

# Windows Protocols Errata

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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

[\[MC-NMF\]: .NET Message Framing Protocol](#)

[\[MS-ADDM\]: Active Directory Web Services: Data Model and Common Elements](#)

[\[MS-ADTS\]: Active Directory Technical Specification](#)

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

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

[\[MS-EMFPLUS\]: Enhanced Metafile Format Plus Extensions](#)

[\[MS-FASP\]: Firewall and Advanced Security Protocol](#)

[\[MS-FRS2\]: Distributed File System Replication Protocol](#)

[\[MS-FSA\]: File System Algorithms](#)

[\[MS-FSCC\]: File System Control Codes](#)

[\[MS-HGSA\]: Host Guardian Service: Attestation Protocol](#)

[\[MS-LCID\]: Windows Language Code Identifier \(LCID\) Reference](#)

[\[MS-NCNBI\]: Network Controller Northbound Interface Specification](#)

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

[\[MS-NNS\]: .NET NegotiateStream Protocol](#)

[\[MS-NRPC\]: Netlogon Remote Protocol](#)

[\[MS-PAR\]: Print System Asynchronous Remote Protocol](#)

[\[MS-RDPBCGR\]: Remote Desktop Protocol: Basic Connectivity and Graphics Remoting](#)

[\[MS-RDPECAM\]: Remote Desktop Protocol: Video Capture Virtual Channel Extension](#)

[\[MS-RDPEGFX\]: Remote Desktop Protocol: Graphics Pipeline Extension](#)

[\[MS-RDPELE\]: Remote Desktop Protocol: Licensing Extension](#)

[\[MS-RDPERP\]: Remote Desktop Protocol: Remote Programs Virtual Channel Extension](#)

[\[MS-RDPEUDP\]: Remote Desktop Protocol: UDP Transport Extension](#)

[\[MS-RDPEUDP2\]: Remote Desktop Protocol: UDP Transport Extension Version 2](#)

[\[MS-RDPRFX\]: Remote Desktop Protocol: RemoteFX Codec Extension](#)

[\[MS-RPRN\]: Print System Remote Protocol](#)

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

[\[MS-SWN\]: Service Witness Protocol](#)

[\[MS-WKST\]: Workstation Service Remote Protocol](#)

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Last date updated: February 19, 2019

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

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## [MC-NMF]: .NET Message Framing Protocol

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Errata below are for Protocol Document Version [V9.0 - 2018/03/16](#).

Errata Published*	Description
2018/07/02	<p>In Section 2.2.6, Preamble Message, the field descriptions have been modified as follows and have been moved to follow the packet diagram.</p> <p>Changed from:</p> <p>The VersionRecord MUST be formatted as specified in section 2.2.3.1. The ModeRecord MUST be formatted as specified in section 2.2.3.2. The ViaRecord MUST be formatted as specified in section 2.2.3.3. The EnvelopeEncodingRecord MUST be formatted as specified in section 2.2.3.4</p> <p>Changed to:</p> <p>VersionRecord (3 bytes): This field MUST be formatted as specified in section 2.2.3.1. ModeRecord (2 bytes): This field MUST be formatted as specified in section 2.2.3.2. ViaRecord (variable): This field MUST be formatted as specified in section 2.2.3.3. EnvelopeEncodingRecord (variable): This field MUST be formatted as specified in section 2.2.3.4</p>

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## [MC-PRCR]: Peer Channel Custom Resolver Protocol

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

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

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Errata below are for Protocol Document Version V15.0 – 2018/09/12.

Errata Published*	Description
2018/12/17	<p>In Section 1.2.1, Normative References, the following reference has been deleted:</p> <p>[RFC4346] Dierks, T., and Rescorla, E., "The Transport Layer Security (TLS) Protocol Version 1.1", RFC 4346, April 2006, <a href="http://www.ietf.org/rfc/rfc4346.txt">http://www.ietf.org/rfc/rfc4346.txt</a></p> <p>In Section 2.1, Endpoints, changed from:</p> <p>The ADWS protocol set uses two types of authentication. Each endpoint (except for the "mex" endpoint) supports one or the other. The forms of authentication are:</p> <ul style="list-style-type: none"><li>• Windows Integrated: These endpoints use Transport Layer Security (TLS) [RFC4346] to protect the TCP transport. Integrated Windows authentication using the .Net Negotiate Stream protocol [MS-NNS] is used to authenticate the client to the server at the transport layer and to negotiate the session key used for TLS.</li></ul> <p>Changed to:</p> <p>The ADWS protocol set uses two types of authentication. Each endpoint (except for the "mex" endpoint) supports one or the other. The forms of authentication are:</p> <ul style="list-style-type: none"><li>• Windows Integrated: These endpoints use integrated Windows authentication with the .Net Negotiate Stream protocol [MS-NNS] to authenticate the client and provide message security at the transport layer.</li></ul>

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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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## [MS-ADSC]: Active Directory Schema Classes

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# [MS-ADTS]: Active Directory Technical Specification

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Errata below are for Protocol Document Version [V49.0 - 2018/09/12](#).

Errata Published*	Description
2018/10/29	<p>In Section 2.2.9, Search Flags, information about confidential attributes and their interaction with certain flags has been added.</p> <p>Changed from:</p> <p>CF (fCONFIDENTIAL, 0x00000080): Specifies that the attribute is confidential. An extended access check (section 3.1.1.4.4) is required.</p> <p>NV (fNEVERVALUEAUDIT, 0x00000100): Specifies that auditing of changes to individual values contained in this attribute MUST NOT be performed. Auditing is outside of the state model.</p> <p>Changed to:</p> <p>CF (fCONFIDENTIAL, 0x00000080): Specifies that the attribute is confidential. An extended access check (section 3.1.1.4.4) is required.</p> <p>Note: The effect of this flag can vary depending on whether the LDAP_SERVER_DIRSYNC_OID control (section 3.1.1.3.4.1.3) or the LDAP_SERVER_DIRSYNC_EX_OID control (section 3.1.1.3.4.1.29) is present in an LDAP search request. If neither of these controls is present, a confidential attribute will not be included in the LDAP search response. If one of these controls is present and the LDAP_DIRSYNC_OBJECT_SECURITY flag is set, a confidential attribute might be included in the response, but its value will be empty.</p> <p>NV (fNEVERVALUEAUDIT, 0x00000100): Specifies that auditing of changes to individual values contained in this attribute MUST NOT be performed. Auditing is outside of the state model.</p>

Errata Published*	Description
	<p>In Section 3.1.1.2.3, Attributes, the section reference for Extended Access Checks has been corrected in the row for searchFlags.</p> <p>Changed from:</p> <p>fCONFIDENTIAL: This attribute is confidential, special access check is needed; see section Reads:Access Checks in section 3.1.1.4.</p> <p>Changed to:</p> <p>fCONFIDENTIAL: This attribute is confidential, so a special access check is required; for details, see the Extended Access Checks in section 3.1.1.4.4.</p>

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

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Errata below are for Protocol Document Version [V28.0 - 2018/09/12](#).

Errata Published*	Description
2018/10/29	<p>In Section 3.2.4.44, Application Requests Querying DFS Referrals, the following has been changed from:</p> <p>An input buffer containing the application-provided REQ_GET_DFS_REFERRAL structure.</p> <p>Changed to:</p> <p>An input buffer containing the application-provided REQ_GET_DFS_REFERRAL structure specified in [MS-DFSC] section 2.2.2.</p> <p>In Section 3.4.4.9, A Local Client Application Queries DFS Referrals, the following has been changed from:</p> <p>An input buffer containing the application-provided REQ_GET_DFS_REFERRAL or REQ_GET_DFS_REFERRAL_EX structure.</p> <p>Changed to:</p> <p>An input buffer containing the application-provided structure REQ_GET_DFS_REFERRAL specified in [MS-DFSC] section 2.2.2 or REQ_GET_DFS_REFERRAL_EX specified in [MS-DFSC] section 2.2.3.</p>

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

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

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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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## [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 [V28.0 - 2018/09/12](#).

Errata Published*	Description
2018/10/29	<p>In Section 3.1.4.2, Sending a DFS Referral Request to the Server, the following has been changed from:</p> <p>The client MUST query the DFS referral, as specified in [MS-CIFS] section 3.4.4.9, by passing ClientGenericContext, HostName, UserCredentials, MaxOutputSize, the REQ_GET_DFS_REFERRAL_EX or REQ_GET_DFS_REFERRAL structure as the input buffer, and the FSCTL code set to FSCTL_DFS_GET_REFERRALS or FSCTL_DFS_GET_REFERRALS_EX based on the input buffer.</p> <p>Changed to:</p> <p>The client MUST query the DFS referral, as specified in [MS-CIFS] section 3.4.4.9, by passing ClientGenericContext, HostName, UserCredentials, MaxOutputSize, the REQ_GET_DFS_REFERRAL_EX or REQ_GET_DFS_REFERRAL structure as the input buffer, and the FSCTL code set to FSCTL_DFS_GET_REFERRALS, if the input buffer is an REQ_GET_DFS_REFERRAL, or FSCTL_DFS_GET_REFERRALS_EX, if the input buffer is an REQ_GET_DFS_REFERRAL_EX.</p>

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

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

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

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

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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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## [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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## [MS-ECS]: Enterprise Client Synchronization Protocol

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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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# [MS-EMFPLUS]: Enhanced Metafile Format Plus Extensions

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Errata below are for Protocol Document Version [V16.0 - 2018/09/12](#).

Errata Published*	Description						
2018/12/10	<p>In this document several sections have been modified to reference [MS-LCID], the Windows Language Code Identifier (LCID) Reference.</p> <p>In Section 1.6, Versioning and Localization, changed from:</p> <p>Localization: EMF+ structures contain the following locale-specific data:</p> <ul style="list-style-type: none"><li>• Language identifiers that correspond to natural languages in locales, including countries, geographical regions, and administrative districts. For details, see the LanguageIdentifier enumeration.</li></ul> <p>Changed to:</p> <p>Localization: EMF+ structures contain the following locale-specific data:</p> <ul style="list-style-type: none"><li>• Language identifiers that correspond to natural languages in locales, including countries, geographical regions, and administrative districts. For details, see [MS-LCID] section 2.1.</li></ul> <p>In Section 2.1.1, Enumeration Constant Types, changed from:</p> <table border="1"><thead><tr><th>Name</th><th>Section</th><th>Description</th></tr></thead><tbody><tr><td>LineCapTypeLanguageIdentifier</td><td>2.1.1.17</td><td>Defines identifiers for natural languages in locales, including countries, geographical regions, and administrative districts. Defines types of line caps to use at the ends of lines that are drawn with graphics pens.</td></tr></tbody></table> <p>Changed to:</p>	Name	Section	Description	LineCapTypeLanguageIdentifier	2.1.1.17	Defines identifiers for natural languages in locales, including countries, geographical regions, and administrative districts. Defines types of line caps to use at the ends of lines that are drawn with graphics pens.
Name	Section	Description					
LineCapTypeLanguageIdentifier	2.1.1.17	Defines identifiers for natural languages in locales, including countries, geographical regions, and administrative districts. Defines types of line caps to use at the ends of lines that are drawn with graphics pens.					

Errata Published*	Description									
	<table border="1" data-bbox="500 233 1398 413"> <thead> <tr> <th data-bbox="505 239 800 285">Name</th> <th data-bbox="803 239 1099 285">Section</th> <th data-bbox="1102 239 1393 285">Description</th> </tr> </thead> <tbody> <tr> <td data-bbox="505 289 800 407">LineCapType</td> <td data-bbox="803 289 1099 407">2.1.1.17</td> <td data-bbox="1102 289 1393 407">Defines types of line caps to use at the ends of lines that are drawn with graphics pens.</td> </tr> </tbody> </table> <p data-bbox="483 491 1279 541">In Section 2.1.1.17, LanguageIdentifier Enumeration, the section title and introduction have been changed.</p> <p data-bbox="483 583 1338 701">Changed from: 2.1.1.17 LanguageIdentifier Enumeration The LanguageIdentifier enumeration defines identifiers for natural languages in locales, including countries, geographical regions, and administrative districts.</p> <p data-bbox="483 779 1377 896">Changed to: 2.1.1.17 LineCapType Enumeration The LineCapType enumeration defines types of line caps to use at the ends of lines that are drawn with graphics pens.</p> <p data-bbox="483 938 1312 1056">In Section 2.2.2.23, EmfPlusLanguageIdentifier Object, changed from: ... The encoded language identifier values are defined in the LanguageIdentifier enumeration. ...</p> <p data-bbox="483 1134 1166 1251">Changed to: ... The encoded LCID values are defined in [MS-LCID] section 2.2. ...</p> <p data-bbox="483 1299 1105 1327">Section 2.1.3.2, Language Identifiers, has been removed.</p>	Name	Section	Description	LineCapType	2.1.1.17	Defines types of line caps to use at the ends of lines that are drawn with graphics pens.			
Name	Section	Description								
LineCapType	2.1.1.17	Defines types of line caps to use at the ends of lines that are drawn with graphics pens.								
2018/11/26	<p data-bbox="483 1352 1360 1402">In Section 2.1.1, Enumeration Constant Types, the "WrapMode" enumeration has been added to the list of defined enumerations.</p> <p data-bbox="483 1444 565 1472">Added:</p> <table border="1" data-bbox="500 1512 1398 1766"> <thead> <tr> <th data-bbox="505 1518 800 1564">Name</th> <th data-bbox="803 1518 1099 1564">Section</th> <th data-bbox="1102 1518 1393 1564">Description</th> </tr> </thead> <tbody> <tr> <td data-bbox="505 1568 800 1612">...</td> <td data-bbox="803 1568 1099 1612">...</td> <td data-bbox="1102 1568 1393 1612">...</td> </tr> <tr> <td data-bbox="505 1617 800 1757">WrapMode</td> <td data-bbox="803 1617 1099 1757">2.1.1.34</td> <td data-bbox="1102 1617 1393 1757">Defines how the pattern from a texture or gradient brush is tiled across a shape or at shape boundaries.</td> </tr> </tbody> </table>	Name	Section	Description	...	...	...	WrapMode	2.1.1.34	Defines how the pattern from a texture or gradient brush is tiled across a shape or at shape boundaries.
Name	Section	Description								
...	...	...								
WrapMode	2.1.1.34	Defines how the pattern from a texture or gradient brush is tiled across a shape or at shape boundaries.								

Errata Published*	Description												
	<p>In Section 2.1.2, Bit Flag Constant Types, the "PathPointType" enumeration has been added to the list of defined flags.</p> <p>Added:</p> <table border="1" data-bbox="500 359 1398 615"> <thead> <tr> <th>Name</th> <th>Section</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>...</td> <td>...</td> <td>...</td> </tr> <tr> <td>PathPointType</td> <td>2.1.2.6</td> <td>Specifies the type properties of points on graphics paths.</td> </tr> <tr> <td>...</td> <td>...</td> <td>...</td> </tr> </tbody> </table> <p>In Section 2.3.8.1, EmfPlusSetTSClip, the name of the "Rects" field has been changed to "rects" throughout the section. For example, changed from:</p> <p>rects (variable): An array of NumRects rectangles that define clipping areas. The format of this data is determined by the C bit in the Flags field.</p> <p>The compression scheme for data in this record uses the following algorithm. Each point of each rectangle is encoded in either a single byte or 2 bytes. If the point is encoded in a single byte, the high bit (0x80) of the byte MUST be set, and the value is a signed number represented by the lower 7 bits. If the high bit is not set, then the value is encoded in 2 bytes, with the high-order byte encoded in the 7 lower bits of the first byte, and the low-order byte value encoded in the second byte.</p> <p>Each point is encoded as the difference between the point in the current rect and the point in the previous rect. The bottom point of the rect is encoded as the difference between the bottom coordinate and the top coordinate on the current rect.</p> <p>See section 2.3.8 for the specification of additional terminal server record types.</p> <p>Changed to:</p> <p>Rects (variable): An array of NumRects rectangles that define clipping areas. The format of this data is determined by the C bit in the Flags field.</p> <p>The compression scheme for data in this record uses the following algorithm. Each point of each rectangle is encoded in either a single byte or 2 bytes. If the point is encoded in a single byte, the high bit (0x80) of the byte MUST be set, and the value is a signed number represented by the lower 7 bits. If the high bit is not set, then the value is encoded in 2 bytes, with the high-order byte encoded in the 7 lower bits of the first byte, and the low-order byte value encoded in the second byte.</p> <p>Each point is encoded as the difference between the point in the current rectangle and the point in the previous rectangle. The bottom point of the rectangle is encoded as the difference between the bottom coordinate and the top coordinate on the current rectangle.</p> <p>See section 2.3.8 for the specification of additional terminal server record types.</p>	Name	Section	Description	...	...	...	PathPointType	2.1.2.6	Specifies the type properties of points on graphics paths.	...	...	...
Name	Section	Description											
...	...	...											
PathPointType	2.1.2.6	Specifies the type properties of points on graphics paths.											
...	...	...											

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## [MS-ERREF]: Windows Error Codes

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## [MS-EVEN]: EventLog Remoting Protocol

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## [MS-EVEN6]: EventLog Remoting Protocol Version 6.0

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## [MS-FASP]: Firewall and Advanced Security Protocol

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Errata Published*	Description
2019/02/19	<p>In Section 2.2.36, FW_RULE, several field names and values have been corrected.</p> <p>Changed from: ...and Direction MUST be FW_DIRECTION_IN.</p> <p>Changed to: ...and Direction MUST be FW_DIR_IN.</p> <p>Changed from: ...LocalPorts MUST be 0 if the Direction is FW_DIRECTION_OUT.</p> <p>Changed to: ...LocalPorts MUST be 0 if the Direction is FW_DIR_OUT.</p> <p>Changed from: ...or the FW_RULE_FLAGS_AUTHENTICATE_WITH_ENCRYPT flag MUST be set on the wFlags field.</p> <p>Changed to: ...or the FW_RULE_FLAGS_AUTHENTICATE_WITH_ENCRYPTION flag MUST be set on the wFlags field.</p> <p>In Section 2.2.50, FW_CS_RULE_FLAGS, several enumeration flag value names and description titles have been changed.</p> <p>Changed from: ...FW_CS_RULE_TUNNEL_BYPASS_IF_ENCRYPTED = 0x08, FW_CS_RULE_OUTBOUND_CLEAR = 0x10</p> <p>Changed to: ...FW_CS_RULE_FLAGS_TUNNEL_BYPASS_IF_ENCRYPTED = 0x08, FW_CS_RULE_FLAGS_OUTBOUND_CLEAR = 0x10</p>

Errata Published*	Description
	<p>Changed from:</p> <p>... FW_CS_RULE_TUNNEL_BYPASS_IF_ENCRYPTED: This flag MUST only be set on tunnel mode rules. If this flag is set and traffic is already arriving encrypted, it is exempted from the tunnel.</p> <p>FW_CS_RULE_OUTBOUND_CLEAR: This flag MUST only be set on tunnel mode rules. If set, when outbound traffic matches the rule, it leaves unprotected, but inbound traffic MUST arrive through the tunnel.</p> <p>Changed to:</p> <p>...FW_CS_RULE_FLAGS_TUNNEL_BYPASS_IF_ENCRYPTED: This flag MUST only be set on tunnel mode rules. If this flag is set and traffic is already arriving encrypted, it is exempted from the tunnel.</p> <p>FW_CS_RULE_FLAGS_OUTBOUND_CLEAR: This flag MUST only be set on tunnel mode rules. If set, when outbound traffic matches the rule, it leaves unprotected, but inbound traffic MUST arrive through the tunnel.</p> <p>In Section 2.2.60, FW_AUTH_SUITE_FLAGS, an enumeration flag value name and description title have been changed.</p> <p>Changed from:</p> <p>...W_AUTH_SUITE_FLAGS_ALLOW_PROXY</p> <p>Changed to:</p> <p>...FW_AUTH_SUITE_FLAGS_ALLOW_PROXY</p> <p>In Section 2.2.63, FW_AUTH_SET2_10, several flag names have been corrected.</p> <p>Changed from:</p> <p>All such contiguous suites that have a specific signing flag (either none, ECDSA256, or ECDSA384) MUST have the same value for the FW_AUTH_SUITE_FLAG_HEALTH_CERT flag. It MUST be set either in all or in none.</p> <p>Changed to:</p> <p>All such contiguous suites that have a specific signing flag (either none, ECDSA256, or ECDSA384) MUST have the same value for the FW_AUTH_SUITE_FLAGS_HEALTH_CERT flag. It MUST be set either in all or in none.</p> <p>Changed from:</p> <p>If the set has a machine certificate suite that has a wFlag that contains the flag FW_AUTH_SUITE_FLAGS_HEALTH_CERT, all machine certificate method suites in the set MUST also have this flag.</p> <p>Changed to:</p> <p>If the set has a machine certificate suite that has a wFlags field that contains the flag FW_AUTH_SUITE_FLAGS_HEALTH_CERT, all machine certificate method suites in the set MUST also have this flag.</p> <p>In Section 2.2.64, FW_AUTH_SET, several flag names have been corrected.</p> <p>Changed from:</p> <p>All such contiguous suites that have a specific signing flag (either none, ECDSA256,</p>

