviderConfiguration (Opnum 4), the description for ulFlags has been changed from: ulFlags: Reserved. This parameter SHOULD be set to zero and SHOULD be ignored on receipt.<46> Changed to: ulFlags: Reserved. This parameter MUST be set to zero and MUST be ignored on receipt. In Section 7, Appendix B: Product Behavior, behavior note <45> (now <44>) (for section 3.2.5.5), which has been changed from: The RPC method W32TimeQueryProviderConfiguration is not supported in Windows 2000 or Windows XP. Changed to: The RPC method W32TimeQueryProviderConfiguration is not supported in Windows 2000, Windows XP, or Windows Server 2003.

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[MS-WCCE]: Windows Client Certificate Enrollment Protocol

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[MS-WCFESAN]: WCF-Based Encrypted Server Administration and Notification Protocol

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[MS-WDSMT]: Windows Deployment Services Multicast Transport Protocol

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[MS-WFDAA]: Wi-Fi Direct (WFD) Application to Application Protocol

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Errata below are for Protocol Document Version V5.0 – 2016/07/14.

Errata Published*	Description
2017/02/06	In three sections, added bytes as the size units for the cbLength and cbLength1 fields. In Section 2.2.2, AppWFDConnectionIE Message, changed from: cbLength1 (2 bytes): This field indicates the remaining size of the message. Changed to: cbLength1 (2 bytes): This field indicates the remaining size of the message in bytes. In Section 2.2.3, AppWFDDiscoveryMetadataIE Message, changed from: cbLength (1 byte): This field indicates the remaining size of the message. cbLength1 (2 bytes): This field indicates the remaining size of the message. Changed to: cbLength (1 byte): This field indicates the remaining size of the message in bytes. cbLength1 (2 bytes): This field indicates the remaining size of the message in bytes. In Section 2.2.4, AppWFDDiscoveryPrimaryIE Message, changed from: cbLength (1 byte): This field indicates the remaining size of the message. cbLength1 (2 bytes): This field indicates the remaining size of the message. Changed to: cbLength (1 byte): This field indicates the remaining size of the message in bytes. cbLength1 (2 bytes): This field indicates the remaining size of the message in bytes.

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[MS-WFDPE]: Wi-Fi Display Protocol Extension

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Errata below are for Protocol Document Version V4.0 – 2017/03/16.

Errata Published*	Description

2017/04/17	In Section 3, Structure Examples, the intel_friendly_name in the example for M3 response for device metadata was updated.
	
	Changed from:
	
	The following is an example of an M3 response for device metadata (section 2.1).
	
	`RTSP/1.0 200 OK`
	`CSeq: 2`
	`Content-Length: 402`
	`Content-Type: text/parameters`
	`wfd_video_formats: 00 00 01 01 00000001 00000000 00000000 00 0000 0000 00 none none wfd_audio_codecs: LPCM 00000003 00`
	`intel_friendly_name: Contoso ScreenMaster 2000`
	`intel_sink_manufacturer_name: Contoso Inc.`
	`intel_sink_model_name: ScreenMaster 2000`
	`intel_sink_device_URL: http://www.example.com/screenmaster/`
	`intel_sink_version: product_ID=G4716-2000 hw_version=1.1.5.1345 sw_version=1.2.4.2451`
	
	Changed to:
	
	The following is an example of an M3 response for device metadata (section 2.1).
	
	`RTSP/1.0 200 OK`
	`CSeq: 2`
	`Content-Length: 402`
	`Content-Type: text/parameters`
	`wfd_video_formats: 00 00 01 01 00000001 00000000 00000000 00 0000 0000 00 none none wfd_audio_codecs: LPCM 00000003 00`
	`intel_friendly_name: Contoso Scr 2000`
	`intel_sink_manufacturer_name: Contoso Inc.`
	`intel_sink_model_name: ScreenMaster 2000`
	`intel_sink_device_URL: http://www.example.com/screenmaster/`

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Errata Published*	Description
	intel_sink_version: product_ID=G4716-2000 hw_version=1.1.5.1345 sw_version=1.2.4.2451

2017/04/17	In several sections, the ABNF syntax examples were corrected; for example, base64_logo was replaced with base64-logo, H.264-codec replaced with H264-codec, and extra spaces removed.
	
	In Section 2.1.1.3, intel_sink_manufacturer_logo, changed from:
	
	The ABNF syntax is as follows:
	intel-sink-manufacturer-logo = "intel_sink_manufacturer_logo:" SP logo CRLF
	logo = "none" / base64_logo
	base64_logo = 464*76800(BASE64CHAR)
	
	Changed to:
	
	The ABNF syntax is as follows:
	intel-sink-manufacturer-logo = "intel_sink_manufacturer_logo:" SP logo CRLF
	logo = "none" / base64-logo
	base64-logo = 464*76800(BASE64CHAR)
	
	In Section 2.7.1.1, wfdx_video_formats, changed from:
	
	The ABNF syntax is as follows:
	wfdx-video-formats = "wfdx_video_formats:" SP sink-video-list CRLF
	sink-video-list = "none" / (native SP preferred-display-mode-supported SP H.264-codec);
	native = 4*4HEXDIG;
	preferred-display-mode-supported = 2*2HEXDIG; 0-not supported, 1-supported, 2-255 reserved
	H.264-codec = profile SP level SP misc-params SP max-hres SP max-vres*("," SP H.264-codec)
	
	Changed to:
	
	The ABNF syntax is as follows:
	wfdx-video-formats = "wfdx_video_formats:" SP sink-video-list CRLF
	sink-video-list = "none" / (native SP preferred-display-mode-supported SP H264-codec);
	native = 4*4HEXDIG;
	preferred-display-mode-supported = 2*2HEXDIG; 0-not supported, 1-supported, 2-255 reserved
	H264-codec = profile SP level SP misc-params SP max-hres SP max-vres *("," SP H264-codec)
	
	In Section 2.7.1.2, microsoft_video_formats, changed from:

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	The video resolutions specified by the microsoft-video-formats parameter apply to each H.264-codec parameter specified in the wfd-video-formats parameter (section 2.7.1.1), as long as the resolution fits within the constraints of the profile and level specified in the H.264-codec parameter. The ABNF syntax is as follows: microsoft-video-formats = "microsoft_video_formats:" SP microsoft-resolutions CRLF microsoft-resolutions = 12HEXDIG Changed to: The video resolutions specified by the microsoft-video-formats parameter apply to each H264-codec parameter specified in the wfd-video-formats parameter (section 2.7.1.1), as long as the resolution fits within the constraints of the profile and level specified in the H264-codec parameter. The ABNF syntax is as follows: microsoft-video-formats = "microsoft_video_formats:" SP microsoft-resolutions CRLF microsoft-resolutions = 12HEXDIG In Section 2.8.1.1, microsoft_rtcp_capability, changed from: The ABNF syntax is as follows: microsoft-rtcp-capability = "microsoft_rtcp_capability:" SP rtcp_caps CRLF rtcp-caps = "supported" / "none" Changed to: The ABNF syntax is as follows: microsoft-rtcp-capability = "microsoft_rtcp_capability:" SP rtcp-caps CRLF rtcp-caps = "supported" / "none"

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[MS-WKST]: Workstation Service Remote Protocol

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[MS-WPO]: Windows Protocols Overview

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[MS-WMF]: Windows Metafile Format

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[MS-WSDS]: WS-Enumeration Directory Services Protocol Extensions

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Errata below are for Protocol Document Version V10.0 – 2017/03/16.

Errata Published*	Description
2017/05/01	In Section 3, Protocol Details, a product behavior note was added with information about which products implement which protocol roles. Changed from: The WS-Enumeration: Directory Services Protocol Extensions [MS-WSDS] extend how the WS-Enumeration [WSENUM] protocol operates between an application and a directory server. The requestor that is the client for the protocol sends a SOAP message containing a request of an Enumerate, Pull, Renew, GetStatus or Release operation to the server, and the server responds with a SOAP message, containing the response, or a SOAP fault, if an error occurred during server processing. Changed to: The WS-Enumeration: Directory Services Protocol Extensions [MS-WSDS] extend how the WS-Enumeration [WSENUM] protocol operates between an application and a directory server. The requestor that is the client for the protocol sends a SOAP message containing a request of an Enumerate, Pull, Renew, GetStatus or Release operation to the server, and the server responds with a SOAP message, containing the response, or a SOAP fault, if an error occurred during server processing.<2> <2>The following products are applicable to WS-Enumeration: Directory Services Protocol Extensions: • Active Directory Management Gateway Service contains the server implementation of WS-Enumeration: Directory Services Protocol Extensions. • Remote Server Administration Tools (excluding Remote Server Administration Tools for Windows Vista operating system) contains the client implementation. For more information about Remote Server Administration Tools, see [MSFT-RSAT]. • Windows Server 2008 R2 and later have both the server and the client implementations.

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[MS-WSMV]: Web Services Management Protocol Extensions for Windows Vista

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[MS-WSP]: Windows Search Protocol

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[MS-WSTEP]: WS-Trust X.509v3 Token Enrollment Extensions

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Errata below are for Protocol Document Version V9.0 – 2016/07/14.

Errata Published*	Description
2017/02/06	In Section 3.1.4.1.3.3, wst:RequestSecurityTokenType, removed the wstep:PreferredLanguage attribute. Changed from: wstep:RequestID: An instance of wstep:RequestID as specified in section 3.1.4.1.2.4. WSTEP extends <wst:RequestSecurityTokenType> with an additional attribute: <xs:attribute name="PreferedLanguage" type="xs:language" use="optional" /> Only the attribute specified below is used in WSTEP. Any attribute received that is not specified below SHOULD be ignored. wstep:PreferredLanguage: The wstep:PreferredLanguage attribute defines the preferred language to be used in a server response. Changed to: wstep:RequestID: An instance of wstep:RequestID as specified in section 3.1.4.1.2.4. In Section, Appendix A: Full WSDL, changed from: <xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:wstep="http://schemas.microsoft.com/windows/pki/2009/01/enrollment" targetNamespace="http://schemas.microsoft.com/windows/pki/2009/01/enrollment" elementFormDefault="qualified"> <xs:import namespace="http://www.w3.org/XML/1998/namespace" schemaLocation="http://www.w3.org/2001/xml.xsd" /> <xs:element name="DispositionMessage" type="wstep:DispositionMessageType" nillable="true" /> <xs:complexType name="DispositionMessageType"> <xs:simpleContent> <xs:extension base="xs:string"> <xs:attribute ref="xml:lang" use="optional" /> </xs:extension> </xs:simpleContent> </xs:complexType> <xs:element name="CertificateEnrollmentWSDetail" nillable="true" type="wstep:CertificateEnrollmentWSDetailType" /> <xs:complexType name="CertificateEnrollmentWSDetailType"> <xs:sequence> <xs:element minOccurs="0" maxOccurs="1" name="BinaryResponse" nillable="true" type="xs:string" />

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	<xs:element minOccurs="0" maxOccurs="1" name="ErrorCode" nillable="true" type="xs:int" /> <xs:element minOccurs="0" maxOccurs="1" name="InvalidRequest" nillable="true" type="xs:boolean" /> <xs:element minOccurs="0" maxOccurs="1" name="RequestID" type="xs:string" nillable="true" /> </xs:sequence> </xs:complexType> <xs:element name="RequestID" type="xs:string" nillable="true" /> <xs:attribute name="PreferredLanguage" type="xml:language" use="optional"/> </xs:schema> Changed to: <xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:wstep="http://schemas.microsoft.com/windows/pki/2009/01/enrollment" targetNamespace="http://schemas.microsoft.com/windows/pki/2009/01/enrollment" elementFormDefault="qualified"> <xs:import namespace="http://www.w3.org/XML/1998/namespace" schemaLocation="http://www.w3.org/2001/xml.xsd" /> <xs:element name="DispositionMessage" type="wstep:DispositionMessageType" nillable="true" /> <xs:complexType name="DispositionMessageType"> <xs:simpleContent> <xs:extension base="xs:string"> <xs:attribute ref="xml:lang" use="optional" /> </xs:extension> </xs:simpleContent> </xs:complexType> <xs:element name="CertificateEnrollmentWSDetail" nillable="true" type="wstep:CertificateEnrollmentWSDetailType" /> <xs:complexType name="CertificateEnrollmentWSDetailType"> <xs:sequence> <xs:element minOccurs="0" maxOccurs="1" name="BinaryResponse" nillable="true" type="xs:string" /> <xs:element minOccurs="0" maxOccurs="1" name="ErrorCode" nillable="true" type="xs:int" /> <xs:element minOccurs="0" maxOccurs="1" name="InvalidRequest" nillable="true" type="xs:boolean" /> <xs:element minOccurs="0" maxOccurs="1" name="RequestID" type="xs:string" nillable="true" /> </xs:sequence> </xs:complexType> <xs:element name="RequestID" type="xs:string" nillable="true" /> </xs:schema>

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[MS-WSUSAR]: Windows Server Update Services: Administrative API Remoting Protocol

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Errata Published*	Description
2017/02/20	In Section 2.2.3.1, UpdateSearch Element, updated the element name UpdateSearch to UpdateScope. Changed from: 2.2.3.1 UpdateSearch Element The UpdateSearch element is the top level node for the update search scope XML fragment... Changed to: 2.2.3.1 UpdateScope Element The UpdateScope element is the top level node for the update search scope XML fragment...

2017/02/20	In Section 2.2.3.1, UpdateScope Element, revised the XML fragment to eliminate the duplicate UpdateTypes attribute.
	