Errata Published*	Description
	<p>or ECDSA384) MUST have the same value for the FW_AUTH_SUITE_FLAG_HEALTH_CERT flag.</p> <p>Changed to: All such contiguous suites that have a specific signing flag (either none, ECDSA256, or ECDSA384) MUST have the same value for the FW_AUTH_SUITE_FLAGS_HEALTH_CERT flag.</p> <p>Changed from: If the set has a machine certificate suite that has a wFlag that contains the flag FW_AUTH_SUITE_FLAGS_HEALTH_CERT, all machine certificate method suites in the set MUST also have this flag.</p> <p>Changed to: If the set has a machine certificate suite that has a wFlags field that contains the flag FW_AUTH_SUITE_FLAGS_HEALTH_CERT, all machine certificate method suites in the set MUST also have this flag.</p> <p>In Section 2.2.73, FW_CRYPTTO_SET, an extra space in the name FW_CRYPTTO_HASH_SHA256 has been removed.</p> <p>Changed from: All Phase1 suites MUST NOT have a Hash field that has the FW_CRYPTTO_HASH_NONE value and MUST have either MD5 (FW_CRYPTTO_HASH_MD5) or SHA (FW_CRYPTTO_HASH_SHA1, FW_CRYPTTO_HASH_SHA256, FW_CRYPTTO_HASH_SHA384) valid values.</p> <p>Changed to: All Phase1 suites MUST NOT have a Hash field that has the FW_CRYPTTO_HASH_NONE value and MUST have either MD5 (FW_CRYPTTO_HASH_MD5) or SHA (FW_CRYPTTO_HASH_SHA1, FW_CRYPTTO_HASH_SHA256, FW_CRYPTTO_HASH_SHA384) valid values.</p> <p>In Section 2.2.90, FW_QUERY_CONDITION, changed from:</p> <p>If the matchType field is equal to FW_MATH_TYPE_EQUAL, the matchKey field MUST be either FW_MATCH_KEY_GROUP or FW_MATCH_KEY_DIRECTION.</p> <p>Changed to: If the matchType field is equal to FW_MATCH_TYPE_EQUAL, the matchKey field MUST be either FW_MATCH_KEY_GROUP or FW_MATCH_KEY_DIRECTION.</p> <p>In Section 3.1.4.12, RRPC_FWSetConfig (Opnum 11), changed from:</p> <p>The caller wants to set a LOG_MAX_FILE_SIZE that is not within the valid values [min, max]."</p> <p>Changed to: The caller wants to set a FW_PROFILE_CONFIG_LOG_MAX_FILE_SIZE that is not within the valid values [min, max].</p>

Errata Published*	Description
	<p>Changed from: The LOG_FILE_PATH configuration value contains the following invalid characters: /,*,?,",&lt;,&gt;, .</p> <p>Changed to: The FW_PROFILE_CONFIG_LOG_FILE_PATH configuration value contains the following invalid characters: /,*,?,",&lt;,&gt;, .</p> <p>In the following sections, the string name "wszSetID" has been changed to "wszSetId":</p> <ul style="list-style-type: none"> <li>3.1.4.19 RRPC_FWSetAuthenticationSet (Opnum 18)</li> <li>3.1.4.20 RRPC_FWDeleteAuthenticationSet (Opnum 19)</li> <li>3.1.4.21 RRPC_FWDeleteAllAuthenticationSets (Opnum 20)</li> <li>3.1.4.24 RRPC_FWSetCryptoSet (Opnum 23)</li> <li>3.1.4.25 RRPC_FWDeleteCryptoSet (Opnum 24)</li> <li>3.1.4.54 RRPC_FWSetAuthenticationSet2_10 (Opnum 53)</li> <li>3.1.4.57 RRPC_FWSetCryptoSet2_10 (Opnum 56)</li> <li>3.1.4.64 RRPC_FWSetAuthenticationSet2_20 (Opnum 63)</li> </ul> <p>In Section 4.3, Enumerating the Firewall Rules, a parameter has been changed.</p> <p>Changed from: [in] WORD            wFlag = 0</p> <p>Changed to: [in] WORD            wFlags = 0</p>

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## [MS-FAX]: Fax Server and Client Remote Protocol

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## [MS-FRS2]: Distributed File System Replication Protocol

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Errata Published*	Description
2019/02/19	<p>In Section 1.2.1, Normative References, the following reference has been added:</p> <p>[MS-XCA] Microsoft Corporation, "Xpress Compression Algorithm".</p> <p>In Section 2.2.1.4.15, XPRESS Block, the Block Data field has been changed from:</p> <p>If the value of the Block Compressed Size field is less than the value of the Block Uncompressed Size field, then the data has been compressed. For more information about decompressing compressed data, see section 3.1.1.1.3.9.</p> <p>Changed to:</p> <p>If the value of the Block Compressed Size field is less than the value of the Block Uncompressed Size field, then the data has been compressed. For more information about decompressing compressed data, see section 3.1.1.2.</p> <p>In Section 3.1.1.1, Compression, the following was changed from:</p> <p>Many of the FrsTransport methods use compression to reduce the amount of data that is returned to the client. This section describes algorithms and a conceptual model of possible data organization that an implementation maintains in order to decompress compressed data. The described organization is provided to facilitate the explanation of how the algorithm behaves. Error checking and handling has been omitted from all algorithms in the interests of clarity. This document does not mandate that implementations adhere to this model as long as their external behavior is consistent with what is described in this document.</p> <p>Changed to:</p> <p>Many of the FrsTransport methods use the LZ77+Huffman Compression algorithm, specified in [MS-XCA] section 2.1, to compress data. This document does not mandate that implementations adhere to this model as long as their external behavior is consistent with what is described in this document.</p>

Errata Published*	Description
	<p>The following sections have been removed and replaced with links to MS-XCA:</p> <ul style="list-style-type: none"> <li>3.1.1.1.1 Pseudocode Conventions</li> <li>3.1.1.1.2 Data Structures <ul style="list-style-type: none"> <li>3.1.1.1.2.1 PREFIX_CODE_NODE</li> <li>3.1.1.1.2.2 PREFIX_CODE_SYMBOL</li> <li>3.1.1.1.2.3 BITSTRING</li> </ul> </li> <li>3.1.1.1.3 Procedures <ul style="list-style-type: none"> <li>3.1.1.1.3.1 PrefixCodeTreeRebuild</li> <li>3.1.1.1.3.2 PrefixCodeTreeAddLeaf</li> <li>3.1.1.1.3.3 SortSymbols</li> <li>3.1.1.1.3.4 CompareSymbols</li> <li>3.1.1.1.3.5 BitstringInit</li> <li>3.1.1.1.3.6 BitstringLookup</li> <li>3.1.1.1.3.7 BitstreamSkip</li> <li>3.1.1.1.3.8 PrefixCodeTreeDecodeSymbol</li> </ul> </li> </ul> <p>A new section, 3.1.1.2, Decompression, has been added:</p> <p>FrSTransport methods that compress data will always return information specifying the size of the original data. It is the caller's responsibility to determine whether the returned data is compressed. If the size of the compressed data buffer that is returned by the server in bytes is equal to the size in bytes of the original uncompressed data, then the buffer returned by the server contains uncompressed data.</p> <p>In Section 3.2.4.1.7, RequestRecords (Opnum 6), the description of the compressedRecords field has been changed from:</p> <p>compressedRecords: The data records, compressed using the DFS-R compression algorithm specified in section 3.1.1.1.</p> <p>The compressedRecords bytes correspond to an array of FRS_ID_GVSN entries. DFS-R uses custom marshaling in this RPC call to compress the set of transmitted records. The size of the FRS_ID_GVSN array is given by the numRecords parameter. The decompression algorithm specified in section 3.1.1.1.3.9 can be used to decompress the received data into a buffer of sizeof(FRS_ID_GVSN)*numRecords bytes, which can be re-interpreted as an array of FRS_ID_GVSN entries.</p> <p>Changed to:</p> <p>compressedRecords: The data records, compressed using the algorithm specified in section 3.1.1.1.</p> <p>The compressedRecords bytes correspond to an array of FRS_ID_GVSN entries. DFS-R uses custom marshaling in this RPC call to compress the set of transmitted records. The size of the FRS_ID_GVSN array is given by the numRecords parameter. The decompression algorithm specified in section 3.1.1.1 can be used to decompress the received data into a buffer of sizeof(FRS_ID_GVSN)*numRecords bytes, which can be re-interpreted as an array of FRS_ID_GVSN entries.</p> <p>In Section 3.2.4.1.14, InitializeFileTransferAsync (Opnum 13), changed from:</p> <ol style="list-style-type: none"> <li>2. An encapsulation of the marshaled file data stream using the compressed data</li> </ol>

Errata Published*	Description
	<p>format (as specified in section 3.2.4.1.14.2) generated by the DFS-R compression algorithm specified in section 3.1.1.1. Even if the marshaled file data stream is not compressed by the server, it is still encapsulated using the compressed data format.</p> <p>Changed to:</p> <p>2. An encapsulation of the marshaled file data stream using the compressed data format (as specified in section 3.2.4.1.14.2) generated by the compression algorithm specified in section 3.1.1.1. Even if the marshaled file data stream is not compressed by the server, it is still encapsulated using the compressed data format.</p>

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## [MS-FSA]: File System Algorithms

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Errata below are for Protocol Document Version [V28.0 - 2018/09/12](#).

Errata Published*	Description
2018/11/12	<p>The following new section has been added:</p> <p>Section 2.1.5.11.31 FileIdInformation OutputBuffer is of type FILE_ID_INFORMATION as specified in [MS-FSCC] section 2.4.43.</p> <p>Pseudocode for the operation is as follows:</p> <ul style="list-style-type: none"><li>• If OutputBufferSize is smaller than sizeof(FILE_ID_INFORMATION), the operation MUST be failed with STATUS_INFO_LENGTH_MISMATCH.</li><li>• OutputBuffer MUST be constructed as follows:</li><li>• OutputBuffer.VolumeSerialNumber set to Open.File.Volume.VolumeSerialNumber.</li><li>• OutBuffer.FileId set to Open.File.FileId128.</li><li>• Upon successful completion of the operation, the object store MUST return:</li><li>• ByteCount set to sizeof(FILE_ID_INFORMATION)</li><li>• Status set to STATUS_SUCCESS.</li></ul>

\*Date format: YYYY/MM/DD

## [MS-FSCC]: File System Control Codes

This topic lists the Errata found in the MS-FSCC document 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 [V45.0 – 2018/09/12](#).

Errata Published*	Description
2018/12/10	<p>In Section 2.1.5, Pathname, the following has been removed:</p> <ul style="list-style-type: none"><li>Each pathname component MUST be no more than 255 characters in length.</li></ul> <p>In Section 2.1.5.2, Filename, the following has been added:</p> <ul style="list-style-type: none"><li>A filename MUST be at least one character but no more than 255 characters in length.</li></ul> <p>In Section 2.1.5.3, Streamname, the following has been added:</p> <ul style="list-style-type: none"><li>A streamname MUST be no more than 255 characters in length.</li></ul>
2018/12/10	<p>In Section 2.3.9.2, SMB2_DUPLICATE_EXTENTS_DATA_EX, a new field called Reserved has been added to the packet diagram and the field descriptions.</p> <p>Added:</p> <p>Reserved (4 bytes): This field SHOULD be set to zero and MUST be ignored.</p>
2018/11/12	<p>In the sections listed below, the description of the EaSize field has been changed.</p> <p>Section 2.4.8, FileBothDirectoryInformation Section 2.4.14, FileFullDirectoryInformation Section 2.4.17, FileIdBothDirectoryInformation Section 2.4.18, FileIdFullDirectoryInformation</p>

Errata Published*	Description																																																																																																																																																																																																																							
	<p>Changed from:</p> <p>EaSize (4 bytes): A 32 -bit unsigned integer that contains the combined length, in bytes, of the extended attributes (EA) for the file.</p> <p>Changed to:</p> <p>EaSize (4 bytes): If FILE_ATTRIBUTE_REPARSE_POINT is set in the FileAttributes field, this field MUST contain a reparse tag as specified in section 2.1.2.1. Otherwise, this field is a 32 -bit unsigned integer that contains the combined length, in bytes, of the extended attributes (EA) for the file.,</p>																																																																																																																																																																																																																							
2018/11/12	<p>In Section 2.4, File Information Classes, the following has been added:</p> <table border="1" data-bbox="477 655 1390 858"> <thead> <tr> <th>File information class</th> <th>Level</th> <th>Uses</th> </tr> </thead> <tbody> <tr> <td>...</td> <td>...</td> <td>...</td> </tr> <tr> <td>FileIdInformation</td> <td>59</td> <td>Query&lt;78&gt;</td> </tr> <tr> <td>...</td> <td>...</td> <td>...</td> </tr> </tbody> </table> <p>&lt;78&gt; Section 2.4: The FileIdInformation information class is supported in the NTFS and ReFS file systems in Windows 8 and subsequent and Windows Server 2012 and subsequent.</p> <p>The following new section has been added:</p> <p>Section 2.4.43 FileIdInformation</p> <p>This information class is used to query the volume serial number and fileid information for a file.</p> <p>A FILE_ID_INFORMATION data element, defined as follows, is provided by the server.</p> <table border="1" data-bbox="467 1220 1421 1617"> <tr> <td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td> <td>1</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td> <td>2</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td> <td>3</td><td>0</td><td>1</td> </tr> <tr> <td colspan="28" style="text-align: center;">VolumeSerialNumber</td> </tr> <tr> <td colspan="28" style="text-align: center;">...</td> </tr> <tr> <td colspan="28" style="text-align: center;">FileId</td> </tr> <tr> <td colspan="28" style="text-align: center;">...</td> </tr> <tr> <td colspan="28" style="text-align: center;">...</td> </tr> <tr> <td colspan="28" style="text-align: center;">...</td> </tr> </table> <p>VolumeSerialNumber (8 bytes): A 64-bit unsigned integer that contains the serial number of the volume where the file is located.</p> <p>FileId (16 bytes): An opaque 128-bit signed integer that is an identifier of the file. For file systems that support file identifiers that are less than 128 bits, the unsupported portions of this value MUST be set to zero.&lt;121&gt;</p> <p>This operation returns a status code as specified in section 2.2. Upon success, the status</p>	File information class	Level	Uses	...	...	...	FileIdInformation	59	Query<78>	...	...	...	0	1	2	3	4	5	6	7	8	9	1	0	1	2	3	4	5	6	7	8	9	2	0	1	2	3	4	5	6	7	8	9	3	0	1	VolumeSerialNumber																												...																												FileId																												...																												...																												...																											
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Errata Published*	Description				
	<p>code returned by the function that processes this file information class is STATUS_SUCCESS. The most common error codes are listed in the following table.</p> <table border="1" data-bbox="479 260 1429 428"> <thead> <tr> <th data-bbox="479 260 959 306">Error Code</th> <th data-bbox="959 260 1429 306">Meaning</th> </tr> </thead> <tbody> <tr> <td data-bbox="479 306 959 428">STATUS_INFO_LENGTH_MISMATCH 0xC0000004</td> <td data-bbox="959 306 1429 428">The specified information record length does not match the length that is required for the specified information class.</td> </tr> </tbody> </table>	Error Code	Meaning	STATUS_INFO_LENGTH_MISMATCH 0xC0000004	The specified information record length does not match the length that is required for the specified information class.
Error Code	Meaning				
STATUS_INFO_LENGTH_MISMATCH 0xC0000004	The specified information record length does not match the length that is required for the specified information class.				

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## [MS-FSRVP]: File Server Remote VSS Protocol

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

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

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Errata below are for Protocol Document Version [V5.0 - 2018/09/12](#).

Errata Published*	Description
2019/02/19	<p>The following new sections have been added to the document:</p> <p>3.1.5.5 Receiving SigningCertificates</p> <p>3.1.5.5.1 GET</p> <p>The operation can be invoked through the following URI and transported by HTTP GET.</p> <p>http://&lt;configuredServiceName&gt;.&lt;configuredDomain&gt;/Attestation/VersionMajorMinor/signingCertificates</p> <p>VersionMajorMinor: Represents the major and minor version numbers separated by a decimal—for example, v2.0. This method is available starting with v2.0.</p> <p>The following is an example of a complete URI for this operation.</p> <p>http://attest.hgs151209.com/Attestation/v2.0/signingCertificates</p> <p>3.1.5.5.1.1 Request Body</p> <p>There is no request body.</p> <p>3.1.5.5.1.2 Response Body</p> <p>The response body for this method contains the following:</p> <p>SigningCertificates: A byte array in the format of a PKCS7-encoded object representing the public signing certificate(s) used by the service to issue health certificates.</p> <p>3.1.5.5.1.3 Processing Details</p> <p>The server MUST return the PKCS7-encoded object representing the public signing certificate(s) used by the service to issue health certificates.</p> <p>...</p> <p>3.2.4.3 Application Requests SigningCertificates</p> <p>The client requests SigningCertificates to get the certificates in the PKCS7-encoded object format representing the public signing certificate(s).</p>

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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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## [MS-IPHTTPS]: IP over HTTPS (IP-HTTPS) Tunneling Protocol

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

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## [MS-KILE]: Kerberos Protocol Extensions

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## [MS-KPP]: Key Provisioning Protocol

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## [MS-KPS]: Key Protection Service Protocol

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## [MS-LCID]: Windows Language Code Identifier (LCID) Reference

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Errata below are for Protocol Document Version [V12.0 - 2018/09/12](#).

Errata Published*	Description																				
2018/12/10	<p>In Section 2.2, LCID Structure, language tag values have been changed from:</p> <table border="1"><thead><tr><th>Language ID</th><th>Language tag</th></tr></thead><tbody><tr><td>...</td><td>...</td></tr><tr><td>0x001A</td><td>bs, hr, or sr</td></tr><tr><td>...</td><td>...</td></tr><tr><td>0x002E</td><td>dsb or hsb</td></tr></tbody></table> <p>Changed to:</p> <table border="1"><thead><tr><th>Language ID</th><th>Language tag</th></tr></thead><tbody><tr><td>...</td><td>...</td></tr><tr><td>0x001A</td><td>hr</td></tr><tr><td>...</td><td>...</td></tr><tr><td>0x002E</td><td>hsb</td></tr></tbody></table> <p>In Section 2.2, LCID Structure, behavior note &lt;8&gt; has been changed from:</p> <p>Language ID (2 bytes): The language component of the LCID.&lt;8&gt; &lt;8&gt; Section 2.2: The following table shows Language IDs and the versions of Windows in which they were first made available. Language IDs are not assigned for all Language tags, please see section 1.3 for further details.</p> <p>...</p>	Language ID	Language tag	...	...	0x001A	bs, hr, or sr	...	...	0x002E	dsb or hsb	Language ID	Language tag	...	...	0x001A	hr	...	...	0x002E	hsb
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...	...	...	...	...																										
Upper Sorbian		0x002E	hsb	Release 7																										

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

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

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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-MICE]: Miracast over infrastructure Connection Establishment Protocol

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## [MS-MSSOD]: Media Streaming Server Protocols Overview

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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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# [MS-NCNBI]: Network Controller Northbound Interface Specification

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Errata below are for Protocol Document Version V6.0 – 2018/09/12.

Errata Published*	Description														
2018/12/17	<p>In several sections throughout this document, missing element Type designations have been added to existing element or header tables. For example, in Section 2.2.1.2, Request Headers, the text in <b>bold</b> has been added to the existing table as shown below.</p> <table border="1"> <thead> <tr> <th>Header</th> <th>Section</th> <th>Type</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Content-Type</td> <td>2.2.1.1</td> <td><b>Required or Optional Required for PUT, must be "application/json; charset=UTF-8". Optional for GET or Delete</b></td> <td>The content type of the payload.</td> </tr> </tbody> </table> <p>In the following sections, the added Type designations are shown in <b>bold</b>.</p> <p>2.2.2, Common JSON Elements</p> <table border="1"> <tbody> <tr> <td>resourceId</td> <td><b>Optional or Required When optional for ancestor resource, then required for descendant resource. See section 2.2.3.</b></td> </tr> <tr> <td>resourceRef</td> <td><b>Read-only Optional or Required See section 1.3.3.2.</b></td> </tr> <tr> <td>properties.etag</td> <td><b>Read-only</b></td> </tr> </tbody> </table>	Header	Section	Type	Description	Content-Type	2.2.1.1	<b>Required or Optional Required for PUT, must be "application/json; charset=UTF-8". Optional for GET or Delete</b>	The content type of the payload.	resourceId	<b>Optional or Required When optional for ancestor resource, then required for descendant resource. See section 2.2.3.</b>	resourceRef	<b>Read-only Optional or Required See section 1.3.3.2.</b>	properties.etag	<b>Read-only</b>
Header	Section	Type	Description												
Content-Type	2.2.1.1	<b>Required or Optional Required for PUT, must be "application/json; charset=UTF-8". Optional for GET or Delete</b>	The content type of the payload.												
resourceId	<b>Optional or Required When optional for ancestor resource, then required for descendant resource. See section 2.2.3.</b>														
resourceRef	<b>Read-only Optional or Required See section 1.3.3.2.</b>														
properties.etag	<b>Read-only</b>														

Errata Published*	Description	
	properties.provisioningState	<b>Read-only</b>
	3.1.5.1 accessControlLists	
	configurationState.id	<b>Optional Read-only</b>
	virtualNetworkInterfaceErrors	<b>Optional Read-only</b>
	3.1.5.5.3 frontendIPConfigurations	
	configurationState.vipEndpointStates	<b>Read-only</b>
	configurationState.vipEndpointStates.vipEndpoint	<b>Read-only</b>
	configurationState.vipEndpointStates.dipEndpointStates	<b>Read-only</b>
	configurationState.vipEndpointStates.dipEndpointStates.dipEndpoint	<b>Read-only</b>
	configurationState.vipEndpointStates.dipEndpointStates.hostIPAddress	<b>Read-only</b>
	configurationState.vipEndpointStates.dipEndpointStates.hostId	<b>Read-only</b>
	configurationState.vipEndpointStates.dipEndpointStates.AdapterId	<b>Read-only</b>
	configurationState.vipEndpointStates.dipEndpointStates.ProbeRule	<b>Read-only</b>
	3.1.5.11 networkInterfaces	
	dnsSettings	<b>Optional</b>
	dnsSettings.dnsServers	<b>Optional</b>
	ipConfigurations	<b>Read-only</b>
	isHostVirtualNetworkInterface	<b>Optional FALSE is default. Cannot be changed after creation.</b>
	internalDnsNameLabel	<b>Optional</b>
	isPrimary	<b>Optional TRUE is default.</b>
	isMultitenantStack	<b>Optional</b>
	privateMacAddress	<b>Optional</b>
	privateMacAllocationMethod	<b>Required</b>
	serviceInsertionElements	<b>Optional Read-only</b>

Errata Published*	Description																										
	<p data-bbox="456 218 748 243">3.1.5.14 publicIPAddresses</p> <table border="1" data-bbox="456 285 1398 338"> <tr> <td data-bbox="456 285 943 338">dnsSettings</td> <td data-bbox="943 285 1398 338"><b>Optional</b></td> </tr> </table> <p data-bbox="456 405 634 430">3.1.5.15 servers</p> <table border="1" data-bbox="456 472 1398 808"> <tr> <td data-bbox="456 472 943 525">connections</td> <td data-bbox="943 472 1398 525"><b>Required</b></td> </tr> <tr> <td data-bbox="456 525 943 577">connections.credential</td> <td data-bbox="943 525 1398 577"><b>Required</b></td> </tr> <tr> <td data-bbox="456 577 943 630">connections.credentialType</td> <td data-bbox="943 577 1398 630"><b>Required</b></td> </tr> <tr> <td data-bbox="456 630 943 682">connections.managementAddresses</td> <td data-bbox="943 630 1398 682"><b>Required</b></td> </tr> <tr> <td data-bbox="456 682 943 808">certificate</td> <td data-bbox="943 682 1398 808"><b>Optional or Required Required only if the certificate used by the server is self-signed.</b></td> </tr> </table> <p data-bbox="456 875 725 900">3.1.5.18 virtualNetworks</p> <table border="1" data-bbox="456 942 1398 1047"> <tr> <td data-bbox="456 942 943 995">configurationState.id</td> <td data-bbox="943 942 1398 995"><b>Optional Read-only</b></td> </tr> <tr> <td data-bbox="456 995 943 1047">configurationState.hostErrors</td> <td data-bbox="943 995 1398 1047"><b>Optional Read-only</b></td> </tr> </table> <p data-bbox="456 1115 824 1140">3.1.5.18.3 virtualNetworkPeerings</p> <table border="1" data-bbox="456 1182 1398 1234"> <tr> <td data-bbox="456 1182 943 1234">remoteVirtualNetwork</td> <td data-bbox="943 1182 1398 1234"><b>Required</b></td> </tr> </table> <p data-bbox="456 1302 704 1327">3.1.5.21 virtualServers</p> <table border="1" data-bbox="456 1369 1398 1526"> <tr> <td data-bbox="456 1369 943 1421">connections.credential</td> <td data-bbox="943 1369 1398 1421"><b>Optional</b></td> </tr> <tr> <td data-bbox="456 1421 943 1474">connections.credentialType</td> <td data-bbox="943 1421 1398 1474"><b>Optional</b></td> </tr> <tr> <td data-bbox="456 1474 943 1526">connections.managementAddresses</td> <td data-bbox="943 1474 1398 1526"><b>Optional</b></td> </tr> </table> <p data-bbox="456 1593 834 1619">In Section 3.1.5.26, changed from:</p> <table border="1" data-bbox="456 1661 1398 1713"> <tr> <td data-bbox="456 1661 943 1713">HTTP method</td> <td data-bbox="943 1661 1398 1713">Description</td> </tr> </table>	dnsSettings	<b>Optional</b>	connections	<b>Required</b>	connections.credential	<b>Required</b>	connections.credentialType	<b>Required</b>	connections.managementAddresses	<b>Required</b>	certificate	<b>Optional or Required Required only if the certificate used by the server is self-signed.</b>	configurationState.id	<b>Optional Read-only</b>	configurationState.hostErrors	<b>Optional Read-only</b>	remoteVirtualNetwork	<b>Required</b>	connections.credential	<b>Optional</b>	connections.credentialType	<b>Optional</b>	connections.managementAddresses	<b>Optional</b>	HTTP method	Description
dnsSettings	<b>Optional</b>																										
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connections.credential	<b>Optional</b>																										
connections.credentialType	<b>Optional</b>																										
connections.managementAddresses	<b>Optional</b>																										
HTTP method	Description																										

Errata Published*	Description	
	PUT	Create a new virtualNetworkManager resource or update an existing VirtualGateways resource.
	GET	Get one virtualNetworkManager resource
	Changed to:	
	HTTP method	Description
	PUT	Update the virtualNetworkManager singleton resource.
	GET	Get the virtualNetworkManager resource.

\* Date format: YYYY/MM/DD

## [MS-NCT]: Network Cost Transfer Protocol

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

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## [MS-NFPS]: Near Field Proximity Sharing Protocol

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## [MS-NKPU]: Network Key Protector Unlock Protocol

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

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Errata below are for Protocol Document Version V30.0 – 2018/09/12.

Errata Published*	Description
2018/12/17	<p>In Sections 4.2.2, NTLM v1 Authentication, 4.2.3, NTLM v1 with Client Challenge, and 4.2.4, NTLMv2 Authentication, the name of a flag has been changed from:</p> <p>NTLM NTLMSSP_NEGOTIATE_NTLM</p> <p>Changed to:</p> <p>NTLMSSP_NEGOTIATE_NTLM</p>

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## [MS-NMFMB]: .NET Message Framing MSMQ Binding Protocol

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## [MS-NNS]: .NET NegotiateStream Protocol

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Errata below are for Protocol Document Version [V7.0 – 2017/12/01](#).

Errata Published*	Description
2019/02/19	<p>In Section 2.2.2, Data Message, the maximum size of the PayloadSize field has been changed from '0x0000FC00' to '0x0000FC30', to accommodate for both the application data size and the size increase that occurs when this protocol signs or encrypts the data to be transferred.</p> <p>Changed from:</p> <p>PayloadSize (4 bytes): The unsigned size, in bytes, of the Payload field. The maximum value for this field is 0x0000FC00 (that is, 63K, or 64,512).</p> <p>Changed to:</p> <p>PayloadSize (4 bytes): The unsigned size, in bytes, of the Payload field. The maximum value for this field is 0x0000FC30 (64,560).</p>

\*Date format: YYYY/MM/DD



Errata Published*	Description																																																																																																																																																																																																																																																																																																																																																																
	<table border="1" data-bbox="380 233 1414 905"> <tr> <td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td> <td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td> <td>20</td><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td> <td>30</td><td>31</td> </tr> <tr> <td colspan="16">SignatureAlgorithm</td> <td colspan="16">SealAlgorithm</td> </tr> <tr> <td colspan="16">Pad</td> <td colspan="16">Flags</td> </tr> <tr> <td colspan="32">SequenceNumber</td> </tr> <tr> <td colspan="32">...</td> </tr> <tr> <td colspan="32">Checksum (8 bytes)</td> </tr> <tr> <td colspan="32">...</td> </tr> <tr> <td colspan="32">Confounder</td> </tr> <tr> <td colspan="32">...</td> </tr> <tr> <td colspan="32">Reserved (24 bytes)</td> </tr> <tr> <td colspan="32">...</td> </tr> </table> <p data-bbox="365 940 1430 1129"> ...  Confounder (8 bytes): A buffer that is employed when the structure is used for encryption, in addition to signing. The bytes are filled with random data that is used by the encryption algorithm. If the structure is used only for signing, the Confounder is not included. For details about the Confounder and encrypting the data, see section 3.3.4.2.1.  Reserved (24 bytes): The sender SHOULD&lt;19&gt; set these bytes to zero, and the receiver MUST ignore them. </p> <p data-bbox="365 1171 1430 1247"> In Section 3.3.4.2.1, Generating a Client Netlogon Signature Token, step 7 has been updated to specify that after the signature is computed, only the first 8 bytes are copied into the Checksum field of either NL_AUTH_SHA2_SIGNATURE (if AES is negotiated) or NL_AUTH_SIGNATURE. </p> <p data-bbox="365 1289 1430 1570"> Changed from:  ...  7. If AES is negotiated, then a signature MUST be computed using the following algorithm:  CALL SHA256Reset(&amp;HashContext, Sk, sizeof(Sk));  ...  Note: In the second call to MD5Update, only the first 8-bytes of the NL_AUTH_SIGNATURE structure are used.  After the signature is computed, the signature MUST be truncated, with only the first 8 bytes being copied into the Checksum field of NL_AUTH_SIGNATURE. </p> <p data-bbox="365 1612 1430 1795"> Changed to:  ...  7. If AES is negotiated, then a signature MUST be computed using the following algorithm:  CALL SHA256Reset(&amp;HashContext, Sk, sizeof(Sk));  ...  Note: In the second call to MD5Update, only the first 8-bytes of the </p>	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	SignatureAlgorithm																SealAlgorithm																Pad																Flags																SequenceNumber																																...																																Checksum (8 bytes)																																...																																Confounder																																...																																Reserved (24 bytes)																																...																															
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<b>Errata Published*</b>	<b>Description</b>
	NL_AUTH_SIGNATURE structure are used. After the signature is computed, the signature MUST be truncated, with only the first 8 bytes being copied into the Checksum field of NL_AUTH_SHA2_SIGNATURE (section 2.2.1.3.3) if AES is negotiated, otherwise, into the Checksum field of NL_AUTH_SIGNATURE (section 2.2.1.3.2).

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

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## [MS-OAPX]: OAuth 2.0 Protocol Extensions

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

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## [MS-OIDCE]: OpenID Connect 1.0 Protocol Extensions

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## [MS-OLEDS]: Object Linking and Embedding (OLE) Data Structures

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

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# [MS-PAR]: Print System Asynchronous Remote Protocol

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Errata below are for Protocol Document Version [V15.0 – 2018/09/12](#).

Errata Published*	Description
2018/12/10	<p>In Section 3.1.4.2.7, RpcAsyncInstallPrinterDriverFromPackage (Opnum 62), changed from:</p> <p>The print server SHOULD&lt;10&gt; perform the following additional validation steps:</p> <p>...</p> <ul style="list-style-type: none"><li>• Validate that, if the printer driver specified by the client is a derived printer driver, either the class printer driver on which the derived printer driver depends is already installed on the print server, or a driver package containing the class printer driver is installed in the print server's driver store, or the print server can locate a driver package containing the class printer driver through some other implementation-specific mechanism;&lt;11&gt; otherwise, the server returns ERROR_UNKNOWN_PRINTER_DRIVER.</li></ul> <p>Changed to:</p> <p>The print server SHOULD&lt;10&gt; perform the following additional validation steps:</p> <p>...</p> <ul style="list-style-type: none"><li>• Validate that, if the printer driver specified by the client is a derived printer driver, either the class printer driver on which the derived printer driver depends is already installed on the print server, or a driver package containing the class printer driver is installed in the print server's driver store, or the print server can locate a driver package containing the class printer driver through some other implementation-specific mechanism;&lt;11&gt; otherwise, the server returns ERROR_UNKNOWN_PRINTER_DRIVER. This HRESULT error code is constructed by using the HRESULT From WIN32 Error Code Macro ([MS-ERREF] section 2.1.2) on the 16-bit Win32 value for this error ([MS-ERREF] section 2.2).</li></ul>

\*Date format: YYYY/MM/DD

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

This topic lists the Errata found in [MS-PEAP] 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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## [MS-PKAP]: Public Key Authentication Protocol

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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-RDPADRV]: Remote Desktop Protocol Audio Level and Drive Letter Persistence Virtual Channel Extension

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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 [V49.0 - 2018/09/12](#).

Errata Published*	Description
2019/02/19	<p>In Section 4.1.4, Server MCS Connect Response PDU with GCC Conference Create Response, the TS_UD_SC_SEC1::encryptionMethod value has been updated from 128BIT_ENCRYPTION_FLAG to ENCRYPTION_METHOD_128BIT.</p> <p>Changed from:</p> <p>...</p> <p>02 00 00 00 -&gt; TS_UD_SC_SEC1::encryptionMethod = 128BIT_ENCRYPTION_FLAG 02 00 00 00 -&gt; TS_UD_SC_SEC1::encryptionLevel = TS_ENCRYPTION_LEVEL_CLIENT_COMPATIBLE 20 00 00 00 -&gt; TS_UD_SC_SEC1::serverRandomLen = 32 bytes b8 00 00 00 -&gt; TS_UD_SC_SEC1::serverCertLen = 184 bytes ...</p> <p>Changed to:</p> <p>...</p> <p>02 00 00 00 -&gt; TS_UD_SC_SEC1::encryptionMethod = ENCRYPTION_METHOD_128BIT 02 00 00 00 -&gt; TS_UD_SC_SEC1::encryptionLevel = ENCRYPTION_LEVEL_CLIENT_COMPATIBLE 20 00 00 00 -&gt; TS_UD_SC_SEC1::serverRandomLen = 32 bytes b8 00 00 00 -&gt; TS_UD_SC_SEC1::serverCertLen = 184 bytes ...</p>

Errata Published*	Description
2019/02/19	<p>In Section 4.1.4, Server MCS Connect Response PDU with GCC Conference Create Response, the variable TS_ENCRYPTION_LEVEL_CLIENT_COMPATIBLE has been updated to ENCRYPTION_LEVEL_CLIENT_COMPATIBLE.</p> <p>Changed from:</p> <p>...</p> <p>02 00 00 00 -&gt; TS_UD_SC_SEC1::encryptionMethod = 128BIT_ENCRYPTION_FLAG  02 00 00 00 -&gt; TS_UD_SC_SEC1::encryptionLevel = TS_ENCRYPTION_LEVEL_CLIENT_COMPATIBLE  20 00 00 00 -&gt; TS_UD_SC_SEC1::serverRandomLen = 32 bytes  b8 00 00 00 -&gt; TS_UD_SC_SEC1::serverCertLen = 184 bytes  ...</p> <p>Changed to:</p> <p>...</p> <p>02 00 00 00 -&gt; TS_UD_SC_SEC1::encryptionMethod = ENCRYPTION_METHOD_128BIT  02 00 00 00 -&gt; TS_UD_SC_SEC1::encryptionLevel = ENCRYPTION_LEVEL_CLIENT_COMPATIBLE  20 00 00 00 -&gt; TS_UD_SC_SEC1::serverRandomLen = 32 bytes  b8 00 00 00 -&gt; TS_UD_SC_SEC1::serverCertLen = 184 bytes  ...</p> <p>In Section 4.1.13, Client Confirm Active PDU, updated variables TS_OSMAJORTYPE_WINDOWS to OSMAJORTYPE_WINDOWS and TS_OSMINORTYPE_WINDOWS_NT to OSMINORTYPE_WINDOWS_NT.</p> <p>Changed from:</p> <p>...</p> <p>01 00 -&gt; TS_GENERAL_CAPABILITYSET::osMajorType = TS_OSMAJORTYPE_WINDOWS (1)  03 00 -&gt; TS_GENERAL_CAPABILITYSET::osMinorType = TS_OSMINORTYPE_WINDOWS_NT (3)  ...</p> <p>Changed to:</p> <p>...</p> <p>01 00 -&gt; TS_GENERAL_CAPABILITYSET::osMajorType = OSMAJORTYPE_WINDOWS (1)  03 00 -&gt; TS_GENERAL_CAPABILITYSET::osMinorType = OSMINORTYPE_WINDOWS_NT (3)  ...</p>
2019/02/19	<p>In Section 3.3.5.3.3, Processing MCS Connect Initial PDU with GCC Conference Create Request, the color depth values in the colorDepth, postBeta2ColorDepth, and highColorDepth client core data field table descriptions have been clarified by referencing the TS_UD_CS_CORE data block section.</p> <p>Changed from:</p> <p>...</p> <p>Client core data field    Validation rule</p>

Errata Published*	Description										
	<p>...</p> <p>colorDepth If this field does not contain a valid color-depth and the postBeta2ColorDepth field is not present, the server MUST close the connection as specified in section 3.3.5.3.3.1.</p> <p>postBeta2ColorDepth If this field does not contain a valid color-depth and the highColorDepth field is not present, the server MUST close the connection as specified in section 3.3.5.3.3.1.</p> <p>highColorDepth If this field does not contain a valid color-depth, a value of 8 bits per pixel is implicitly assumed.</p> <p>...</p> <p>Changed to:</p> <p>...</p> <p>Client core data field Validation rule</p> <p>...</p> <p>colorDepth If this field does not contain a valid color depth (valid values are specified in section 2.2.1.3.2) and the postBeta2ColorDepth field is not present, the server MUST close the connection as specified in section 3.3.5.3.3.1.</p> <p>postBeta2ColorDepth If this field does not contain a valid color depth (valid values are specified in section 2.2.1.3.2) and the highColorDepth field is not present, the server MUST close the connection as specified in section 3.3.5.3.3.1.</p> <p>highColorDepth If this field does not contain a valid color depth (valid values are specified in section 2.2.1.3.2), a value of 8 bits per pixel is assumed.</p>										
2019/02/19	<p>In Section 2.2.6.1.1, Channel PDU Header (CHANNEL_PDU_HEADER), a flag, CHANNEL_FLAG_SHADOW_PERSISTENT, that it is unused in the flags field table, has been added.</p> <p>Changed from:</p> <p>...</p> <p>flags (4 bytes): A 32-bit, unsigned integer. The channel control flags.</p> <table border="1" data-bbox="500 1266 1399 1703"> <thead> <tr> <th data-bbox="500 1266 964 1318">Flag</th> <th data-bbox="967 1266 1399 1318">Meaning</th> </tr> </thead> <tbody> <tr> <td data-bbox="500 1323 964 1367">...</td> <td data-bbox="967 1323 1399 1367">...</td> </tr> <tr> <td data-bbox="500 1371 964 1524">CHANNEL_FLAG_RESUME 0x00000040</td> <td data-bbox="967 1371 1399 1524">All virtual channel traffic MUST be resumed. This flag is only valid in server-to-client virtual channel traffic. It MUST be ignored in client-to-server data.</td> </tr> <tr> <td data-bbox="500 1528 964 1650">CHANNEL_PACKET_COMPRESSED 0x00200000</td> <td data-bbox="967 1528 1399 1650">The virtual channel data is compressed. This flag is equivalent to MPPC bit C (for more information see [RFC2118] section 3.1).</td> </tr> <tr> <td data-bbox="500 1654 964 1703">...</td> <td data-bbox="967 1654 1399 1703">...</td> </tr> </tbody> </table> <p>Changed to:</p> <p>...</p>	Flag	Meaning	...	...	CHANNEL_FLAG_RESUME 0x00000040	All virtual channel traffic MUST be resumed. This flag is only valid in server-to-client virtual channel traffic. It MUST be ignored in client-to-server data.	CHANNEL_PACKET_COMPRESSED 0x00200000	The virtual channel data is compressed. This flag is equivalent to MPPC bit C (for more information see [RFC2118] section 3.1).	...	...
Flag	Meaning										
...	...										
CHANNEL_FLAG_RESUME 0x00000040	All virtual channel traffic MUST be resumed. This flag is only valid in server-to-client virtual channel traffic. It MUST be ignored in client-to-server data.										
CHANNEL_PACKET_COMPRESSED 0x00200000	The virtual channel data is compressed. This flag is equivalent to MPPC bit C (for more information see [RFC2118] section 3.1).										
...	...										