	Changed from:
	
	`<UpdateScope`
	`  ApprovedStates="[integer]"`
	`  FromArrivalDate="[datetime]"`
	`  ToArrivalDate="[datetime]"`
	`  UpdateTypes="[integer]"`
	`  IncludedInstallationStates="[integer]"`
	`  ExcludedInstallationStates="[integer]"`
	`  ...`
	`  UpdateApprovalActions="[integer]"`
	`  ApprovedComputerTargetGroups="[string]"`
	`  UpdateTypes="[integer]"`
	`  ExcludeOptionalUpdates="[bool]" >`
	`  <UpdateApprovalScope>…</UpdateApprovalScope>`
	`</UpdateScope>`
	
	Changed to:
	
	`<UpdateScope`
	`  ApprovedStates="[integer]"`
	`  FromArrivalDate="[datetime]"`

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Errata Published*	Description
	ToArrivalDate="[datetime]" UpdateTypes="[integer]" IncludedInstallationStates="[integer]" ExcludedInstallationStates="[integer]" ... UpdateApprovalActions="[integer]" ApprovedComputerTargetGroups="[string]" ExcludeOptionalUpdates="[bool]" > <UpdateApprovalScope>…</UpdateApprovalScope> </UpdateScope>
2017/02/20	In Section 2.2.3.1.15, ApprovedComputerTargetGroups Attribute, in the escaped example, changed "GUIDID" to "GUID". Changed from: Because this is an attribute, the XML fragment has to be escaped, for example: ApprovedComputerTargetGroups = "<root><TargetGroupID >GUIDID</TargetGroupID ></root>" Changed to: Because this is an attribute, the XML fragment has to be escaped, for example: ApprovedComputerTargetGroups = "<root><TargetGroupID >GUID</TargetGroupID ></root>" In Section 2.2.3.2.9, ComputerTargetGroups Attribute, in the escaped example, changed "GUIDID" to "GUID". Changed from: Because this is an attribute, the XML fragment has to be escaped, for example: ComputerTargetGroups = "<root><TargetGroupID >GUIDID</TargetGroupID ></root>" Changed to: Because this is an attribute, the XML fragment has to be escaped, for example: ComputerTargetGroups = "<root><TargetGroupID >GUID</TargetGroupID ></root>"
2017/02/20	In Section 2.2.3.2.2, RequestedTargetGroupNames Attribute, in the escaped example, added ""<".

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Errata Published*	Description

	Changed from:
	Because this is an attribute, the XML fragment has to be escaped, for example:
	
	`RequestedTargetGroupNames = "<root><RequestedTargetGroup Name="Target Group Name</RequestedTargetGroup>…</root>"`
	
	Changed to:
	Because this is an attribute, the XML fragment has to be escaped, for example:
	
	`RequestedTargetGroupNames = "<root><RequestedTargetGroup Name="Target Group Name"></RequestedTargetGroup>…</root>"`

2017/02/20	In Section 2.2.4.11, EmailNotificationConfigurationRow, added the complexType element to the first line of the XML definition.
	
	Changed from:
	
	`<xsd: name="EmailNotificationConfigurationRow">`
	`<xsd:sequence>`
	`...`
	
	Changed to:
	
	`<xsd:complexType name="EmailNotificationConfigurationRow">`
	`<xsd:sequence>`
	`...`

2017/02/20	In Section 3.1.4.82, GetDynamicCategories, added the </wsdl:operation> tag to the end of the XML definition.
	
	Changed from:
	...
	
	`name="ApiRemotingSoap_GetDynamicCategories_OutputMessage"`
	`message="tns:ApiRemotingSoap_GetDynamicCategories_OutputMessage"/>`
	
	Changed to:
	...
	
	`name="ApiRemotingSoap_GetDynamicCategories_OutputMessage"`
	`message="tns:ApiRemotingSoap_GetDynamicCategories_OutputMessage"/>`

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Errata Published*	Description
	</wsdl:operation>
2017/02/20	In Section 3.1.4.76.3.1, SignCabExForPublishingWithTimeStampOptionRequestBody, in the description of the filePath field, changed the capitalization of the field name from filepath to filePath. Changed from: filePath: This field MUST be present. It specifies the path to the file to publish. If the filepath field is NULL, the server MUST send a SOAP fault as specified in section 3.1.4.1. Changed to: filePath: This field MUST be present. It specifies the path to the file to publish. If the filePath field is NULL, the server MUST send a SOAP fault as specified in section 3.1.4.1.

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[MS-WSUSOD]: Windows Server Update Services Protocols Overview

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Errata below are for Protocol Document Version V6.0 – 2016/09/26.

Errata Published*	Description
2017/04/03	In this overview document, the text and diagrams in three of the examples were updated to indicate that self-updating functionality is dependent on product version, and is optional for the rest of the example. In Section 3.3, Example 3: Initial Update Synchronization to Update Client, changed from:

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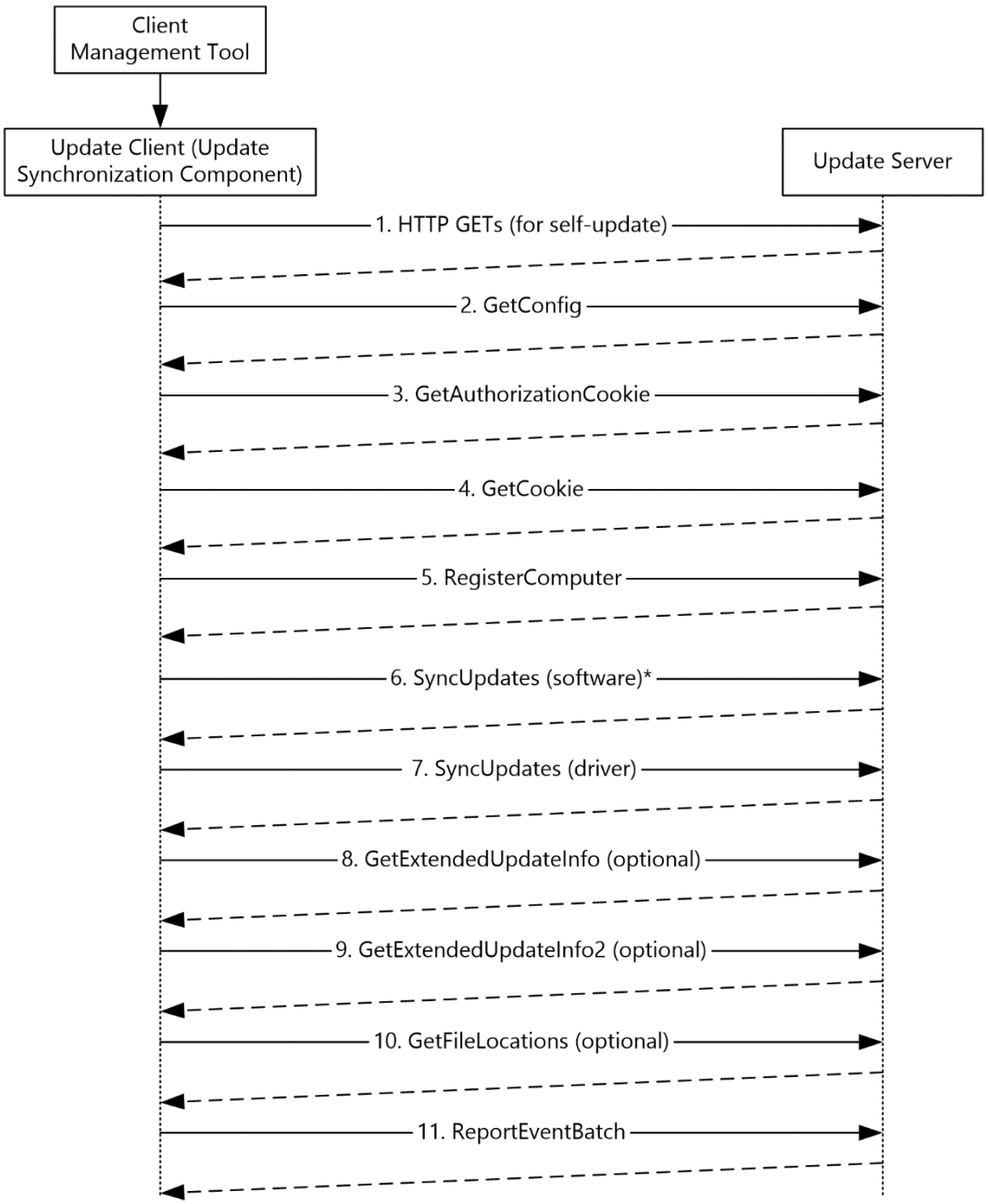
Errata Published*	Description
	 The message flow is as follows: 1. The update client makes a series of HTTP GET requests to determine the availability of applicable update client software. If applicable update client software is available, it downloads the software using HTTP GET requests and updates itself. The message details are specified in [MS-WUSP] section 3.1.5.1. … Changed to:

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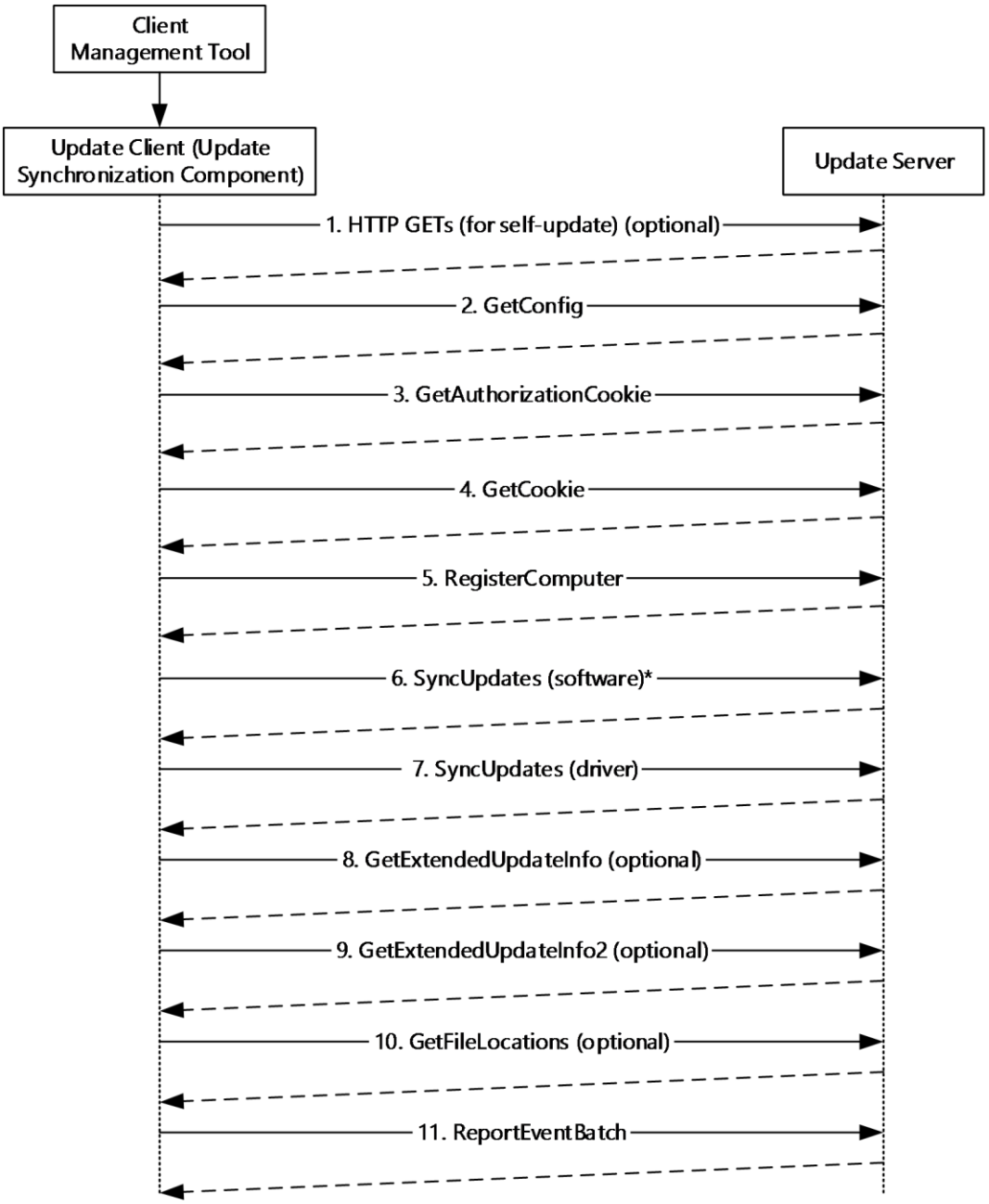
Errata Published*	Description
	 The message flow is as follows: 1. (Optional) The update client makes a series of HTTP GET requests to determine the availability of applicable update client software. If applicable update client software is available, it downloads the software using HTTP GET requests and updates itself. The message details are specified in [MS-WUSP] section 3.1.5.1.<2> <2> Section 3.3: Self-update functionality is only available in Windows 8.1 and earlier. …

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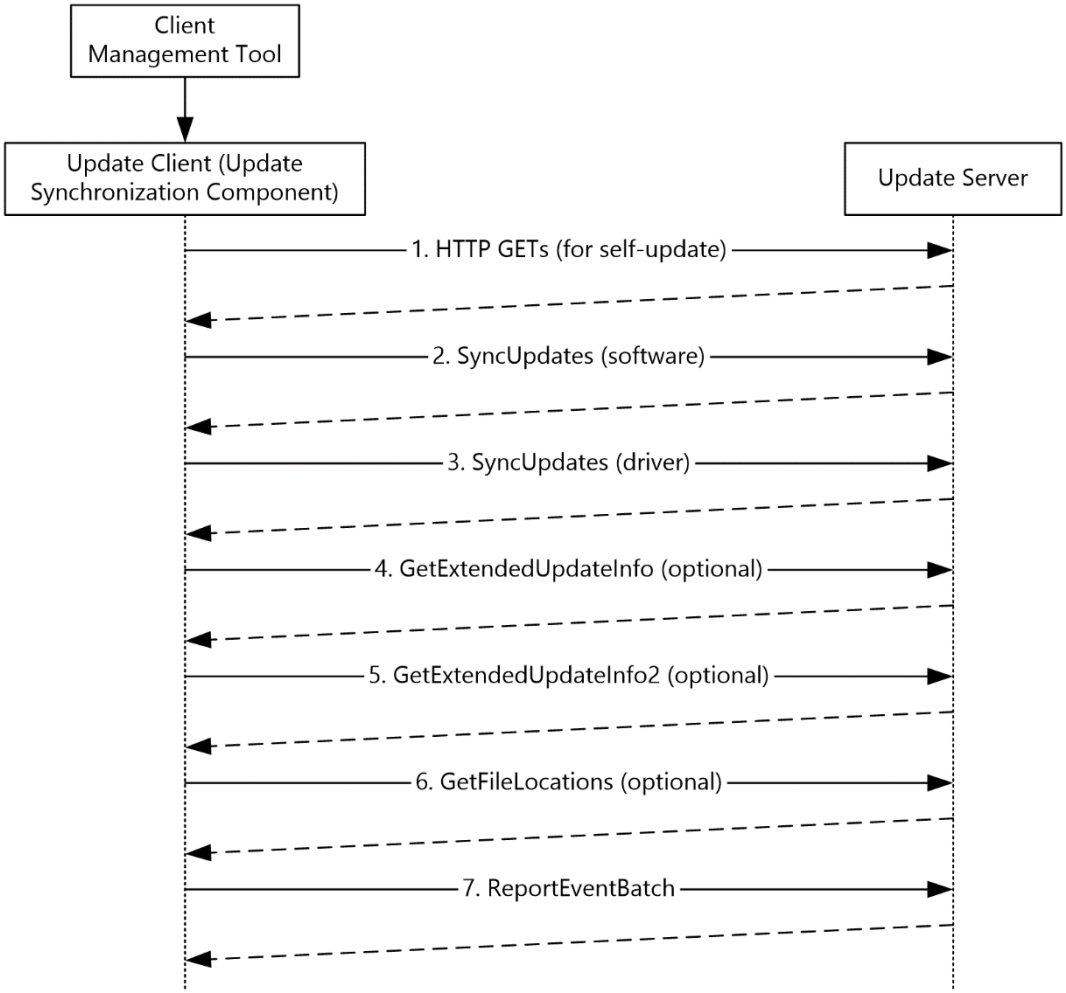
Errata Published*	Description
	In Section 3.4, Example 4: Differential Update Synchronization to Update Client, changed from:  This message sequence is as follows: 1. The update client makes a series of HTTP GET requests to determine the availability of applicable update client software. If so, it downloads the software using HTTP GET requests and updates itself. A differential update synchronization is less likely to find applicable update client software if a previous update synchronization was performed recently. Changed to:

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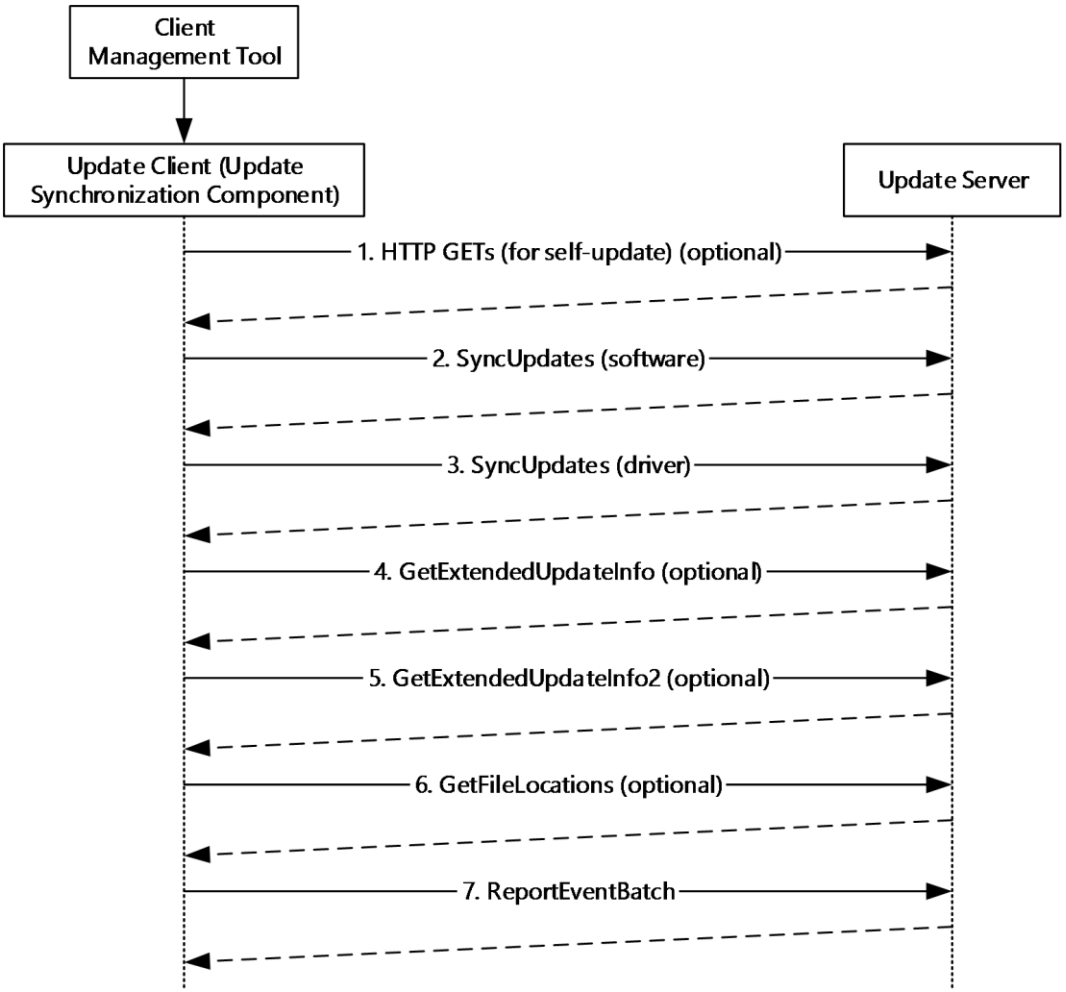
Errata Published*	Description
	 This message sequence is as follows: 1. (Optional) The update client makes a series of HTTP GET requests to determine the availability of applicable update client software. If so, it downloads the software using HTTP GET requests and updates itself. The message details are specified in [MS-WUSP] section 3.1.5.1.<3> A differential update synchronization is less likely to find applicable update client software if a previous update synchronization was performed recently. <3> Section 3.4: Self-update functionality is only available in Windows 8.1 and earlier. … In Section 3.6, Example 6: Update Client Is Pointed to a New Update Server, changed from:

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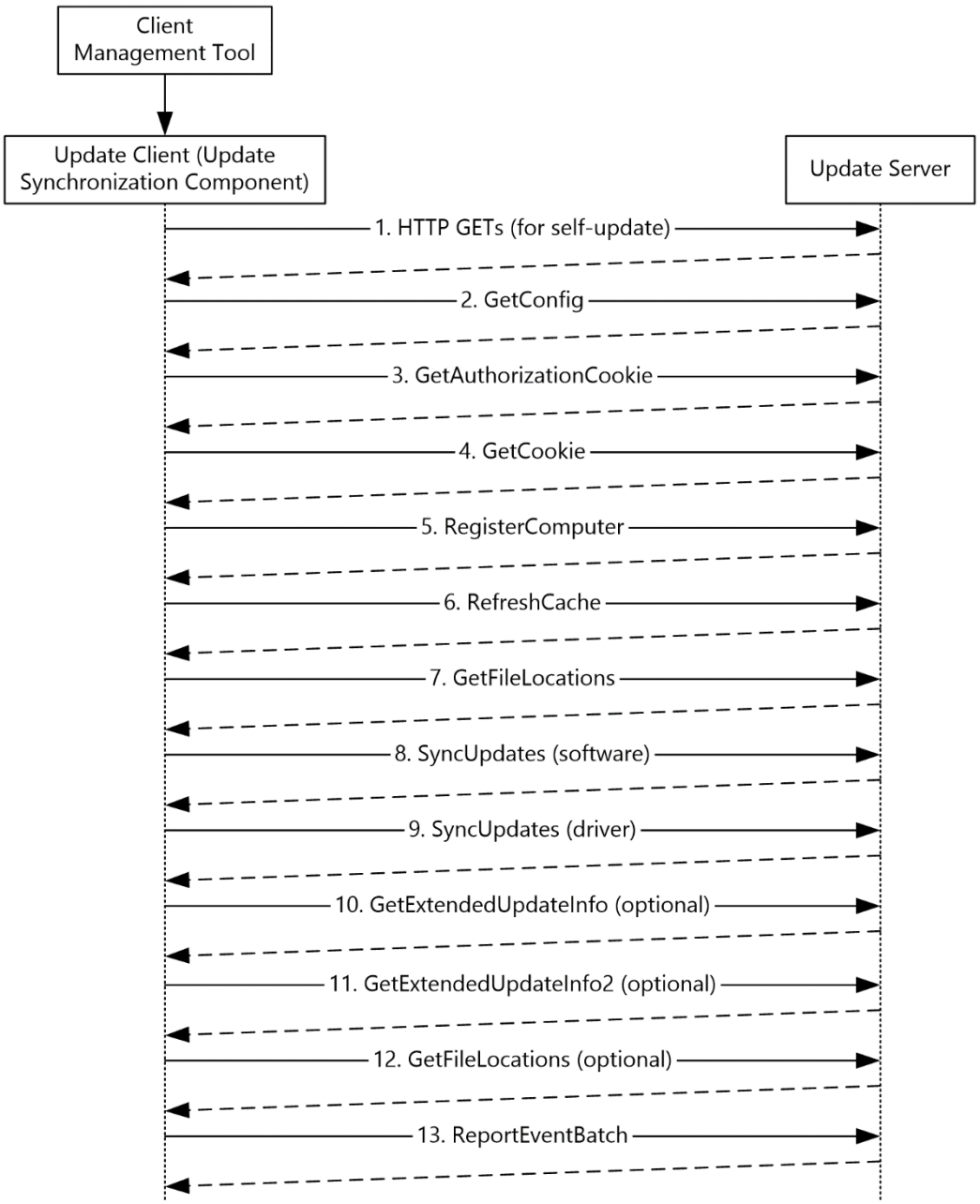
Errata Published*	Description
	 The message flow is as follows: 1. The update client makes a series of HTTP GET requests to the update server to synchronize metadata to the client. … Changed to:

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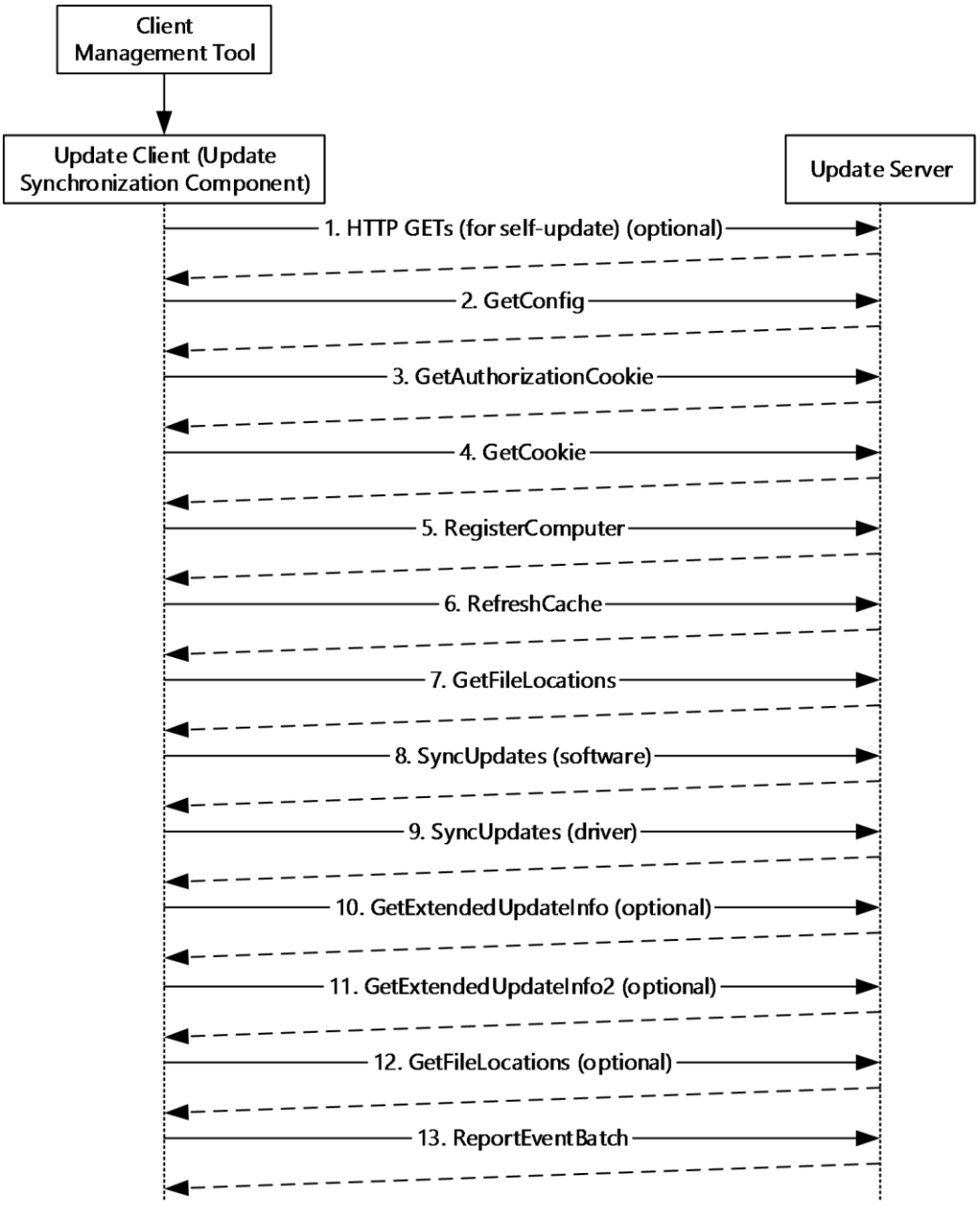
Errata Published*	Description
	 The message flow is as follows: 1. (Optional) The update client makes a series of HTTP GET requests to determine the availability of applicable update client software. If applicable update client software is available, it downloads the software using HTTP GET requests and updates itself. The message details are specified in [MS-WUSP] section 3.1.5.1. <4> <4> Section 3.6: Self-update functionality is only available in Windows 8.1 and earlier. …

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[MS-WSUSSS]: Windows Update Services: Server-Server Protocol

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July 18, 2016 - Download

Errata below are for Protocol Document Version V3.0 – 2016/07/14.

Errata Published*	Description

2017/02/20	In Section 2.2.4.1, ArrayOfAuthorizationCookie, changed the namespace for the type attribute in the XML definition from "s1" to "tns".
	
	Changed from:
	...
	
	`<s:element minOccurs="0" maxOccurs="unbounded" name="AuthorizationCookie" nillable="true" type="s1:AuthorizationCookie" />`
	
	...
	Changed to:
	...
	