Errata Published*	Description	
	flags (4 bytes): A 32-bit, unsigned integer. The channel control flags.	
	Flag	Meaning
	...	...
	CHANNEL_FLAG_RESUME 0x00000040	All virtual channel traffic MUST be resumed. This flag is only valid in server-to-client virtual channel traffic. It MUST be ignored in client-to-server data.
	CHANNEL_FLAG_SHADOW_PERSISTENT 0x00000080	This flag is unused and its value MUST be ignored by the client and server.
	CHANNEL_PACKET_COMPRESSED 0x00200000	The virtual channel data is compressed. This flag is equivalent to MPPC bit C (for more information see [RFC2118] section 3.1).
	...	...

\*Date format: YYYY/MM/DD

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

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## [MS-RDPEAR]: Remote Desktop Protocol Authentication Redirection Virtual Channel

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

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# [MS-RDPECAM]: Remote Desktop Protocol: Video Capture Virtual Channel Extension

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Errata below are for Protocol Document Version [V1.0 - 2018/09/12](#).

Errata Published*	Description				
2019/02/19	<p>In Section 4.6.2, Property List Response, an annotated dump of a Property List Response (section 2.2.3.17) has been added.</p> <p>Added: The following is an annotated dump of a Property List Response (section 2.2.3.17).</p> <pre> 00000000 02 15 01 02 03 00 00 00 00 fa 00 00 00 05 00 00 ..... 00000010 00 00 00 00 00 02 02 01 00 00 00 00 ff 00 00 00 ..... 00000020 01 00 00 00 80 00 00 00 ..... 02-&gt;SHARED_MSG_HEADER::Version = 2 15-&gt;SHARED_MSG_HEADER::MessageId = PropertyListResponse(21) 01-&gt;PropertyDescription[0]::PropertySet = CameraControl(1) 02-&gt;PropertyDescription[0]::PropertyId = Focus(2) 03-&gt;PropertyDescription[0]::Capabilities = Manual and Auto(1 + 2) 00 00 00 00-&gt;PropertyDescription[0]::MinValue = 0 fa 00 00 00-&gt;PropertyDescription[0]::MaxValue = 250 05 00 00 00-&gt;PropertyDescription[0]::Step = 5 00 00 00 00-&gt;PropertyDescription[0]::DefaultValue = 0 02-&gt;PropertyDescription[1]::PropertySet = VideoProcAmp(2) 02-&gt;PropertyDescription[1]::PropertyId = Brightness(2) 01-&gt;PropertyDescription[1]::Capabilities = Manual(1) 00 00 00 00-&gt;PropertyDescription[1]::MinValue = 0 ff 00 00 00-&gt;PropertyDescription[1]::MaxValue = 255 01 00 00 00-&gt;PropertyDescription[1]::Step = 1 80 00 00 00-&gt;PropertyDescription[1]::DefaultValue = 128                     </pre>				
2019/02/19	<p>In Section 2.2.1, Shared Message Header (SHARED_MSG_HEADER), updated values to hexadecimal format for consistency in the MessageId field table.</p> <p>Changed from: ... MessageId (1 byte): An 8-bit unsigned integer that specifies the type of the message.</p> <table border="1" data-bbox="500 1654 1398 1782"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>SuccessResponse 1</td> <td>A Success Response (section 2.2.3.1) message.</td> </tr> </tbody> </table>	Value	Meaning	SuccessResponse 1	A Success Response (section 2.2.3.1) message.
Value	Meaning				
SuccessResponse 1	A Success Response (section 2.2.3.1) message.				

Errata Published*	Description	
	ErrorResponse 2	An Error Response (section 2.2.3.2) message.
	SelectVersionRequest 3	A Select Version Request (section 2.2.2.1) message.
	SelectVersionResponse 4	A Select Version Response (section 2.2.2.2) message.
	DeviceAddedNotification 5	A Device Added Notification (section 2.2.2.3) message.
	DeviceRemovedNotification 6	A Device Removed Notification (section 2.2.2.4) message.
	ActivateDeviceRequest 7	An Activate Device Request (section 2.2.3.3) message.
	DeactivateDeviceRequest 8	A Deactivate Device Request (section 2.2.3.4) message.
	StreamListRequest 9	A Stream List Request (section 2.2.3.5) message.
	StreamListResponse 10	A Stream List Response (section 2.2.3.6) message.
	MediaTypeListRequest 11	A Media Type List Request (section 2.2.3.7) message.
	MediaTypeListResponse 12	A Media Type List Response (section 2.2.3.8) message.
	CurrentMediaTypeRequest 13	A Current Media Type Request (section 2.2.3.9) message.
	CurrentMediaTypeResponse 14	A Current Media Type Response (section 2.2.3.10) message.
	StartStreamsRequest 15	A Start Streams Request (section 2.2.3.11) message.
	StopStreamsRequest 16	A Stop Streams Request (section 2.2.3.12) message.
	SampleRequest 17	A Sample Request (section 2.2.3.13) message.
	SampleResponse 18	A Sample Response (section 2.2.3.14) message.
	SampleErrorResponse 19	A Sample Error Response (section 2.2.3.15) message.
	PropertyListRequest 20	A Property List Request (section 2.2.3.16) message. This message is supported only by version 2 of the protocol.
	PropertyListResponse 21	A Property List Response (section 2.2.3.17) message. This message is supported only by version 2 of the

Errata Published*	Description																													
		protocol.																												
	PropertyValueRequest 22	A Property Value Request (section 2.2.3.18) message. This message is supported only by version 2 of the protocol.																												
	PropertyValueResponse 23	A Property Value Response (section 2.2.3.19) message. This message is supported only by version 2 of the protocol.																												
	SetPropertyValueRequest 24	A Set Property Value Request (section 2.2.3.20) message. This message is supported only by version 2 of the protocol.																												
	Changed to:																													
	...																													
	MessageId (1 byte): An 8-bit unsigned integer that specifies the type of the message.																													
	<table border="1"> <thead> <tr> <th data-bbox="508 806 951 844">Value</th> <th data-bbox="951 806 1403 844">Meaning</th> </tr> </thead> <tbody> <tr> <td data-bbox="508 844 951 926">SuccessResponse 0x01</td> <td data-bbox="951 844 1403 926">A Success Response (section 2.2.3.1) message.</td> </tr> <tr> <td data-bbox="508 926 951 1008">ErrorResponse 0x02</td> <td data-bbox="951 926 1403 1008">An Error Response (section 2.2.3.2) message.</td> </tr> <tr> <td data-bbox="508 1008 951 1089">SelectVersionRequest 0x03</td> <td data-bbox="951 1008 1403 1089">A Select Version Request (section 2.2.2.1) message.</td> </tr> <tr> <td data-bbox="508 1089 951 1171">SelectVersionResponse 0x04</td> <td data-bbox="951 1089 1403 1171">A Select Version Response (section 2.2.2.2) message.</td> </tr> <tr> <td data-bbox="508 1171 951 1253">DeviceAddedNotification 0x05</td> <td data-bbox="951 1171 1403 1253">A Device Added Notification (section 2.2.2.3) message.</td> </tr> <tr> <td data-bbox="508 1253 951 1335">DeviceRemovedNotification 0x06</td> <td data-bbox="951 1253 1403 1335">A Device Removed Notification (section 2.2.2.4) message.</td> </tr> <tr> <td data-bbox="508 1335 951 1417">ActivateDeviceRequest 0x07</td> <td data-bbox="951 1335 1403 1417">An Activate Device Request (section 2.2.3.3) message.</td> </tr> <tr> <td data-bbox="508 1417 951 1499">DeactivateDeviceRequest 0x08</td> <td data-bbox="951 1417 1403 1499">A Deactivate Device Request (section 2.2.3.4) message.</td> </tr> <tr> <td data-bbox="508 1499 951 1581">StreamListRequest 0x09</td> <td data-bbox="951 1499 1403 1581">A Stream List Request (section 2.2.3.5) message.</td> </tr> <tr> <td data-bbox="508 1581 951 1663">StreamListResponse 0x0A</td> <td data-bbox="951 1581 1403 1663">A Stream List Response (section 2.2.3.6) message.</td> </tr> <tr> <td data-bbox="508 1663 951 1745">MediaTypeListRequest 0x0B</td> <td data-bbox="951 1663 1403 1745">A Media Type List Request (section 2.2.3.7) message.</td> </tr> <tr> <td data-bbox="508 1745 951 1827">MediaTypeListResponse 0x0C</td> <td data-bbox="951 1745 1403 1827">A Media Type List Response (section 2.2.3.8) message.</td> </tr> <tr> <td data-bbox="508 1827 951 1808">CurrentMediaTypeRequest 0x0D</td> <td data-bbox="951 1827 1403 1808">A Current Media Type Request</td> </tr> </tbody> </table>	Value	Meaning	SuccessResponse 0x01	A Success Response (section 2.2.3.1) message.	ErrorResponse 0x02	An Error Response (section 2.2.3.2) message.	SelectVersionRequest 0x03	A Select Version Request (section 2.2.2.1) message.	SelectVersionResponse 0x04	A Select Version Response (section 2.2.2.2) message.	DeviceAddedNotification 0x05	A Device Added Notification (section 2.2.2.3) message.	DeviceRemovedNotification 0x06	A Device Removed Notification (section 2.2.2.4) message.	ActivateDeviceRequest 0x07	An Activate Device Request (section 2.2.3.3) message.	DeactivateDeviceRequest 0x08	A Deactivate Device Request (section 2.2.3.4) message.	StreamListRequest 0x09	A Stream List Request (section 2.2.3.5) message.	StreamListResponse 0x0A	A Stream List Response (section 2.2.3.6) message.	MediaTypeListRequest 0x0B	A Media Type List Request (section 2.2.3.7) message.	MediaTypeListResponse 0x0C	A Media Type List Response (section 2.2.3.8) message.	CurrentMediaTypeRequest 0x0D	A Current Media Type Request	
	Value	Meaning																												
	SuccessResponse 0x01	A Success Response (section 2.2.3.1) message.																												
	ErrorResponse 0x02	An Error Response (section 2.2.3.2) message.																												
	SelectVersionRequest 0x03	A Select Version Request (section 2.2.2.1) message.																												
	SelectVersionResponse 0x04	A Select Version Response (section 2.2.2.2) message.																												
	DeviceAddedNotification 0x05	A Device Added Notification (section 2.2.2.3) message.																												
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MediaTypeListResponse 0x0C	A Media Type List Response (section 2.2.3.8) message.																													
CurrentMediaTypeRequest 0x0D	A Current Media Type Request																													

Errata Published*	Description							
		(section 2.2.3.9) message.						
	CurrentMediaTypeResponse 0x0E	A Current Media Type Response (section 2.2.3.10) message.						
	StartStreamsRequest 0x0F	A Start Streams Request (section 2.2.3.11) message.						
	StopStreamsRequest 0x10	A Stop Streams Request (section 2.2.3.12) message.						
	SampleRequest 0x11	A Sample Request (section 2.2.3.13) message.						
	SampleResponse 0x12	A Sample Response (section 2.2.3.14) message.						
	SampleErrorResponse 0x13	A Sample Error Response (section 2.2.3.15) message.						
	PropertyListRequest 0x14	A Property List Request (section 2.2.3.16) message. This message is supported only by version 2 of the protocol.						
	PropertyListResponse 0x15	A Property List Response (section 2.2.3.17) message. This message is supported only by version 2 of the protocol.						
	PropertyValueRequest 0x16	A Property Value Request (section 2.2.3.18) message. This message is supported only by version 2 of the protocol.						
	PropertyValueResponse 0x17	A Property Value Response (section 2.2.3.19) message. This message is supported only by version 2 of the protocol.						
	SetPropertyValueRequest 0x18	A Set Property Value Request (section 2.2.3.20) message. This message is supported only by version 2 of the protocol.						
	<p>In Section 2.2.3.2, Error Response, updated values to hexadecimal format for consistency in the ErrorCode field table.</p> <p>Changed from:</p> <p>...</p> <p>ErrorCode (4 bytes): A 32-bit unsigned integer containing an error code.</p> <table border="1" data-bbox="500 1644 1399 1810"> <thead> <tr> <th data-bbox="500 1644 954 1696">Value</th> <th data-bbox="954 1644 1399 1696">Meaning</th> </tr> </thead> <tbody> <tr> <td data-bbox="500 1696 954 1749">UnexpectedError 1</td> <td data-bbox="954 1696 1399 1749">An unexpected error occurred.</td> </tr> <tr> <td data-bbox="500 1749 954 1810">InvalidMessage 2</td> <td data-bbox="954 1749 1399 1810">An invalid message was received. Either the message is malformed, or</td> </tr> </tbody> </table>		Value	Meaning	UnexpectedError 1	An unexpected error occurred.	InvalidMessage 2	An invalid message was received. Either the message is malformed, or
Value	Meaning							
UnexpectedError 1	An unexpected error occurred.							
InvalidMessage 2	An invalid message was received. Either the message is malformed, or							

Errata Published*	Description													
		the protocol version or message type is unexpected.												
	NotInitialized 3	The object MUST be initialized before the requested operation can be carried out. This error could be returned, for example, when attempting to communicate with a deactivated camera device.												
	InvalidRequest 4	The request is invalid in the current state.												
	InvalidStreamNumber 5	The provided stream number was invalid.												
	InvalidMediaType 6	The data specified for the stream format is invalid, inconsistent, or not supported.												
	OutOfMemory 7	The client ran out of memory.												
	ItemNotFound 8	The device does not support the requested property. This error code is generated only by version 2 of the protocol.												
	SetNotFound 9	The device does not support the requested property set. This error code is generated only by version 2 of the protocol.												
	OperationNotSupported 10	The requested operation is not supported. This error code is generated only by version 2 of the protocol.												
	<p>Changed to:</p> <p>...</p>													
	<p>ErrorCode (4 bytes): A 32-bit unsigned integer containing an error code.</p>													
	<table border="1"> <thead> <tr> <th data-bbox="500 1283 951 1325">Value</th> <th data-bbox="951 1283 1403 1325">Meaning</th> </tr> </thead> <tbody> <tr> <td data-bbox="500 1325 951 1377">UnexpectedError 0x00000001</td> <td data-bbox="951 1325 1403 1377">An unexpected error occurred.</td> </tr> <tr> <td data-bbox="500 1377 951 1503">InvalidMessage 0x00000002</td> <td data-bbox="951 1377 1403 1503">An invalid message was received. Either the message is malformed, or the protocol version or message type is unexpected.</td> </tr> <tr> <td data-bbox="500 1503 951 1682">NotInitialized 0x00000003</td> <td data-bbox="951 1503 1403 1682">The object MUST be initialized before the requested operation can be carried out. This error could be returned, for example, when attempting to communicate with a deactivated camera device.</td> </tr> <tr> <td data-bbox="500 1682 951 1755">InvalidRequest 0x00000004</td> <td data-bbox="951 1682 1403 1755">The request is invalid in the current state.</td> </tr> <tr> <td data-bbox="500 1755 951 1810">InvalidStreamNumber 0x00000005</td> <td data-bbox="951 1755 1403 1810">The provided stream number was</td> </tr> </tbody> </table>		Value	Meaning	UnexpectedError 0x00000001	An unexpected error occurred.	InvalidMessage 0x00000002	An invalid message was received. Either the message is malformed, or the protocol version or message type is unexpected.	NotInitialized 0x00000003	The object MUST be initialized before the requested operation can be carried out. This error could be returned, for example, when attempting to communicate with a deactivated camera device.	InvalidRequest 0x00000004	The request is invalid in the current state.	InvalidStreamNumber 0x00000005	The provided stream number was
Value	Meaning													
UnexpectedError 0x00000001	An unexpected error occurred.													
InvalidMessage 0x00000002	An invalid message was received. Either the message is malformed, or the protocol version or message type is unexpected.													
NotInitialized 0x00000003	The object MUST be initialized before the requested operation can be carried out. This error could be returned, for example, when attempting to communicate with a deactivated camera device.													
InvalidRequest 0x00000004	The request is invalid in the current state.													
InvalidStreamNumber 0x00000005	The provided stream number was													

Errata Published*	Description				
		invalid.			
	InvalidMediaType 0x00000006	The data specified for the stream format is invalid, inconsistent, or not supported.			
	OutOfMemory 0x00000007	The client ran out of memory.			
	ItemNotFound 0x00000008	The device does not support the requested property. This error code is generated only by version 2 of the protocol.			
	SetNotFound 0x00000009	The device does not support the requested property set. This error code is generated only by version 2 of the protocol.			
	OperationNotSupported 0x0000000A	The requested operation is not supported. This error code is generated only by version 2 of the protocol.			
	<p>In Section 2.2.3.6.1, STREAM_DESCRIPTION, updated the value to hexadecimal format for consistency in the StreamCategory field table.</p>				
<p>Changed from: ... StreamCategory (1 byte): An 8-bit unsigned integer that specifies the category of the stream.</p>					
<table border="1"> <thead> <tr> <th data-bbox="500 1073 950 1125">Value</th> <th data-bbox="953 1073 1396 1125">Meaning</th> </tr> </thead> <tbody> <tr> <td data-bbox="500 1129 950 1228">Capture 1</td> <td data-bbox="953 1129 1396 1228">Capture category streams provide a stream of compressed or uncompressed digital video.</td> </tr> </tbody> </table>		Value	Meaning	Capture 1	Capture category streams provide a stream of compressed or uncompressed digital video.
Value	Meaning				
Capture 1	Capture category streams provide a stream of compressed or uncompressed digital video.				
<p>Changed to: ... StreamCategory (1 byte): An 8-bit unsigned integer that specifies the category of the stream.</p>					
<table border="1"> <thead> <tr> <th data-bbox="500 1396 950 1449">Value</th> <th data-bbox="953 1396 1396 1449">Meaning</th> </tr> </thead> <tbody> <tr> <td data-bbox="500 1453 950 1551">Capture 0x01</td> <td data-bbox="953 1453 1396 1551">Capture category streams provide a stream of compressed or uncompressed digital video.</td> </tr> </tbody> </table>		Value	Meaning	Capture 0x01	Capture category streams provide a stream of compressed or uncompressed digital video.
Value	Meaning				
Capture 0x01	Capture category streams provide a stream of compressed or uncompressed digital video.				
<p>In Section 2.2.3.8.1, MEDIA_TYPE_DESCRIPTION, updated values to hexadecimal format for consistency in the Format field table.</p>					
<p>Changed from: ... Format (1 byte): An 8-bit unsigned integer that specifies the stream codec.</p>					

Errata Published*	Description	
	Value	Meaning
	H264 1	H.264 video as described in [ITU-H.264-201704]. Media samples contain H.264 bitstream data with start codes and interleaved sequence parameter set/picture parameter set (SPS/PPS) packets. Each sample contains one complete picture, either one field or one frame.
	MJPEG 2	Motion JPEG. Motion JPEG is a video compression format in which each video frame of a digital video sequence is independently compressed as a JPEG image.
	YUY2 3	YUY2 video as specified in [MSDN-YUVFormats].
	NV12 4	NV12 video as described in [MSDN-YUVFormats].
	I420 5	I420 video. Identical to YV12 as described in [MSDN-YUVFormats] except that the order of the U and V planes is reversed.
	RGB24 6	RGB, 24 bits per pixel.
	RGB32 7	RGB, 32 bits per pixel.
	...	
	Changed to:	
	...	
	Format (1 byte): An 8-bit unsigned integer that specifies the stream codec.	
	Value	Meaning
	H264 0x01	H.264 video as described in [ITU-H.264-201704]. Media samples contain H.264 bitstream data with start codes and interleaved sequence parameter set/picture parameter set (SPS/PPS) packets. Each sample contains one complete picture, either one field or one frame.
	MJPEG 0x02	Motion JPEG. Motion JPEG is a video compression format in which each video frame of a digital video sequence is independently compressed as a JPEG image.
YUY2 0x03	YUY2 video as specified in [MSDN-YUVFormats].	
NV12 0x04	NV12 video as described in [MSDN-YUVFormats].	

Errata Published*	Description															
	I420 0x05	I420 video. Identical to YV12 as described in [MSDN-YUVFormats] except that the order of the U and V planes is reversed.														
	RGB24 0x06	RGB, 24 bits per pixel.														
	RGB32 0x07	RGB, 32 bits per pixel.														
	...															
	In Section 2.2.3.17.1, PROPERTY_DESCRIPTION, updated values to hexadecimal format for consistency in the PropertySet and PropertyId field tables.															
	Changed from:															
	...															
	PropertySet (1 byte): An 8-bit unsigned integer that specifies the property set.															
	<table border="1"> <thead> <tr> <th data-bbox="500 726 948 779">Value</th> <th data-bbox="948 726 1404 779">Meaning</th> </tr> </thead> <tbody> <tr> <td data-bbox="500 779 948 852">CameraControl 1</td> <td data-bbox="948 779 1404 852">This property set category controls camera device settings.</td> </tr> <tr> <td data-bbox="500 852 948 957">VideoProcAmp 2</td> <td data-bbox="948 852 1404 957">This property set controls devices that can adjust the image color attributes of analog or digital signals.</td> </tr> </tbody> </table>		Value	Meaning	CameraControl 1	This property set category controls camera device settings.	VideoProcAmp 2	This property set controls devices that can adjust the image color attributes of analog or digital signals.								
Value	Meaning															
CameraControl 1	This property set category controls camera device settings.															
VideoProcAmp 2	This property set controls devices that can adjust the image color attributes of analog or digital signals.															
	PropertyId (1 byte): An 8-bit unsigned integer that contains the identifier of the property within the property set specified by the PropertySet field.															
	CameraControl properties:															
	<table border="1"> <thead> <tr> <th data-bbox="500 1125 948 1178">Value</th> <th data-bbox="948 1125 1404 1178">Meaning</th> </tr> </thead> <tbody> <tr> <td data-bbox="500 1178 948 1251">Exposure 1</td> <td data-bbox="948 1178 1404 1251">This property controls the exposure time of the device.</td> </tr> <tr> <td data-bbox="500 1251 948 1325">Focus 2</td> <td data-bbox="948 1251 1404 1325">This property controls the focus setting of the device.</td> </tr> <tr> <td data-bbox="500 1325 948 1398">Pan 3</td> <td data-bbox="948 1325 1404 1398">This property controls the pan setting of the device.</td> </tr> <tr> <td data-bbox="500 1398 948 1472">Roll 4</td> <td data-bbox="948 1398 1404 1472">This property controls the roll setting of the device.</td> </tr> <tr> <td data-bbox="500 1472 948 1545">Tilt 5</td> <td data-bbox="948 1472 1404 1545">This property controls the tilt setting of the device.</td> </tr> <tr> <td data-bbox="500 1545 948 1640">Zoom 6</td> <td data-bbox="948 1545 1404 1640">This property controls the zoom setting of the device.</td> </tr> </tbody> </table>		Value	Meaning	Exposure 1	This property controls the exposure time of the device.	Focus 2	This property controls the focus setting of the device.	Pan 3	This property controls the pan setting of the device.	Roll 4	This property controls the roll setting of the device.	Tilt 5	This property controls the tilt setting of the device.	Zoom 6	This property controls the zoom setting of the device.
Value	Meaning															
Exposure 1	This property controls the exposure time of the device.															
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Zoom 6	This property controls the zoom setting of the device.															
	VideoProcAmp properties:															
	<table border="1"> <thead> <tr> <th data-bbox="500 1713 948 1766">Value</th> <th data-bbox="948 1713 1404 1766">Meaning</th> </tr> </thead> <tbody> <tr> <td data-bbox="500 1766 948 1814">BacklightCompensation 1</td> <td data-bbox="948 1766 1404 1814">This property controls the backlight</td> </tr> </tbody> </table>		Value	Meaning	BacklightCompensation 1	This property controls the backlight										
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Errata Published*	Description															
		compensation setting of the device. This value MUST be either 0 or 1. The value 0 indicates that backlight compensation is disabled. The value 1 indicates that backlight compensation is enabled.														
	Brightness 2	This property controls the brightness setting of the device.														
	Contrast 3	This property controls the contrast setting of the device.														
	Hue 4	This property controls the hue setting of the device.														
	WhiteBalance 5	This property controls the white balance setting of the device.														
	...															
	Changed to:															
	...															
	PropertySet (1 byte): An 8-bit unsigned integer that specifies the property set.															
	<table border="1"> <thead> <tr> <th data-bbox="508 804 951 852">Value</th> <th data-bbox="954 804 1396 852">Meaning</th> </tr> </thead> <tbody> <tr> <td data-bbox="508 856 951 905">CameraControl 0x01</td> <td data-bbox="954 856 1396 905">This property set category controls camera device settings.</td> </tr> <tr> <td data-bbox="508 909 951 957">VideoProcAmp 0x02</td> <td data-bbox="954 909 1396 957">This property set controls devices that can adjust the image color attributes of analog or digital signals.</td> </tr> </tbody> </table>		Value	Meaning	CameraControl 0x01	This property set category controls camera device settings.	VideoProcAmp 0x02	This property set controls devices that can adjust the image color attributes of analog or digital signals.								
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	<table border="1"> <thead> <tr> <th data-bbox="508 1161 951 1209">Value</th> <th data-bbox="954 1161 1396 1209">Meaning</th> </tr> </thead> <tbody> <tr> <td data-bbox="508 1213 951 1262">Exposure 0x01</td> <td data-bbox="954 1213 1396 1262">This property controls the exposure time of the device.</td> </tr> <tr> <td data-bbox="508 1266 951 1314">Focus 0x02</td> <td data-bbox="954 1266 1396 1314">This property controls the focus setting of the device.</td> </tr> <tr> <td data-bbox="508 1318 951 1367">Pan 0x03</td> <td data-bbox="954 1318 1396 1367">This property controls the pan setting of the device.</td> </tr> <tr> <td data-bbox="508 1371 951 1419">Roll 0x04</td> <td data-bbox="954 1371 1396 1419">This property controls the roll setting of the device.</td> </tr> <tr> <td data-bbox="508 1423 951 1472">Tilt 0x05</td> <td data-bbox="954 1423 1396 1472">This property controls the tilt setting of the device.</td> </tr> <tr> <td data-bbox="508 1476 951 1524">Zoom 0x06</td> <td data-bbox="954 1476 1396 1524">This property controls the zoom setting of the device.</td> </tr> </tbody> </table>		Value	Meaning	Exposure 0x01	This property controls the exposure time of the device.	Focus 0x02	This property controls the focus setting of the device.	Pan 0x03	This property controls the pan setting of the device.	Roll 0x04	This property controls the roll setting of the device.	Tilt 0x05	This property controls the tilt setting of the device.	Zoom 0x06	This property controls the zoom setting of the device.
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Errata Published*	Description																								
	<p>VideoProcAmp properties:</p> <table border="1" data-bbox="500 233 1398 793"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>BacklightCompensation 0x01</td> <td>This property controls the backlight compensation setting of the device. This value MUST be either 0 or 1. The value 0 indicates that backlight compensation is disabled. The value 1 indicates that backlight compensation is enabled.</td> </tr> <tr> <td>Brightness 0x02</td> <td>This property controls the brightness setting of the device.</td> </tr> <tr> <td>Contrast 0x03</td> <td>This property controls the contrast setting of the device.</td> </tr> <tr> <td>Hue 0x04</td> <td>This property controls the hue setting of the device.</td> </tr> <tr> <td>WhiteBalance 0x05</td> <td>This property controls the white balance setting of the device.</td> </tr> </tbody> </table> <p>...</p> <p>In Section 2.2.3.19.1, PROPERTY_VALUE, updated values to hexadecimal format for consistency in the Mode field table.</p> <p>Changed from:</p> <p>...</p> <p>Mode (1 byte): An 8-bit unsigned integer that specifies how the property was set.</p> <table border="1" data-bbox="500 1136 1398 1283"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>Manual 1</td> <td>The value was set manually.</td> </tr> <tr> <td>Auto 2</td> <td>The value was set automatically.</td> </tr> </tbody> </table> <p>...</p> <p>Changed to:</p> <p>...</p> <p>Mode (1 byte): An 8-bit unsigned integer that specifies how the property was set.</p> <table border="1" data-bbox="500 1465 1398 1612"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>Manual 0x01</td> <td>The value was set manually.</td> </tr> <tr> <td>Auto 0x02</td> <td>The value was set automatically.</td> </tr> </tbody> </table> <p>...</p>	Value	Meaning	BacklightCompensation 0x01	This property controls the backlight compensation setting of the device. This value MUST be either 0 or 1. The value 0 indicates that backlight compensation is disabled. The value 1 indicates that backlight compensation is enabled.	Brightness 0x02	This property controls the brightness setting of the device.	Contrast 0x03	This property controls the contrast setting of the device.	Hue 0x04	This property controls the hue setting of the device.	WhiteBalance 0x05	This property controls the white balance setting of the device.	Value	Meaning	Manual 1	The value was set manually.	Auto 2	The value was set automatically.	Value	Meaning	Manual 0x01	The value was set manually.	Auto 0x02	The value was set automatically.
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\*Date format: YYYY/MM/DD

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

This topic lists the Errata found in [MS-RDPEDYC] 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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## [MS-RDPEFS]: Remote Desktop Protocol: File System Virtual Channel Extension

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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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September 12, 2018 - [Download](#)

Errata below are for Protocol Document Version [V14.0 - 2018/09/12](#).

Errata Published*	Description
2019/02/19	<p>In Section 2.2.4.5, RFX_AVC444_BITMAP_STREAM, "YUV420 frame" in the cbAvc420EncodedBitstream1 field description has been replaced with "luma frame".</p> <p>Changed from:</p> <p>...</p> <p>cbAvc420EncodedBitstream1 (30 bits): A 30-bit unsigned integer that specifies the size, in bytes, of the luma frame present in the avc420EncodedBitstream1 field. If no YUV420 frame is present, then this field MUST be set to zero.</p> <p>...</p> <p>Changed to:</p> <p>...</p> <p>cbAvc420EncodedBitstream1 (30 bits): A 30-bit unsigned integer that specifies the size, in bytes, of the YUV420 frame present in the avc420EncodedBitstream1 field. If no YUV420 frame is present, then this field MUST be set to zero.</p> <p>...</p> <p>In Section 2.2.4.6, RFX_AVC444V2_BITMAP_STREAM, "YUV420 frame" in the cbAvc420EncodedBitstream1 field description has been replaced with "luma frame".</p> <p>Changed from:</p> <p>...</p> <p>cbAvc420EncodedBitstream1 (30 bits): A 30-bit unsigned integer that specifies the size, in bytes, of the luma frame present in the avc420EncodedBitstream1 field. If no YUV420 frame is present, then this field MUST be set to zero.</p> <p>...</p>

Errata Published*	Description												
	<p>Changed to:</p> <p>...</p> <p>cbAvc420EncodedBitstream1 (30 bits): A 30-bit unsigned integer that specifies the size, in bytes, of the YUV420 frame present in the avc420EncodedBitstream1 field. If no YUV420 frame is present, then this field MUST be set to zero.</p> <p>...</p>												
2018/12/10	<p>In Section 2.2.1.6, RDPGFX_CAPSET, the RDPGFX_CAPVERSION_106 value has been changed from 0x000A0601 to 0x000A0600 in the version field description.</p> <p>Changed from:</p> <p>...</p> <p>version (4 bytes): A 32-bit unsigned integer that specifies the version of the capability set.</p> <table border="1" data-bbox="500 655 1398 835"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>...</td> <td>...</td> </tr> <tr> <td>RDPGFX_CAPVERSION_106 0x000A0601</td> <td>RDPGFX_CAPSET_VERSION106 (section 2.2.3.9)</td> </tr> </tbody> </table> <p>Changed to:</p> <p>...</p> <p>version (4 bytes): A 32-bit unsigned integer that specifies the version of the capability set.</p> <table border="1" data-bbox="500 1037 1398 1218"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>...</td> <td>...</td> </tr> <tr> <td>RDPGFX_CAPVERSION_106 0x000A0600</td> <td>RDPGFX_CAPSET_VERSION106 (section 2.2.3.9)</td> </tr> </tbody> </table> <p>In Section 2.2.3.9, RDPGFX_CAPSET_VERSION106, the RDPGFX_CAPVERSION_106 value has been changed from 0x000A0601 to 0x000A0600 in the version field description.</p> <p>Changed from:</p> <p>...</p> <p>version (4 bytes): A 32-bit unsigned integer that specifies the version of the capability set. This field MUST be set to RDPGFX_CAPVERSION_106 (0x000A0601).</p> <p>...</p> <p>Changed to:</p> <p>...</p> <p>version (4 bytes): A 32-bit unsigned integer that specifies the version of the capability set. This field MUST be set to RDPGFX_CAPVERSION_106 (0x000A0600).</p> <p>...</p>	Value	Meaning	...	...	RDPGFX_CAPVERSION_106 0x000A0601	RDPGFX_CAPSET_VERSION106 (section 2.2.3.9)	Value	Meaning	...	...	RDPGFX_CAPVERSION_106 0x000A0600	RDPGFX_CAPSET_VERSION106 (section 2.2.3.9)
Value	Meaning												
...	...												
RDPGFX_CAPVERSION_106 0x000A0601	RDPGFX_CAPSET_VERSION106 (section 2.2.3.9)												
Value	Meaning												
...	...												
RDPGFX_CAPVERSION_106 0x000A0600	RDPGFX_CAPSET_VERSION106 (section 2.2.3.9)												

\*Date format: YYYY/MM/DD

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

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

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## [MS-RDPELE]: Remote Desktop Protocol: Licensing Extension

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Errata below are for Protocol Document Version [V14.0 – 2018/09/12](#).

Errata Published*	Description
2018/12/10	<p>In Section 4, Protocol Examples, text has been added to clarify that the sample protocol packets are only examples and should not be considered to have been generated as part of the same protocol run.</p> <p>Changed from: For a complete listing of RDP headers, see [MS-RDPBCGR] section 4.</p> <p>Changed to: For a complete listing of RDP headers, see [MS-RDPBCGR] section 4.</p> <p>The sample protocol packets listed in sections 4.1 through to 4.7 are provided as examples and should not be considered to have been generated as part of the same protocol run.</p>
2018/12/10	<p>In Section 2.2.2.5, Client Platform Challenge Response (CLIENT_PLATFORM_CHALLENGE_RESPONSE), text has been added to clarify that decrypted Client Hardware Identification should follow the Platform Challenge Response Data in the MACData field description.</p> <p>Changed from: MACData (16 bytes): An array of 16 bytes containing an MD5 digest (MAC) generated over the decrypted Client Hardware Identification and Platform Challenge Response Data. ...</p> <p>Changed to: MACData (16 bytes): An array of 16 bytes containing an MD5 digest (MAC) generated over the Platform Challenge Response Data and decrypted Client Hardware Identification. ...</p>

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

This topic lists the Errata found in [MS-RDPEMC] 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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## [MS-RDPEMT]: Remote Desktop Protocol: Multitransport Extension

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

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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 [V27.0 - 2018/09/12](#).