	`<s:element minOccurs="0" maxOccurs="unbounded" name="AuthorizationCookie" nillable="true" type="tns:AuthorizationCookie" />`
	
	...
	In Section 2.2.4.3, ArrayOfGuid, changed the namespace for the type attribute in the XML definition from "s2" to "s1".
	Changed from:
	...
	
	`<s:element minOccurs="0" maxOccurs="unbounded" name="guid" type="s2:guid" />`
	
	...

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Errata Published*	Description

	Changed to:
	...
	
	`<s:element minOccurs="0" maxOccurs="unbounded" name="guid" type="s1:guid" />`
	
	...
	In Section 2.2.4.6, ArrayOfUpdateIdentity, changed the namespace for the type attribute in the XML definition from "s1" to "tns".
	
	Changed from:
	...
	
	`<s:element minOccurs="0" maxOccurs="unbounded" name="UpdateIdentity" nillable="true" type="s1:UpdateIdentity" />`
	
	...
	
	Changed to:
	...
	
	`<s:element minOccurs="0" maxOccurs="unbounded" name="UpdateIdentity" nillable="true" type="tns:UpdateIdentity" />`
	
	...
	In Section 2.2.4.9, UpdateIdentity, changed the namespace for the type attribute in the XML definition from "s2" to "s1".
	
	Changed from:
	...
	
	`<s:element minOccurs="1" maxOccurs="1" name="UpdateID" type="s2:guid" />`
	
	...
	Changed to:
	...
	
	`<s:element minOccurs="1" maxOccurs="1" name="UpdateID"`

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Errata Published*	Description
	type="s1:guid" /> ... In Section 3.1.4.1.2.2, GetAuthConfigResponse, changed the namespace for the type attribute in the XML definition from "s1" to "tns". Changed from: ... <s:element minOccurs="0" maxOccurs="1" name="GetAuthConfigResult" type="s1:ServerAuthConfig" /> ... Changed to: ... <s:element minOccurs="0" maxOccurs="1" name="GetAuthConfigResult" type="tns:ServerAuthConfig" /> ... In Section 3.1.4.1.3.1, ServerAuthConfig, changed the namespace for the type attribute in the XML definition from "s1" to "tns". Changed from: ... <s:element minOccurs="0" maxOccurs="1" name="AuthInfo" type="s1:ArrayOfAuthPlugInInfo" /> ... Changed to: ... <s:element minOccurs="0" maxOccurs="1" name="AuthInfo" type="tns:ArrayOfAuthPlugInInfo" /> ... In Section 3.1.4.1.3.2, ArrayOfAuthPlugInInfo, changed the namespace for the type attribute in the XML definition from "s1" to "tns".

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Errata Published*	Description

	Changed from:
	...
	
	`<s:element minOccurs="0" maxOccurs="unbounded" name="AuthPlugInInfo" nillable="true" type="s1:AuthPlugInInfo" />`
	
	...
	Changed to:
	...
	
	`<s:element minOccurs="0" maxOccurs="unbounded" name="AuthPlugInInfo" nillable="true" type="tns:AuthPlugInInfo" />`
	
	...

2017/02/20	In Section 3.1.4.2.2.1, GetAuthorizationCookie, corrected the code snippet. Changed from: `<s:element name="GetAuthorizationCookie"><s:complexType><s:sequence><s:element minOccurs="0" maxOccurs="1" name="accountName" type="s:string" /><s:element minOccurs="0" maxOccurs="1" name="accountGuid" type="s:string" /><s:element minOccurs="0" maxOccurs="1" name="programKeys" type="tns:ArrayOfGuid" /></s:sequence></s:complexType></s:element>`  Changed to (change in **bold**):  `<s:element name="GetAuthorizationCookie"><s:complexType><s:sequence><s:element minOccurs="0" maxOccurs="1" name="accountName" type="s:string" /><s:element minOccurs="0" maxOccurs="1" name="accountGuid" type="s:string" /><s:element minOccurs="0" maxOccurs="1" name="programKeys" type="tns:ArrayOfGuid" />**</s:sequence></s:complexType></s:element>**

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Errata Published*	Description

	In Section 3.1.4.7.2.2, GetDriverIdListResponse, corrected the code snippet.
	
	Changed from:
	
	`<s:element name="GetDriverIdListResponse">`
	`  <s:complexType>`
	`  <s:sequence>`
	`  <s:element minOccurs="0" maxOccurs="1"`
	`name="GetDriverIdListResult" type="tns:DriverSetAndRevisionIdList" />`
	`  </s:sequence`
	`  </s:complexType>`
	`</s:element>`
	
	Changed to (change in **bold**):
	
	`<s:element name="GetDriverIdListResponse">`
	`  <s:complexType>`
	`  <s:sequence>`
	`  <s:element minOccurs="0" maxOccurs="1"`
	`name="GetDriverIdListResult" type="tns:DriverSetAndRevisionIdList" />`
	`  </s:sequence>`
	`  </s:complexType>`
	`</s:element>`

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[MS-WUSP]: Windows Update Services: Client-Server Protocol

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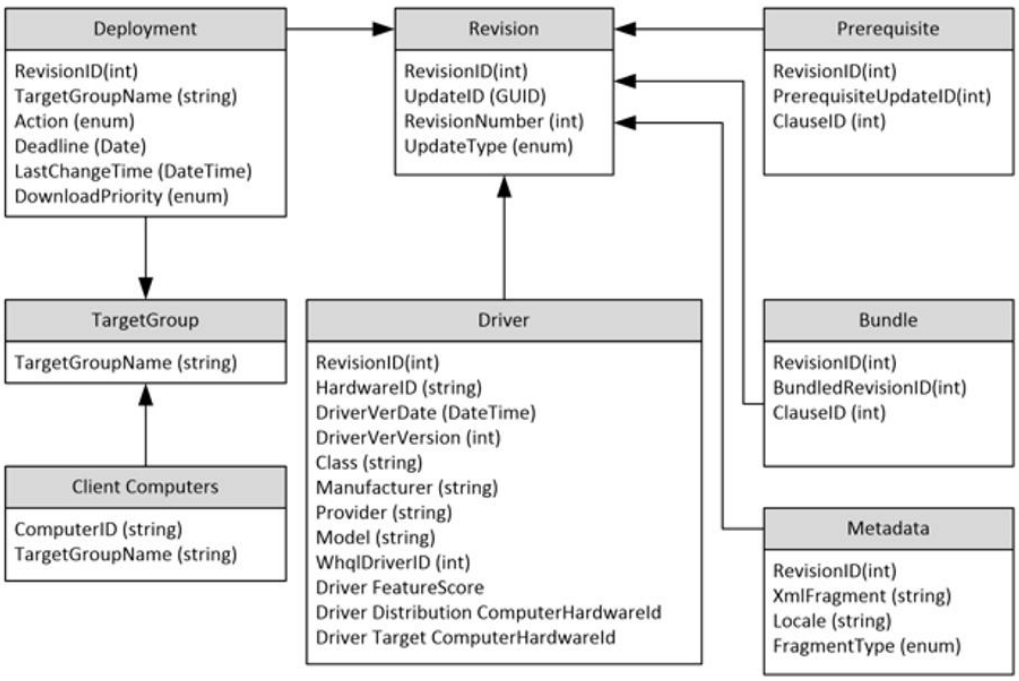
Errata below are for Protocol Document Version V25.0 – 2016/07/14.