Errata Published*	Description
2019/02/19	<p>In Section 2.2.1.3.1.2.1, New or Existing Window, added that the string is not guaranteed to be null-terminated in the TitleInfo field description.</p> <p>Changed from:</p> <p>...</p> <p>TitleInfo (variable): UNICODE_STRING. Variable length. Contains the window's title string. The maximum value for the CbString field of UNICODE_STRING is 520 bytes. This structure is present only if the WINDOW_ORDER_FIELD_TITLE flag is set in the FieldsPresentFlags field of TS_WINDOW_ORDER_HEADER.</p> <p>...</p> <p>Changed to:</p> <p>...</p> <p>TitleInfo (variable): UNICODE_STRING. Variable length. Contains the window's title string. This string is not guaranteed to be null-terminated. The maximum value for the CbString field of UNICODE_STRING is 520 bytes. This structure is present only if the WINDOW_ORDER_FIELD_TITLE flag is set in the FieldsPresentFlags field of TS_WINDOW_ORDER_HEADER.</p> <p>...</p> <p>In Section 2.2.2.7.1, Server Min Max Info PDU (TS_RAIL_ORDER_MINMAXINFO), changed unsigned 16-bit integer to signed 16-bit integer in the MaxWidth, MaxHeight, MaxPosX, MaxPosY, MinTrackWidth, MinTrackHeight, MaxTrackWidth, and MaxTrackHeight field descriptions.</p>

Errata Published*	Description
	<p>Changed from:</p> <p>...</p> <p>MaxWidth (2 bytes): An unsigned 16-bit integer. The width of the maximized window.</p> <p>MaxHeight (2 bytes): An unsigned 16-bit integer. The height of the maximized window.</p> <p>MaxPosX (2 bytes): An unsigned 16-bit integer. The x-coordinate of the top-left corner of the maximized window.</p> <p>MaxPosY (2 bytes): An unsigned 16-bit integer. The y-coordinate of the top-left corner of the maximized window.</p> <p>MinTrackWidth (2 bytes): An unsigned 16-bit integer. The minimum width to which the window can be resized.</p> <p>MinTrackHeight (2 bytes): An unsigned 16-bit integer. The minimum height to which the window can be resized.</p> <p>MaxTrackWidth (2 bytes): An unsigned 16-bit integer. The maximum width to which the window can be resized.</p> <p>MaxTrackHeight (2 bytes): An unsigned 16-bit integer. The maximum height to which the window can be resized.</p> <p>Changed to:</p> <p>...</p> <p>MaxWidth (2 bytes): A signed 16-bit integer. The width of the maximized window.</p> <p>MaxHeight (2 bytes): A signed 16-bit integer. The height of the maximized window.</p> <p>MaxPosX (2 bytes): A signed 16-bit integer. The x-coordinate of the top-left corner of the maximized window.</p> <p>MaxPosY (2 bytes): A signed 16-bit integer. The y-coordinate of the top-left corner of the maximized window.</p> <p>MinTrackWidth (2 bytes): A signed 16-bit integer. The minimum width to which the window can be resized.</p> <p>MinTrackHeight (2 bytes): A signed 16-bit integer. The minimum height to which the window can be resized.</p> <p>MaxTrackWidth (2 bytes): A signed 16-bit integer. The maximum width to which the window can be resized.</p> <p>MaxTrackHeight (2 bytes): A signed 16-bit integer. The maximum height to which the window can be resized.</p>

Errata Published*	Description
	<p>In Section 2.2.2.7.2, Server Move/Size Start PDU (TS_RAIL_ORDER_LOCALMOVESIZE), changed unsigned 16-bit integer to signed 16-bit integer in the PosX and PosY field descriptions.</p> <p>Changed from:</p> <p>...</p> <p>PosX (2 bytes): An unsigned 16-bit integer. The meaning of this field depends upon the value of the MoveSizeType field.</p> <p>...</p> <p>PosY (2 bytes): An unsigned 16-bit integer. The meaning of this field depends on the value of the MoveSizeType field.</p> <p>...</p> <p>Changed to:</p> <p>...</p> <p>PosX (2 bytes): A signed 16-bit integer. The meaning of this field depends upon the value of the MoveSizeType field.</p> <p>...</p> <p>PosY (2 bytes): A signed 16-bit integer. The meaning of this field depends on the value of the MoveSizeType field.</p> <p>...</p> <p>In Section 2.2.2.7.3, Server Move/Size End PDU (TS_RAIL_ORDER_LOCALMOVESIZE), changed unsigned 16-bit integer to signed 16-bit integer in the TopLeftX and TopLeftY field descriptions.</p> <p>Changed from:</p> <p>...</p> <p>TopLeftX (2 bytes): An unsigned 16-bit integer. The x-coordinate of the moved or resized window's top-left corner.</p> <p>TopLeftY (2 bytes): An unsigned 16-bit integer. The y-coordinate of the moved or resized window's top-left corner.</p> <p>Changed to:</p> <p>...</p> <p>TopLeftX (2 bytes): A signed 16-bit integer. The x-coordinate of the moved or resized window's top-left corner.</p> <p>TopLeftY (2 bytes): A signed 16-bit integer. The y-coordinate of the moved or resized window's top-left corner.</p> <p>In Section 2.2.2.7.4, Client Window Move PDU (TS_RAIL_ORDER_WINDOWMOVE), changed unsigned 16-bit integer to signed 16-bit integer in the Left, Top, Right, and Bottom field descriptions.</p> <p>Changed from:</p> <p>...</p> <p>Left (2 bytes): An unsigned 16-bit integer. The x-coordinate of the top-left corner of</p>

Errata Published*	Description
	<p>the window's new position.</p> <p>Top (2 bytes): An unsigned 16-bit integer. The y-coordinate of the top-left corner of the window's new position.</p> <p>Right (2 bytes): An unsigned 16-bit integer. The x-coordinate of the bottom-right corner of the window's new position.</p> <p>Bottom (2 bytes): An unsigned 16-bit integer. The y-coordinate of the bottom-right corner of the window's new position.</p> <p>Changed to:</p> <p>...</p> <p>Left (2 bytes): A signed 16-bit integer. The x-coordinate of the top-left corner of the window's new position.</p> <p>Top (2 bytes): A signed 16-bit integer. The y-coordinate of the top-left corner of the window's new position.</p> <p>Right (2 bytes): A signed 16-bit integer. The x-coordinate of the bottom-right corner of the window's new position.</p> <p>Bottom (2 bytes): A signed 16-bit integer. The y-coordinate of the bottom-right corner of the window's new position.</p> <p>In Section 2.2.2.7.5, Client Window Snap PDU (TS_RAIL_ORDER_SNAP_ARRANGE), changed unsigned 16-bit integer to signed 16-bit integer in the Left, Top, Right, and Bottom field descriptions.</p> <p>Changed from:</p> <p>...</p> <p>Left (2 bytes): An unsigned 16-bit integer. The x-coordinate of the top-left corner of the window's new position.</p> <p>Top (2 bytes): An unsigned 16-bit integer. The y-coordinate of the top-left corner of the window's new position.</p> <p>Right (2 bytes): An unsigned 16-bit integer. The x-coordinate of the bottom-right corner of the window's new position.</p> <p>Bottom (2 bytes): An unsigned 16-bit integer. The y-coordinate of the bottom-right corner of the window's new position.</p> <p>Changed to:</p> <p>...</p> <p>Left (2 bytes): A signed 16-bit integer. The x-coordinate of the top-left corner of the window's new position.</p> <p>Top (2 bytes): A signed 16-bit integer. The y-coordinate of the top-left corner of the window's new position.</p>

Errata Published*	Description
	<p>Right (2 bytes): A signed 16-bit integer. The x-coordinate of the bottom-right corner of the window's new position.</p> <p>Bottom (2 bytes): A signed 16-bit integer. The y-coordinate of the bottom-right corner of the window's new position.</p> <p>In Section 2.2.2.8.1, Server Get Application ID Response PDU (TS_RAIL_ORDER_GET_APPID_RESP), changed the ApplicationId field size from 512 bytes to 520 bytes.</p> <p>Changed from:</p> <p>...</p> <p>&lt;Bit table&gt;</p> <p>Hdr</p> <p>WindowId</p> <p>ApplicationId (512 bytes)</p> <p>...</p> <p>...</p> <p>ApplicationId (512 bytes): A null-terminated string of Unicode characters specifying the Application ID that the Client SHOULD associate with its window, if it supports using the Application ID for identifying and grouping windows.</p> <p>Changed to:</p> <p>...</p> <p>&lt;Bit table&gt;</p> <p>Hdr</p> <p>WindowId</p> <p>ApplicationId (520 bytes)</p> <p>...</p> <p>...</p> <p>ApplicationId (520 bytes): A null-terminated string of Unicode characters specifying the Application ID that the Client SHOULD associate with its window, if it supports using the Application ID for identifying and grouping windows.</p> <p>In Section 2.2.2.8.2, Server Get Application ID Extended Response PDU (TS_RAIL_ORDER_GET_APPID_RESP_EX), changed the ApplicationId field size from 512 bytes to 520 bytes.</p> <p>Changed from:</p> <p>...</p> <p>&lt;Bit table&gt;</p> <p>Hdr</p> <p>WindowId</p> <p>ApplicationId (512 bytes)</p> <p>...</p> <p>...</p> <p>ApplicationId (512 bytes): A null-terminated string of Unicode characters specifying the Application ID that the Client SHOULD associate with its window, if it supports</p>

Errata Published*	Description
	<p>using the Application ID for identifying and grouping windows.</p> <p>...</p> <p>Changed to:</p> <p>...</p> <p>&lt;Bit table&gt;</p> <p>Hdr</p> <p>WindowId</p> <p>ApplicationId (520 bytes)</p> <p>...</p> <p>...</p> <p>ApplicationId (520 bytes): A null-terminated string of Unicode characters specifying the Application ID that the Client SHOULD associate with its window, if it supports using the Application ID for identifying and grouping windows.</p> <p>...</p>
2019/02/19	<p>In Section 4.2.1, TS_RAIL_ORDER_HANDSHAKE, Filter Updated PDUs has been changed to Handshake PDU.</p> <p>Changed from:</p> <p>The following are network captures of the Filter Updated PDUs (TS_RAIL_ORDER_HANDSHAKE, as specified in 2.2.2.2.1).</p> <p>...</p> <p>Changed to:</p> <p>The following are network captures of the Handshake PDU (TS_RAIL_ORDER_HANDSHAKE, as specified in 2.2.2.2.1).</p> <p>...</p>
2019/02/19	<p>In Section 1.3.2.1, RAIL Session Connection, text that describes EnhancedRemoteApp in a RAIL-specific connection establishment sequence bulleted item and clarifies when the server should send a HandshakeEx PDU instead of a Handshake PDU after the RDP connection is established has been added.</p> <p>Changed from:</p> <p>...</p> <ul style="list-style-type: none"> <li>● The Alternate Shell field of the Client Info PDU, as specified in [MS-RDPBCGR] section 2.2.1.11, is NOT used to communicate the initial application started in the session. Instead, the initial application information is communicated to the server via the Client Execute PDU.</li> <li>● If the server supports RAIL, the Demand Active PDU has to contain the Remote Programs Capability Set and Window List Capability Set to indicate that it supports RAIL.</li> </ul> <p>..</p> <p>After the RDP connection is established, a RAIL client and server exchange Handshake PDUs over the RAIL Virtual Channel to indicate that each is ready for data on the virtual channel.</p> <p>..</p> <p>Changed to:</p>

Errata Published*	Description
	<p>...</p> <ul style="list-style-type: none"> <li>• The Alternate Shell field of the Client Info PDU, as specified in [MS-RDPBCGR] section 2.2.1.11, is NOT used to communicate the initial application started in the session. Instead, the initial application information is communicated to the server via the Client Execute PDU.</li> <li>• The client can set the INFO_HIDEDEF_RAIL_SUPPORTED flag of the Client Info PDU (as specified in [MS-RDPBCGR] section 2.2.1.11.1.1) to request an Enhanced RemoteApp session. If the server does not support Enhanced RemoteApp, it should fall back to a standard RemoteApp session.</li> <li>• If the server supports RAIL, the Demand Active PDU has to contain the Remote Programs Capability Set and Window List Capability Set to indicate that it supports RAIL.</li> </ul> <p>...</p> <p>After the RDP connection is established, a RAIL client and server exchange Handshake PDUs over the RAIL Virtual Channel to indicate that each is ready for data on the virtual channel. The server should send a HandshakeEx PDU instead of a Handshake PDU if the client and server both indicate support for it in the Remote Programs Capability Set, or if Enhanced RemoteApp is in use. The client must respond with a Handshake PDU.</p> <p>...</p> <p>In Section 3.1.5.1, Constructing Handshake PDU, references have been added to the HandshakeEx PDU section.</p> <p>Changed from:</p> <p>The Handshake PDU is constructed during initialization of the remote applications integrated locally (RAIL) virtual channel. The buildNumber field SHOULD be initialized to the build or version of the sending party. This PDU MUST be sent before any other PDU on the virtual channel.</p> <p>Changed to:</p> <p>The Handshake PDU is constructed during initialization of the remote applications integrated locally (RAIL) virtual channel. The buildNumber field SHOULD be initialized to the build or version of the sending party. This PDU (or alternatively the HandshakeEx PDU (section 2.2.2.2.3) if the sending party is the server) MUST be sent before any other PDU on the virtual channel.</p> <p>In Section 3.1.5.2 Processing Handshake PDU, references have been added to the HandshakeEx PDU section.</p> <p>Changed from:</p> <p>...</p> <p>The receiving party MUST NOT process any other virtual channel PDUs unless the Handshake PDU has been received.</p> <p>Changed to:</p> <p>...</p> <p>The receiving party MUST NOT process any other virtual channel PDUs unless either the Handshake PDU or (if the receiving party is the client) the HandshakeEx PDU (section 2.2.2.2.3) has been received.</p>

Errata Published*	Description
	<p>In Section 3.2.5.1.3, Constructing Client Info PDU, text describing Enhanced RemoteApp and the INFO_HIDEF_RAIL_SUPPORTED flag has been added.</p> <p>Changed from:</p> <p>...</p> <p>For remote applications integrated locally (RAIL) clients, the flags field of the Info Packet (as specified in [MS-RDPBCGR] section 2.2.1.11.1.1) MUST have the INFO_RAIL (0x00008000) flag set. This informs the server that the client wants to create a RAIL session.</p> <p>Changed to:</p> <p>...</p> <p>For remote applications integrated locally (RAIL) clients, the flags field of the Info Packet (as specified in [MS-RDPBCGR] section 2.2.1.11.1.1) MUST have the INFO_RAIL (0x00008000) flag set. This informs the server that the client wants to create a RAIL session.</p> <p>If the client supports Enhanced RemoteApp, the flags field SHOULD also have the INFO_HIDEF_RAIL_SUPPORTED (0x02000000) flag set. This flag requests that the server create a RAIL session in Enhanced RemoteApp mode. Setting this flag does not guarantee that Enhanced RemoteApp will be enabled since the server may not support this mode.</p> <p>A new section, Section 3.2.5.2.1.2, Processing HandshakeEx PDU, has been added:</p> <p>The client SHOULD check the buildNumber field to verify compatibility of the receiver with the sender.&lt;25&gt;</p> <p>If the TS_RAIL_ORDER_HANDSHAKEEX_FLAGS_HIDEF (0x00000001) flag in the railHandshakeFlags field is set, the remote session is running in Enhanced RemoteApp mode, and the client SHOULD handle the RDPGFX_MAP_SURFACE_TO_WINDOW_PDU ([MS-RDPEGFX] section 2.2.2.20) message. If this flag is not set, the session is not running in Enhanced RemoteApp mode, even if the client requested it in the Client Info PDU (as specified in section 3.2.5.1.3). In this scenario, the client SHOULD NOT expect to receive Enhanced RemoteApp messages.</p> <p>The client MUST NOT process any other virtual channel PDUs unless either the HandshakeEx PDU (section 2.2.2.2.3) or the Handshake PDU (section 2.2.2.2.1) has been received.</p> <p>In Section 3.3.5.1.3, Processing Client Info PDU, text that describes when the client has requested that the RAIL session be created in EnhancedRemoteApp mode and what happens if the server supports Enhanced RemoteApp mode has been added.</p> <p>Changed from:</p> <p>...</p> <p>If the flags field of the Info Packet (as specified in [MS-RDPBCGR] section 2.2.1.11.1.1) has the INFO_RAIL (0x00008000) flag set, it indicates that the client wants to start a remote applications integrated locally (RAIL) connection. If the</p>

Errata Published*	Description
	<p>server supports RAIL, it SHOULD indicate this by using the Demand Active PDU (see section 3.3.5.1.4).</p> <p>Changed to:</p> <p>...</p> <p>If the flags field of the Info Packet (as specified in [MS-RDPBCGR] section 2.2.1.1.1.1) has the INFO_RAIL (0x00008000) flag set, it indicates that the client wants to start a remote applications integrated locally (RAIL) connection. If the server supports RAIL, it SHOULD indicate this by using the Demand Active PDU (see section 3.3.5.1.4).</p> <p>If the flags field of the Info Packet has the INFO_HIDEF_RAIL_SUPPORTED (0x02000000) flag set, it indicates that the client has requested that the RAIL session be created in Enhanced RemoteApp mode. If the server supports Enhanced RemoteApp mode this mode SHOULD be enabled, and upon initialization of the RAIL virtual channel the HandshakeEx PDU (section 2.2.2.3) MUST be sent with the TS_RAIL_ORDER_HANDSHAKEEX_FLAGS_HIDEF (0x00000001) flag set (section 3.3.5.2.1.2). If the INFO_HIDEF_RAIL_SUPPORTED flag is not set, the server MUST NOT enable Enhanced RemoteApp.</p> <p>A new section, Section 3.3.5.2.1.2, Sending HandshakeEx PDU, has been added:</p> <p>The HandshakeEx PDU MUST be constructed as specified in section 2.2.2.3.</p> <p>If Enhanced RemoteApp has been enabled for the current RAIL session (section 3.3.5.1.3), the server MUST set the TS_RAIL_ORDER_HANDSHAKEEX_FLAGS_HIDEF (0x00000001) flag. If it has not been enabled, the server MUST NOT set this flag.</p> <p>If Enhanced RemoteApp is not enabled, and support for the HandshakeEx PDU was not indicated in the Remote Programs Capability Set (section 2.2.1.1.1), the server MUST send the Handshake PDU (section 3.1.5.1) instead of the HandshakeEx PDU.</p> <p>In Section 6: Appendix A, Product Behavior, a new product behavior note has been added:</p> <p>&lt;25&gt; Section 3.2.5.2.1.2: Windows implementations ignore any incompatibility resulting from checking the buildNumber field between the sender and the receiver.</p>

\*Date format: YYYY/MM/DD

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

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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 [V12.0 – 2018/09/12](#).

Errata Published*	Description
2019/02/19	<p>In Section 3.1.5.1.1, SYN Datagrams, clarified that when a SYN datagram is created, it has to be zero-padded to increase the size to either the uUpStreamMtu field or the uDownStreamMtu field, whichever is smaller.</p> <p>Changed from:</p> <p>...</p> <p>5. This datagram MUST be zero-padded to increase the size of this datagram to 1232 bytes.</p> <p>Changed to:</p> <p>...</p> <p>5. This datagram MUST be zero-padded to increase the size of this datagram to uUpStreamMtu or uDownStreamMtu, whichever is smaller.</p>
2019/02/19	<p>In Section 3.1.5, Message Processing Events and Sequencing Rules, changed Listen/ to Listen, Close/- to Close, and ACK/ to ACK in the terminal server state and Close/- to Close and SYN+ACK/ACK to SYN+ACK/ACK(+DATA) in the terminal client state illustrated in the State diagram for the terminal server and terminal client states figure.</p> <p>Changed from:</p>

Errata Published*	Description
	<p>Figure 13: State diagram for the terminal server and terminal client states</p> <p>Changed to:</p>

Errata Published*	Description
	<div data-bbox="532 243 1365 974" data-label="Diagram"> <pre> graph TD     subgraph Terminal_server [Terminal server]         C1(( )) --&gt; C1_state[Closed]         C1_state -- Listen --&gt; L1[Listen]         L1 -- "SYN/SYN+ACK" --&gt; SR1[SYN Received]         SR1 -- ACK --&gt; E1[Established]         E1 -- Close --&gt; C1_state         C1_state -- "Close network connection" --&gt; F1(( ))     end      subgraph Terminal_client [Terminal client]         C2(( )) --&gt; C2_state[Closed]         C2_state -- "Connect/SYN" --&gt; SS1[SYN Sent]         SS1 -- "SYN+ACK/ACK(+DATA)" --&gt; E2[Established]         E2 -- Close --&gt; C2_state         C2_state -- "Close network connection" --&gt; F2(( ))     end </pre> </div> <p data-bbox="501 1016 1349 1041"><b>Figure 13: State diagram for the terminal server and terminal client states</b></p> <p data-bbox="480 1096 1401 1173">In Section 3.1.5.2, Connection Sequence, changed the following: Listen/- : to Listen: in the first connection sequence; Connect/SYN-: to Connect/SYN: in the second connection sequence; and ACK/-: to ACK: in the fifth connection sequence.</p> <p data-bbox="480 1215 646 1241">Changed from:</p> <p data-bbox="480 1260 509 1276">...</p> <p data-bbox="480 1283 1088 1308">1. Listen/- : The terminal server enters the Listen state:</p> <p data-bbox="480 1327 509 1344">...</p> <p data-bbox="480 1350 673 1375">2. Connect/SYN-:</p> <p data-bbox="480 1394 509 1411">...</p> <p data-bbox="480 1417 587 1442">5. ACK/-:</p> <p data-bbox="480 1461 509 1478">...</p> <p data-bbox="480 1520 618 1545">Changed to:</p> <p data-bbox="480 1564 509 1581">...</p> <p data-bbox="480 1587 1062 1612">1. Listen: The terminal server enters the Listen state:</p> <p data-bbox="480 1631 509 1648">...</p> <p data-bbox="480 1654 665 1680">2. Connect/SYN:</p> <p data-bbox="480 1698 509 1715">...</p> <p data-bbox="480 1722 570 1747">5. ACK:</p> <p data-bbox="480 1766 509 1782">...</p>

\*Date format: YYYY/MM/DD

# [MS-RDPEUDP2]: Remote Desktop Protocol: UDP Transport Extension Version 2

This topic lists the Errata found in [MS-RDPEUDP2] 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 [V1.0 - 2018/09/12](#).