Errata Published *	Description
2017/03/20	In Section 3.1.1, Abstract Data Model, the abstract data model diagram was updated to include the isCategory field in the Prerequisite table. Changed from:  **Figure 2: Server abstract data model**

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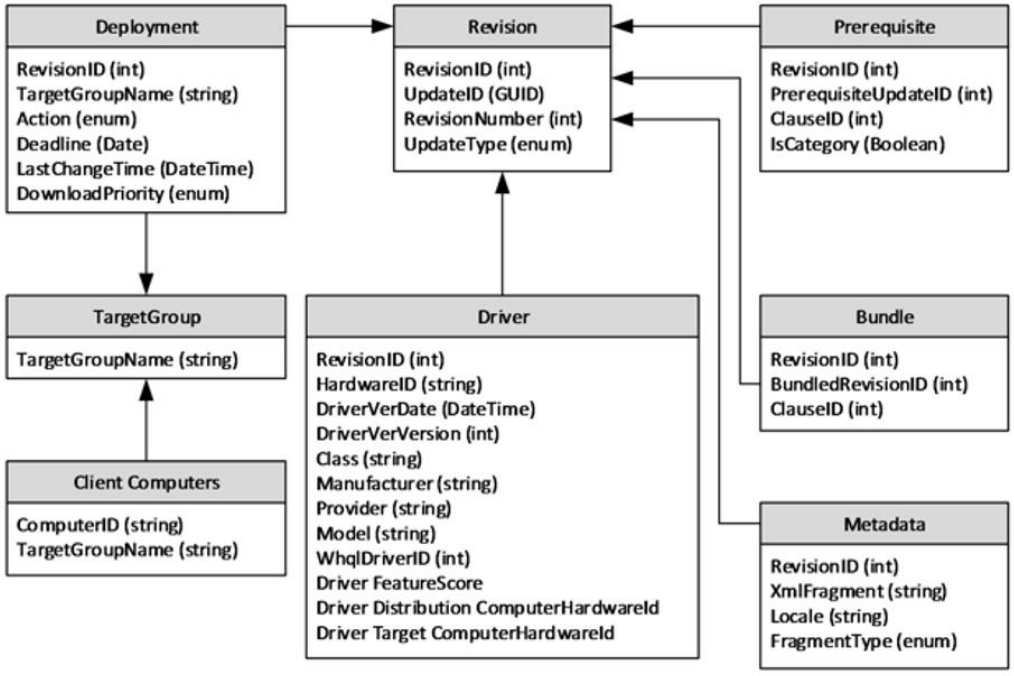
Errata Published *	Description
	Changed to:  **Figure 2: Server abstract data model**
2017/03/20	In three sections, added four behavior notes to indicate product applicability for self-updating functionality. In Section 2, Messages, changed from: Self-update content directory: A virtual directory containing the client self-update binaries, as specified in section 2.2.2.5, which MUST be populated with self-update content files. The server provides this virtual directory only as a container of files, which are accessible by clients through HTTP GET and HEAD requests. Changed to: Self-update content directory: A virtual directory containing the client self-update binaries, as specified in section 2.2.2.5, which MUST be populated with self-update content files. The server provides this virtual directory only as a container of files, which are accessible by clients through HTTP GET and HEAD requests.<2> <2> Section 2: Self-updating functionality is available only in Windows XP, Windows Vista, Windows 7, Windows 8, and Windows 8.1. In Section 2.1, Transport, changed from: The following TCP ports MUST be exposed by the server as endpoints for the HTTP over TCP/IP transport. commonPort: Used for self-update and web services communication.

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<table>
<tr><th>Errata Published *</th><th>Description</th></tr>
<tr><td></td><td>
Changed to:
The following TCP ports MUST be exposed by the server as endpoints for the HTTP over TCP/IP transport.
commonPort: Used for self-update and web services communication.<4>

<4> Section 2.1: Self-updating functionality is available only in Windows XP, Windows Vista, Windows 7, Windows 8, and Windows 8.1.
-
In the same section, changed from:

The following virtual directories MUST be exposed by the server as endpoints for the HTTP and SOAP over HTTP transports.

Update content directory: This virtual directory MUST be exposed at URL http://serverUrl:[contentPort]/Content

Self-update content directory: This virtual directory, MUST be exposed at URL http://serverUrl:[commonPort]/SelfUpdate

Changed to:

The following virtual directories MUST be exposed by the server as endpoints for the HTTP and SOAP over HTTP transports.

Update content directory: This virtual directory MUST be exposed at URL http://serverUrl:[contentPort]/Content

Self-update content directory: This virtual directory, MUST be exposed at URL http://serverUrl:[commonPort]/SelfUpdate<6>

<6> Section 2.1: Self-updating functionality is available only in Windows XP, Windows Vista, Windows 7, Windows 8, and Windows 8.1.

In Section 2.2.2.3.1, ReportEventBatch, changed from:

<table>
<tr><td>TargetClientVersion</td><td>S</td><td>String</td><td>WUA agent version that the agent is self-updating to.</td><td>Self-update events</td></tr>
</table>

Changed to:
</td></tr>
</table>

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<table>
<tr><th>Errata Published *</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><td>TargetClientVersion</td><td>S</td><td>String</td><td>WUA agent version that the agent is self-updating to.</td><td>Self-update events<23></td></tr>
</table>
<23> Section 2.2.2.3.1: Self-updating functionality is available only in Windows XP, Windows Vista, Windows 7, Windows 8, and Windows 8.1 operating system.
</td></tr>
<tr><td>2017/03/20</td><td>In Section 3.2.1, Abstract Data Model, in the description of the fields in the CachedCookie table, the name of the CookieData field was changed to EncryptedData and is now consistent with the field names in the diagram.

Changed from:
CachedCookie table: The cookie returned from GetCookie (section 3.1.5.4), SyncUpdates (section 3.1.5.7), or GetFileLocations (section 3.1.5.10). There is at most one entry, which includes the following elements:
Expiration: A clear-text copy of the time the cookie expires.
CookieData: An opaque sequence of one or more bytes containing server-implementation–specific authorization, authentication, and protocol state information.

Changed to:
CachedCookie table: The cookie returned from GetCookie (section 3.1.5.4), SyncUpdates (section 3.1.5.7), or GetFileLocations (section 3.1.5.10). There is at most one entry, which includes the following elements:
Expiration: A clear-text copy of the time the cookie expires.
EncryptedData: An opaque sequence of one or more bytes containing server-implementation–specific authorization, authentication, and protocol state information.</td></tr>
<tr><td>2017/03/20</td><td>In Section 2, Messages, changed the name of the oldCookies element to oldCookie.

Changed from:
…
oldCookies: Optionally specifies an existing cookie (that MUST have been obtained from a previous method call to GetCookie, GetFileLocations (section 2.2.2.2.7), or SyncUpdates (section 2.2.2.2.4)) that needs renewal by the server.

Changed to:
…
oldCookie: Optionally specifies an existing cookie (that MUST have been obtained from a previous method call to GetCookie, GetFileLocations (section 2.2.2.2.7), or SyncUpdates (section 2.2.2.2.4)) that needs renewal by the server.</td></tr>
</table>

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[MS-XCEP]: X.509 Certificate Enrollment Policy Protocol

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