Errata Published*	Description
2019/02/19	<p>In Section 1.3, Overview, changed the maximum transmission unit (MTU) in RDP-UDP2 transport layer from 1600 to 1232 bytes.</p> <p>Changed from:</p> <p>...</p> <p>In this specification, the initiating endpoint A is referred to as the terminal client (2) and endpoint B is referred to as the terminal server. The maximum transmission unit (MTU) size in RDP-UDP2 transport layer is set to 1600 bytes.</p> <p>...</p> <p>Changed to:</p> <p>...</p> <p>In this specification, the initiating endpoint A is referred to as the terminal client (2) and endpoint B is referred to as the terminal server. The maximum transmission unit (MTU) size in RDP-UDP2 transport layer is set to 1232 bytes.</p> <p>...</p>
2019/02/19	<p>In Section 1.7, Versioning and Capability Negotiation, changed RDPUDP_VERSION_UDP2 to RDPUDP_PROTOCOL_VERSION_3.</p> <p>Changed from:</p> <p>During the RDP-UDP initialization stage, the UDP transport performs a handshake to negotiate between the client and server for a commonly supported UDP version. If the version is equal to RDPUDP_VERSION_UDP2, which is a new version that corresponds to the new extension specified in this document, the transport message flow switches to the RDP-UDP2 version.</p> <p>Changed to:</p> <p>During the RDP-UDP initialization stage, the UDP transport performs a handshake to negotiate between the client and server for a commonly supported UDP version. If the version is greater than or equal to RDPUDP_PROTOCOL_VERSION_3, which is a new version that corresponds to the new extension specified in this document, the transport message flow switches to the RDP-UDP2 version.</p> <p>In Section 2.2.1.2.1, Acknowledgement Payload, changed "lesser than or equal to 255 " to "less than or equal to 255" in the delayAckTimeScale field description.</p> <p>Changed from:</p> <p>C - delayAckTimeScale (4 bits): A 4-bit unsigned integer that specifies the scale</p>

Errata Published*	Description
	<p>applied to the time differences for all the delayed ACKs carried in this packet. The Receiver SHOULD send a value for this field that ensures that each time interval in the delayAckTimeAdditions field is of size lesser than or equal to 255 (section 3.1.5.6).</p> <p>Changed to:</p> <p>C - delayAckTimeScale (4 bits): A 4-bit unsigned integer that specifies the scale applied to the time differences for all the delayed ACKs carried in this packet. The Receiver SHOULD send a value for this field that ensures that each time interval in the delayAckTimeAdditions field is of size less than or equal to 255 (section 3.1.5.6).</p> <p>In Section 4.1.2, On the Receiver when receiving the packet, changed RDPUDP_VERSION_4 to RDPUDP_PROTOCOL_VERSION_3 in the first step.</p> <p>Changed from:</p> <p>1. A packet is received at the RDP-UDP layer. Because the UDP version is set to RDPUDP_VERSION_4, it is passed to the RDP-UDP2 stack for processing as an OnWire version of the packet (section 1.3.1).</p> <p>...</p> <p>Changed to:</p> <p>1. A packet is received at the RDP-UDP layer. Because the UDP version is set to RDPUDP_PROTOCOL_VERSION_3, it is passed to the RDP-UDP2 stack for processing as an OnWire version of the packet (section 1.3.1).</p> <p>...</p>
2019/02/19	<p>In Section 2.2.1.3, PacketPrefixByte, changed the number that the Short_Packet_Length field should be set to from 0 to 7 if the length of the RDP-UDP2 Packet that follows the PacketPrefixByte is greater than 7 bytes.</p> <p>Changed from:</p> <p>...</p> <p>C - Short_Packet_Length (3 bits): A 3-bit unsigned integer that specifies the length, in bytes, of the RDP-UDP2 Packet (section 2.2.2.1) that follows the PacketPrefixByte if the size is less than or equal to 7 bytes. If the length of the RDP-UDP2 Packet (section 2.2.2.1) that follows the PacketPrefixByte is greater than 7 bytes, then this field MUST be set to 0.</p> <p>Changed to:</p> <p>...</p> <p>C - Short_Packet_Length (3 bits): A 3-bit unsigned integer that specifies the length, in bytes, of the RDP-UDP2 Packet (section 2.2.2.1) that follows the PacketPrefixByte if the size is less than or equal to 7 bytes. If the length of the RDP-UDP2 Packet (section 2.2.2.1) that follows the PacketPrefixByte is greater than 7 bytes, then this field MUST be set to 7.</p> <p>In Section 3.1.1.1.5, RDP-UDP2 Packet Network Format, changed the number that the Short_Packet_Length field should be set to from 0 to 7 if the RDP-UDP2 packet size is greater than or equal to 7 bytes.</p> <p>Changed from:</p> <p>Each RDP-UDP2 packet should include a PacketPrefixByte as defined in section</p>

Errata Published*	Description
	<p>2.2.2.1.3. If the RDP-UDP2 packet size is less than 7 bytes, then the Short_Packet_Length field MUST be set to the size of the RDP-UDP2 packet. If the RDP-UDP2 packet size is greater than or equal to 7 bytes, then the Short_Packet_Length field MUST be set to 0.</p> <p>Changed to:</p> <p>Each RDP-UDP2 packet should include a PacketPrefixByte as defined in section 2.2.2.1.3. If the RDP-UDP2 packet size is less than 7 bytes, then the Short_Packet_Length field MUST be set to the size of the RDP-UDP2 packet. If the RDP-UDP2 packet size is greater than or equal to 7 bytes, then the Short_Packet_Length field MUST be set to 7.</p>
2019/02/19	<p>In Section 3.1.1.1.5, RDP-UDP2 Packet Network Format, described a dummy packet and its processing rules when it follows the PacketPrefixByte structure.</p> <p>Changed from:</p> <p>...</p> <ul style="list-style-type: none"> <li>• If Packet_Type_Index is set to 8, then a dummy packet follows the PacketPrefixByte.</li> </ul> <p>Changed to:</p> <p>...</p> <ul style="list-style-type: none"> <li>• If Packet_Type_Index is set to 8, then a dummy packet follows the PacketPrefixByte. A dummy packet is treated as a normal RDP-UDP2 packet by the UDP transport. However, loss of this packet MUST not generate a retransmit. In addition, the contents MUST be ignored by higher layers using the UDP transport.</li> </ul>
2019/02/19	<p>In Section 3.1.1.1.5.1, Sending RDP-UDP2 Packet, clarified when the Short_Packet_Length field of the PacketPrefixByte structure must be set to 7.</p> <p>Changed from:</p> <p>...</p> <p>2. If the size of the RDP-UDP2 Packet Layout is less than 7 bytes, then it MUST be padded to be of length of 7 bytes and the original length in bytes MUST be set in the Short_Packet_Length field of the PacketPrefixByte structure.</p> <p>...</p> <p>Changed to:</p> <p>...</p> <p>2. If the size of the RDP-UDP2 Packet Layout is less than 7 bytes, then it MUST be padded to be of length of 7 bytes and the original length in bytes MUST be set in the Short_Packet_Length field of the PacketPrefixByte structure. Otherwise, the Short_Packet_Length field of the PacketPrefixByte structure MUST be set to 7.</p> <p>...</p>

\*Date format: YYYY/MM/DD

## [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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## [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 [V20.0 - 2018/09/12](#).

Errata Published*	Description
2019/02/19	<p>In Section 4.2.4.1, Input TS_RFX_TILESET Message, updated the first line of an annotated dump of a TS_RFX_TILESET message containing a single encoded 64x64 tile from "00000000 c7 cc 3e 0b 00 00 01 01 c2 ca 00 00 51 50 01 40" to "00000000 c7 cc 3e 0b 00 00 01 00 c2 ca 00 00 51 50 01 40".</p> <p>Changed from: The following is an annotated dump of a TS_RFX_TILESET (section 2.2.2.3.4) message containing a single encoded 64x64 tile.</p> <pre>00000000 c7 cc 3e 0b 00 00 01 01 c2 ca 00 00 51 50 01 40 ...</pre> <p>Changed to: The following is an annotated dump of a TS_RFX_TILESET (section 2.2.2.3.4) message containing a single encoded 64x64 tile.</p> <pre>00000000 c7 cc 3e 0b 00 00 01 00 c2 ca 00 00 51 50 01 40 ...</pre>
2019/02/19	<p>In Section 3.1.8.1.6, Linearization, updated the converted value of -10 to 10 after coefficients from LL3 undergo differential encoding.</p> <p>Changed from: ...</p> <p>The coefficients from LL3 also undergo differential encoding. Except for the first coefficient, every raster-scanned LL3 coefficient is subtracted from its previous neighbor. For example, if the raster-scanned LL3 coefficients are</p> <pre>[64, 32, 42, 54, 50, 60, 40, 70]</pre> <p>Then, after differential encoding, they would get converted to</p>

Errata Published*	Description
	<p>[64, -32, 10, 12, -4, -10, -20, 30]</p> <p>Changed to:</p> <p>...</p> <p>The coefficients from LL3 also undergo differential encoding. Except for the first coefficient, every raster-scanned LL3 coefficient is subtracted from its previous neighbor. For example, if the raster-scanned LL3 coefficients are</p> <p>[64, 32, 42, 54, 50, 60, 40, 70]</p> <p>Then, after differential encoding, they would get converted to</p> <p>[64, -32, 10, 12, -4, 10, -20, 30]</p>

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

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## [MS-RMSOD]: Rights Management Services Protocols Overview

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## [MS-RPCE]: Remote Procedure Call Protocol Extensions

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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 [V32.0 – 2018/09/12](#).

Errata Published*	Description														
2018/12/10	<p>In Section 1.7, Versioning and Capability Negotiation, changed from:</p> <ul style="list-style-type: none"><li>Capability Negotiation: Functional negotiation ... by comparing the value returned by the server in the dwBuildNumber member of OSVERSIONINFO (section 2.2.3.10.1) with well-known version-specific dwBuildNumber values.&lt;2&gt;</li></ul> <p>&lt;2&gt; Section 1.7: The values of the dwBuildNumber member in the OSVERSIONINFO structure (section 2.2.3.10.1) for specific versions of Windows are shown in the table that follows.</p> <table border="1"><thead><tr><th>Version</th><th>dwBuildNumber value</th></tr></thead><tbody><tr><td>Windows 10 and Windows Server 2016</td><td>&gt;= 10586</td></tr><tr><td>...</td><td>...</td></tr></tbody></table> <p>Changed to:</p> <ul style="list-style-type: none"><li>Capability Negotiation: Functional negotiation ... by comparing the value returned by the server in the dwBuildNumber member of OSVERSIONINFO (section 2.2.3.10.1) with well-known version-specific dwBuildNumber values.&lt;2&gt;</li></ul> <p>&lt;2&gt; Section 1.7: The values of the dwBuildNumber member in the OSVERSIONINFO structure (section 2.2.3.10.1) for specific versions of Windows are shown in the table that follows.</p> <table border="1"><thead><tr><th>Version</th><th>dwBuildNumber value</th></tr></thead><tbody><tr><td>Windows Server operating system</td><td>&gt;= 16299</td></tr><tr><td>Windows 10 and Windows Server 2016</td><td>&gt;= 10586</td></tr><tr><td>...</td><td>...</td></tr></tbody></table>	Version	dwBuildNumber value	Windows 10 and Windows Server 2016	>= 10586	...	...	Version	dwBuildNumber value	Windows Server operating system	>= 16299	Windows 10 and Windows Server 2016	>= 10586	...	...
Version	dwBuildNumber value														
Windows 10 and Windows Server 2016	>= 10586														
...	...														
Version	dwBuildNumber value														
Windows Server operating system	>= 16299														
Windows 10 and Windows Server 2016	>= 10586														
...	...														

Errata Published*	Description
	<p>In Section 2.2.3.10.1, OSVERSIONINFO, changed from:</p> <p>dwBuildNumber (4 bytes): The build number of the OS. This is a version-specific value.&lt;168&gt;</p> <p>&lt;168&gt; Section 2.2.3.10.1: The values of the dwBuildNumber member in the OSVERSIONINFO structure (section 2.2.3.10.1) for specific versions of Windows is shown in the table that follows. On Windows Vista and later, an error is returned if the value is less than that shown in the table.</p> <p>Changed to:</p> <p>dwBuildNumber (4 bytes): The build number of the OS. This is a version-specific value.&lt;168&gt;</p> <p>&lt;168&gt; Section 2.2.3.10.1: The values of the dwBuildNumber member in the OSVERSIONINFO structure (section 2.2.3.10.1) for specific versions of Windows are listed in the product behavior note for dwBuildNumber in Versioning and Capability Negotiation (section 1.7).</p> <p>In Section 3.1.4.1.8.8, SPLCLIENT_CONTAINER Parameters, changed from:</p> <p>pClientInfo: This parameter is a pointer to an SPLCLIENT_CONTAINER (section 2.2.1.2.14) structure that specifies client information. The Level member of the SPLCLIENT_CONTAINER structure MUST be 0x00000001.&lt;245&gt; The value of the dwBuildNum member is used to verify that the client OS version is valid. It is a version-specific number.&lt;246&gt;</p> <p>&lt;246&gt; Section 3.1.4.1.8.8: The values of the dwBuildNumber member in the OSVERSIONINFO structure (section 2.2.3.10.1) for specific versions of Windows are listed in the product behavior note for dwBuildNumber in Versioning and Capability Negotiation (section 1.7).</p> <p>Changed to:</p> <p>pClientInfo: This parameter is a pointer to an SPLCLIENT_CONTAINER (section 2.2.1.2.14) structure that specifies client information. The Level member of the SPLCLIENT_CONTAINER structure MUST be 0x00000001.&lt;245&gt; The value of the dwBuildNum member is used to verify that the client OS version is valid. It is a version-specific number.&lt;246&gt;</p> <p>&lt;246&gt; Section 3.1.4.1.8.8: The values of the dwBuildNumber member in the OSVERSIONINFO structure (section 2.2.3.10.1) for specific versions of Windows are listed in the product behavior note for dwBuildNumber in Versioning and Capability Negotiation (section 1.7).</p> <p>On Windows Vista and later, an error is returned if the value is less than that shown for the corresponding Windows version in the table.</p>
2018/10/29	<p>In Section 2.2.3.10.1, OSVERSIONINFO, the description of dwBuildNumber has been changed from:</p> <p>dwBuildNumber (4 bytes): The build number of the OS.&lt;168&gt;.</p> <p>Changed to:</p>

Errata Published*	Description
	<p>dwBuildNumber (4 bytes): The build number of the OS. This SHOULD&lt;168&gt; be a version-specific value.</p> <p>In Section 3.1.4.1.8.8, SPLCLIENT_CONTAINER Parameters, the following has been changed from:</p> <p>pClientInfo: This parameter is a pointer to an SPLCLIENT_CONTAINER (section 2.2.1.2.14) structure that specifies client information. The Level member of the SPLCLIENT_CONTAINER structure MUST be 0x00000001.&lt;245&gt;</p> <p>Changed to:</p> <p>pClientInfo: This parameter is a pointer to an SPLCLIENT_CONTAINER (section 2.2.1.2.14) structure that specifies client information. The Level member of the SPLCLIENT_CONTAINER structure MUST be 0x00000001.&lt;245&gt; The dwBuildNum member is used to verify that the client OS version is valid. It SHOULD&lt;246&gt; be a version-specific number.</p> <p>In Section 7, Appendix B: Product Behavior, the following behavior notes have been changed.</p> <p>Changed from:</p> <p>&lt;168&gt; Section 2.2.3.10.1: The dwBuildNumber value for OSVERSIONINFO and OSVERSIONINFOEX for specific versions of Windows is shown in the table that follows.</p> <p>Changed to:</p> <p>&lt;168&gt; Section 2.2.3.10.1: The dwBuildNumber value for OSVERSIONINFO and OSVERSIONINFOEX for specific versions of Windows is shown in the table that follows. On Windows Vista and later, an error is returned if the value is less than that shown in the table.</p> <p>Changed from:</p> <p>&lt;245&gt; Section 3.1.4.1.8.8: Windows does not use the following members: pUserName, dwBuildNum, dwMajorVersion, dwMinorVersion, and wProcessorArchitecture. pMachineName is used only if the server cannot determine the client machine name using remote procedure call (RPC) functions. The pMachineName member can be NULL.</p> <p>Changed to:</p> <p>&lt;245&gt; Section 3.1.4.1.8.8: Windows does not use the following members: pUserName, dwMajorVersion, dwMinorVersion, and wProcessorArchitecture. pMachineName is used only if the server cannot determine the client machine name using remote procedure call (RPC) functions. The pMachineName member can be NULL.</p> <p>In that section a new behavior note 246 has been added:</p>

Errata Published*	Description
	<246> Section 3.1.4.1.8.8: Windows version-specific values are listed in the product behavior note for dwBuildNumber in OSVERSIONINFO structure (section 2.2.3.10.1).

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

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## [MS-RRP]: Windows Remote Registry Protocol

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

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## [MS-RSVD]: Remote Shared Virtual Disk Protocol

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## [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)

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## [MS-SCMR]: Service Control Manager Remote Protocol

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## [MS-SHLLINK]: Shell Link (.LNK) Binary File Format

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

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Errata below are for Protocol Document Version [V56.0 – 2018/09/12](#).

Errata Published*	Description
2018/12/17	<p>In Section 2.2.2.2.1, MOVE_DST_IPADDR structure, the description of the (IPv4Address/Reserved2)/ IPv6Address (16 bytes) field has been changed from:</p> <p>(IPv4Address/Reserved2)/ IPv6Address (16 bytes): This field is interpreted in different ways depending on the type of IP address passed in.</p> <p>Reserved2 (12 bytes): The client MUST set this to 0, and the server MUST ignore it on receipt.</p> <p>If the value of the Type field is MOVE_DST_IPADDR_V6, this field is the IPv6Address field.</p> <p>Changed to:</p> <p>(IPv4Address/Reserved2)/ IPv6Address (16 bytes): This field is interpreted in different ways depending on the value of the Type field.</p> <p>Reserved2 (12 bytes): The server MUST set this to 0, and the client MUST ignore it on receipt.</p> <p>If the value of the Type field is MOVE_DST_IPADDR_V6, this field is the IPv6Address field.</p>

Errata Published*	Description
	<p>In Section 3.3.5.7, Receiving an SMB2 TREE_CONNECT Request, the following has been changed from:</p> <p>If TreeConnect.Share.Type includes STYPE_CLUSTER_SOFS, Connection.Dialect is "3.1.1" and the SMB2_TREE_CONNECT_FLAG_REDIRECT_TO_OWNER bit is set in the Flags field of the SMB2 TREE_CONNECT request, the server MUST query the underlying object store in an implementation-specific manner to determine whether the share is hosted on this node. If not, the server MUST return error data as specified in section 2.2.2 with ErrorData set to SMB2_ERROR_Context response formatted as ErrorId set to SMB2_ERROR_ID_SHARE_REDIRECT, and ErrorContextData set to the Share Redirect error context data as specified in section 2.2.2.2 with IPAddrMoveList set to the list of IP addresses obtained in an implementation-specific manner.</p> <p>Changed to:</p> <p>If TreeConnect.Share.Type includes STYPE_CLUSTER_SOFS, Connection.Dialect is "3.1.1" and the SMB2_TREE_CONNECT_FLAG_REDIRECT_TO_OWNER bit is set in the Flags field of the SMB2 TREE_CONNECT request, the server MUST query the underlying object store in an implementation-specific manner to determine whether the share is hosted on this node. If not, the server MUST fail the tree connect request by setting the Status field in SMB2 header to STATUS_BAD_NETWORK_NAME, return error data as specified in section 2.2.2 with ErrorData set to SMB2_ERROR_Context response formatted as ErrorId set to SMB2_ERROR_ID_SHARE_REDIRECT, and ErrorContextData set to the Share Redirect error context data as specified in section 2.2.2.2 with IPAddrMoveList set to the list of IP addresses determined for where to access the share.</p> <p>In this same section, changed from:</p> <p>If Connection.Dialect is "3.0.2" or "3.1.1" and TreeConnect.Share.Type includes STYPE_CLUSTER_SOFS, the server SHOULD&lt;239&gt; set the SMB2_SHARE_CAP_ASYMMETRIC bit in the Capabilities field in an implementation specific manner.</p> <p>If Connection.Dialect is "3.1.1" and TreeConnect.Share.SupportsIdentityRemoting is set, the server MUST set the SMB2_SHAREFLAG_IDENTITY_REMOTING bit in the ShareFlags field of the SMB2 TREE_CONNECT response.</p> <p>If Connection.Dialect is "3.1.1", TreeConnect.Share.Type includes STYPE_CLUSTER_SOFS, and the SMB2_TREE_CONNECT_FLAG_REDIRECT_TO_OWNER bit is set in the Flags field of the SMB2 TREE_CONNECT request, the server MUST fail the tree connect request with a STATUS_BAD_NETWORK_NAME error, set the ErrorId in the SMB2 Error Context response to SMB2_ERROR_ID_SHARE_REDIRECT, and return an error context response, as specified in section 2.2.2.2, with IPAddrMoveList set to the list of IP addresses obtained in a implementation-specific manner.</p> <p>&lt;239&gt; Section 3.3.5.7: Windows Server 2012 R2 also verifies whether TreeConnect.Share is asymmetric before setting the SMB2_SHARE_CAP_ASYMMETRIC bit in</p> <p>Changed to:</p> <p>If Connection.Dialect is "3.0.2" or "3.1.1", TreeConnect.Share.Type includes STYPE_CLUSTER_SOFS, and TreeConnect.Share is asymmetric, the server MUST set the SMB2_SHARE_CAP_ASYMMETRIC bit in the Capabilities field.</p>

Errata Published*	Description
	<p>If Connection.Dialect is "3.1.1" and TreeConnect.Share.SupportsIdentityRemoting is set, the server MUST set the SMB2_SHAREFLAG_IDENTITY_REMOTING bit in the ShareFlags field of the SMB2 TREE_CONNECT response.</p> <p>If Connection.Dialect is "3.1.1", TreeConnect.Share.Type includes STYPE_CLUSTER_SOFs, and the SMB2_TREE_CONNECT_FLAG_REDIRECT_TO_OWNER bit is set in the Flags field of the SMB2 TREE_CONNECT request and the SMB2_SHARE_CAP_ASYMMETRIC bit is set in the Capabilities field, the server SHOULD&lt;239&gt; set the SMB2_SHARE_CAP_REDIRECT_TO_OWNER bit in the Capabilities field.</p> <p>&lt;239&gt; Section 3.3.5.7: Windows Server v1709 operating system and later and Windows Server 2019 and later support the SMB2_SHARE_CAP_REDIRECT_TO_OWNER bit.</p>
2018/12/10	<p>In Section 3.3.5.9.12, Handling the SMB2_CREATE_DURABLE_HANDLE_RECONNECT_V2 Create Context, the following has been changed from:</p> <p>The server MUST look up an existing Open in the GlobalOpenTable by doing a lookup with the FileId.Persistent portion of the create context.</p> <p>If the lookup fails, the server SHOULD&lt;280&gt; fail the request with STATUS_OBJECT_NAME_NOT_FOUND and proceed as specified in "Failed Open Handling" in section 3.3.5.9.</p> <p>&lt;281&gt; Section 3.3.5.9.12: Windows Server 2012 with [KB2770917] and Windows 8 with [KB2770917] fail the CREATE request with STATUS_INVALID_PARAMETER if the request includes the SMB2_DHANDLE_FLAG_PERSISTENT bit in the Flags field of the SMB2_CREATE_DURABLE_HANDLE_RECONNECT_V2 Create Context.</p> <p>If the Session was established by specifying PreviousSessionId in the SMB2 SESSION_SETUP request, therefore invalidating the previous session, Windows 8.1 and Windows Server 2012 R2 close the durable opens established on the previous session.</p> <p>Changed to:</p> <p>The server MUST look up an existing Open in the GlobalOpenTable by doing a lookup with the FileId.Persistent portion of the create context.</p> <p>If the lookup fails:</p> <p>If the request includes the SMB2_DHANDLE_FLAG_PERSISTENT bit in the Flags field of the SMB2_CREATE_DURABLE_HANDLE_RECONNECT_V2 create context, the server MUST look up an existing Open in the GlobalOpenTable by doing a lookup with the CreateGuid of the create context. If the lookup fails, the server SHOULD&lt;281&gt; fail the request with STATUS_OBJECT_NAME_NOT_FOUND and proceed as specified in "Failed Open Handling" in section 3.3.5.9.</p> <p>Otherwise, the server SHOULD&lt;282&gt; fail the request with STATUS_OBJECT_NAME_NOT_FOUND and proceed as specified in "Failed Open Handling" in section 3.3.5.9.</p> <p>&lt;281&gt; Section 3.3.5.9.12: Windows 8 with [KB2770917] and Windows Server 2012 with [KB2770917] fail the CREATE request with STATUS_INVALID_PARAMETER.</p> <p>&lt;282&gt; Section 3.3.5.9.12: If the Session was established by specifying PreviousSessionId in the SMB2 SESSION_SETUP request, therefore invalidating the previous session, Windows 8.1 and Windows Server 2012 R2 close the durable opens established on the previous session.</p>
2018/12/10	<p>In Section 3.2.5.5, Receiving an SMB2 TREE_CONNECT Response, the following has been changed from:</p>

Errata Published*	Description
	<p>If Connection.Dialect is "3.1.1", the Status field in the SMB2 header of the response is STATUS_BAD_NETWORK_NAME, and the ErrorId in the SMB2 Error Context response is set to SMB2_ERROR_ID_SHARE_REDIRECT, the client MUST return the Share Redirect Error Context response to the calling application as specified in section 2.2.2.2.2.</p> <p>Changed to:</p> <p>If Connection.Dialect is "3.1.1", SMB2_TREE_CONNECT_FLAG_REDIRECT_TO_OWNER bit is set in the Flags field of the SMB2 TREE_CONNECT Request, the Status field in the SMB2 header of the response is STATUS_BAD_NETWORK_NAME, and the ErrorId in the SMB2 Error Context response is set to SMB2_ERROR_ID_SHARE_REDIRECT, the client MUST return the Share Redirect Error Context response to the calling application as specified in section 2.2.2.2.2.</p>
2018/11/12	<p>In Section 2.2.37, SMB2 QUERY_INFO Request, the following has been added to the list under FileInfoClass:</p> <ul style="list-style-type: none"> <li>• FileIdInformation</li> </ul> <p>In Section 3.3.5.20.1, Handling SMB2_0_INFO_FILE, the following was added:</p> <p>If the server does not implement the SMB 3.x dialect family and the request is for the FileIdInformation information class, the server MUST fail the request with STATUS_NOT_SUPPORTED.</p>
2018/10/29	<p>In Section 2.2.31, SMB2 IOCTL Request, the following has been changed from:</p> <p>Buffer (variable): A variable-length buffer that contains the input and output data buffer for the request, as described by the InputOffset, InputCount, OutputOffset, and OutputCount. There is no minimum size restriction for this field as there can be FSCTLs with no input or output buffers. For FSCTL_SRV_COPYCHUNK or FSCTL_SRV_COPYCHUNK_WRITE, the format of this buffer is specified in SRV_COPYCHUNK_COPY. The Buffer format for FSCTL_DFS_GET_REFERRALS is specified in [MS-DFSC] section 2.2.2. The format of this buffer for all other FSCTLs is specified in the reference topic for the FSCTL being called.</p> <p>Changed to:</p> <p>Buffer (variable): A variable-length buffer that contains the input and output data buffer for the request, as described by the InputOffset, InputCount, OutputOffset, and OutputCount. There is no minimum size restriction for this field as there can be FSCTLs with no input or output buffers. The format of this buffer for FSCTLs is specified in subsequent sections of 3.2.4.20.</p> <p>In Section 3.2.4.20.2.2, Application Requests a Server Side Data Copy, the following has been changed from:</p> <p>The SMB2 IOCTL Request MUST be initialized as follows:</p> <ul style="list-style-type: none"> <li>• The CtlCode field MUST be set to the FSCTL code supplied by the application.</li> <li>• The FileId field is set to Open.FileId.</li> <li>• The InputOffset field is set to the offset to the Buffer[], in bytes, from the beginning of the SMB2 header.</li> </ul>

Errata Published*	Description
	<ul style="list-style-type: none"> <li>• The InputCount is set to the size, in bytes, of the SRV_COPYCHUNK_COPY structure that is constructed following the syntax specified in section 2.2.31.1.1 with the client input parameters as follows:</li> <li>• The client sets the SourceKey field to the key of the source file.</li> <li>• For each range to be copied, the client initializes a SRV_COPYCHUNK structure following the syntax specified in section 2.2.31.1.1 using the provided source offset, destination offset, and length, in bytes.</li> <li>• The ChunkCount is set to the number of chunks being sent.</li> <li>• The SRV_COPYCHUNK_COPY structure is copied into the request at InputOffset bytes from the beginning of the SMB2 header.</li> <li>• The OutputOffset field SHOULD&lt;125&gt; be set to zero.</li> <li>• The OutputCount field is set to 0.</li> <li>• The MaxInputResponse field is set to 0.</li> <li>• The MaxOutputResponse field is set to the size of a SRV_COPYCHUNK_RESPONSE structure, as specified in section 2.2.32.1.</li> <li>• SMB2_0_IOCTL_IS_FSCTL is set to TRUE in the Flags field.</li> </ul> <p>The request MUST be sent to the server.</p> <p>Changed to:</p> <p>The SMB2 IOCTL Request MUST be initialized as follows:</p> <ul style="list-style-type: none"> <li>• The CtlCode field MUST be set to the FSCTL code supplied by the application.</li> <li>• The FileId field is set to Open.FileId.</li> <li>• The Buffer field is set to an SRV_COPYCHUNK_COPY Request, as specified in section 2.2.31.1.</li> <li>• The SourceKey field is set to the key of the source file.</li> <li>• For each range to be copied, the client initializes the Chunks field following the syntax specified in section 2.2.31.1.1 using the application provided source offset, destination offset, and length, in bytes.</li> <li>• The ChunkCount is set to the number of chunks being sent.</li> <li>• The InputOffset field is set to the offset to the Buffer, in bytes, from the beginning of the SMB2 header.</li> <li>• The InputCount is set to the size, in bytes, of the Buffer field.</li> <li>• The OutputOffset field SHOULD&lt;125&gt; be set to zero.</li> <li>• The OutputCount field is set to 0.</li> <li>• The MaxInputResponse field is set to 0.</li> <li>• The MaxOutputResponse field is set to the size of a SRV_COPYCHUNK_RESPONSE structure, as specified in section 2.2.32.1.</li> <li>• SMB2_0_IOCTL_IS_FSCTL is set to TRUE in the Flags field.</li> </ul> <p>The request MUST be sent to the server.</p> <p>In Section 3.2.4.20.3, Application Requests DFS Referral Information, the following has been changed from:</p> <p>The application provides the following:</p> <ul style="list-style-type: none"> <li>• ServerName: The name of the server from which to query referrals.</li> <li>• UserCredentials: An opaque implementation-specific entity that identifies the credentials to be used when authenticating to the remote server.</li> <li>• The maximum output buffer response size, in bytes.</li> <li>• An input buffer containing the application-provided REQ_GET_DFS_REFERRAL or REQ_GET_DFS_REFERRAL_EX structure.</li> </ul>

Errata Published*	Description
	<ul style="list-style-type: none"> <li>• FSCTL code.</li> </ul> <p>Changed to:</p> <p>The application provides the following:</p> <ul style="list-style-type: none"> <li>• ServerName: The name of the server from which to query referrals.</li> <li>• UserCredentials: An opaque implementation-specific entity that identifies the credentials to be used when authenticating to the remote server.</li> <li>• The maximum output buffer response size, in bytes.</li> <li>• An input buffer containing the application-provided structure REQ_GET_DFS_REFERRAL specified in [MS-DFSC] section 2.2.2 or REQ_GET_DFS_REFERRAL_EX specified in [MS-DFSC] section 2.2.3.</li> <li>• The FSCTL code for DFS referral information, either FSCTL_DFS_GET_REFERRALS or FSCTL_DFS_GET_REFERRALS_EX.</li> </ul> <p>In Section 3.2.4.20.7, Application Requests Content Information for a File, the following has been changed from:</p> <p>The SMB2 IOCTL Request MUST be initialized as follows:</p> <ul style="list-style-type: none"> <li>• The CtlCode field is set to FSCTL_SRV_READ_HASH.</li> <li>• The FileId field is set to Open.FileId.</li> <li>• The InputOffset field is set to the offset to the Buffer[], in bytes, from the beginning of the SMB2 header.</li> <li>• The InputCount is set to the size, in bytes, of the SRV_READ_HASH request structure that is constructed following the syntax specified in section 2.2.31.2 with the client input parameters as follows: <ul style="list-style-type: none"> <li>• The client initializes a SRV_READ_HASH request structure following the syntax specified in section 2.2.31.2 using the application-provided hash type, hash version, hash retrieval type, length and offset, in bytes.</li> <li>• The SRV_READ_HASH request structure is copied into the request at InputOffset bytes from the beginning of the SMB2 header.</li> <li>• The OutputOffset field SHOULD&lt;132&gt; be set to zero.</li> <li>• The OutputCount field is set to 0.</li> <li>• The MaxInputResponse field is set to 0.</li> <li>• The MaxOutputResponse field is set to the maximum number of bytes that the application expects to retrieve.</li> <li>• The SMB2_0_IOCTL_IS_FSCTL in the Flags field is set to TRUE.</li> </ul> </li> </ul> <p>The request MUST be sent to the server, and the response from the server MUST be handled as described in section 3.2.5.14.7.</p> <p>The status of the response MUST be returned to the application.</p> <p>Changed to:</p> <p>The SMB2 IOCTL Request MUST be initialized as follows:</p> <ul style="list-style-type: none"> <li>• The CtlCode field is set to FSCTL_SRV_READ_HASH.</li> <li>• The FileId field is set to Open.FileId.</li> <li>• The Buffer field is set to an SRV_READ_HASH Request, as specified in section 2.2.31.2.</li> <li>• The client initializes an SRV_READ_HASH request structure following the syntax specified in section 2.2.31.2 using the application-provided hash type, hash version, hash retrieval type, length, and offset, in bytes.</li> <li>• The InputOffset field is set to the offset to the Buffer, in bytes, from the</li> </ul>

Errata Published*	Description
	<p>beginning of the SMB2 header.</p> <ul style="list-style-type: none"> <li>• The InputCount is set to the size, in bytes, of the Buffer field.</li> <li>• The OutputOffset field SHOULD&lt;132&gt; be set to zero.</li> <li>• The OutputCount field is set to 0.</li> <li>• The MaxInputResponse field is set to 0.</li> <li>• The MaxOutputResponse field is set to the maximum number of bytes that the application expects to retrieve.</li> <li>• The SMB2_0_IOCTL_IS_FSCTL in the Flags field is set to TRUE.</li> </ul> <p>The request MUST be sent to the server, and the response from the server MUST be handled as described in section 3.2.5.14.7.</p> <p>The status of the response MUST be returned to the application.</p> <p>In Section 3.2.4.20.8, Application Requests Resiliency on an Open File, the following has been changed from:</p> <p>The SMB2 IOCTL Request MUST be initialized as follows:</p> <ul style="list-style-type: none"> <li>• The CtlCode field MUST be set to FSCTL_LMR_REQUEST_RESILIENCY.</li> <li>• The FileId field MUST be set to Open.FileId.</li> <li>• The InputOffset field MUST be set to the offset to the Buffer[], in bytes, from the beginning of the SMB2 header.</li> <li>• The InputCount field MUST be set to the size, in bytes, of the NETWORK_RESILIENCY_REQUEST structure specified in section 2.2.31.3.</li> <li>• A NETWORK_RESILIENCY_REQUEST structure MUST be appended to the request at InputOffset bytes from the beginning of the SMB2 header. The Timeout field of the NETWORK_RESILIENCY_REQUEST structure MUST be set to the time-out (in milliseconds) provided by the application.</li> <li>• The OutputOffset field SHOULD&lt;133&gt; be set to zero.</li> <li>• The OutputCount field MUST be set to 0.</li> <li>• The MaxInputResponse field MUST be set to 0.</li> <li>• The MaxOutputResponse field MUST be set to 0.</li> <li>• SMB2_0_IOCTL_IS_FSCTL in the Flags field MUST be set to TRUE.</li> </ul> <p>The request MUST be sent to the server, and the response from the server MUST be handled as described in section 3.2.5.14.9.</p> <p>The status of the response MUST be returned to the application.</p> <p>Changed to:</p> <p>The SMB2 IOCTL Request MUST be initialized as follows:</p> <ul style="list-style-type: none"> <li>• The CtlCode field MUST be set to FSCTL_LMR_REQUEST_RESILIENCY.</li> <li>• The FileId field MUST be set to Open.FileId.</li> <li>• The Buffer field is set to a NETWORK_RESILIENCY_REQUEST Request, as specified in section 2.2.31.3.</li> <li>• The Timeout field MUST be set to the application-provided time-out (in milliseconds).</li> <li>• The InputOffset field MUST be set to the offset to the Buffer, in bytes, from the beginning of the SMB2 header.</li> <li>• The InputCount field MUST be set to the size, in bytes, of the Buffer field.</li> <li>• The OutputOffset field SHOULD&lt;133&gt; be set to zero.</li> <li>• The OutputCount field MUST be set to 0.</li> <li>• The MaxInputResponse field MUST be set to 0.</li> <li>• The MaxOutputResponse field MUST be set to 0.</li> </ul>

Errata Published*	Description
	<ul style="list-style-type: none"> <li>• SMB2_0_IOCTL_IS_FSCTL in the Flags field MUST be set to TRUE.</li> </ul> <p>The request MUST be sent to the server, and the response from the server MUST be handled as described in section 3.2.5.14.9.</p> <p>The status of the response MUST be returned to the application.</p>
2018/10/29	<p>In Section 3.3.5.9, Receiving an SMB2 CREATE Request, the following has been changed from:</p> <p>If Connection.Dialect belongs to the SMB 3.x dialect family and the request does not contain SMB2_CREATE_DURABLE_HANDLE_RECONNECT Create Context or SMB2_CREATE_DURABLE_HANDLE_RECONNECT_V2 Create Context, the server MUST look up an existing open in the GlobalOpenTable where Open.FileName matches the file name in the Buffer field of the request. If an Open entry is found, and if all the following conditions are satisfied, the server MUST fail the request with STATUS_FILE_NOT_AVAILABLE.</p> <ul style="list-style-type: none"> <li>• Open.IsPersistent is TRUE</li> <li>• Open.Connection is NULL</li> <li>• Open.OplockLevel is not equal to SMB2_OPLOCK_LEVEL_BATCH</li> </ul> <p>Open.OplockLevel is not equal to SMB2_OPLOCK_LEVEL_LEASE or Open.Lease.LeaseState does not include SMB2_LEASE_HANDLE_CACHING</p> <p>Changed to:</p> <p>If Connection.Dialect belongs to the SMB 3.x dialect family and the request does not contain SMB2_CREATE_DURABLE_HANDLE_RECONNECT Create Context or SMB2_CREATE_DURABLE_HANDLE_RECONNECT_V2 Create Context, the server MUST look up an existing open in the GlobalOpenTable where Open.FileName matches the file name in the Buffer field of the request. If an Open entry is found, and if all the following conditions are satisfied, the server SHOULD&lt;240&gt; fail the request with STATUS_FILE_NOT_AVAILABLE.</p> <ul style="list-style-type: none"> <li>• Open.IsPersistent is TRUE</li> <li>• Open.Connection is NULL</li> </ul> <p>&lt;240&gt; Section 3.3.5.9: If Open.ClientGuid is not equal to the ClientGuid of the connection that received this request, Open.Lease.LeaseState is equal to RWH or Open.OplockLevel is equal to SMB2_OPLOCK_LEVEL_BATCH, Windows-based servers will attempt to break the lease/oplock and return STATUS_PENDING to process the create request asynchronously. Otherwise, if Open.Lease.LeaseState does not include SMB2_LEASE_HANDLE_CACHING and Open.OplockLevel is not equal to SMB2_OPLOCK_LEVEL_BATCH, Windows-based servers return STATUS_FILE_NOT_AVAILABLE.</p>
2018/10/29	<p>In Section 2.2.13.2.13, SMB2_CREATE_APP_INSTANCE_ID, the description of the StructureSize field has been changed from:</p> <p>StructureSize (2 bytes): The client MUST set this field to 20 , indicating the size of this structure.</p> <p>Changed to:</p> <p>StructureSize (2 bytes): This field MUST be set to 20 , indicating the size of this structure.</p>

Errata Published*	Description
	<p>In Section 2.2.13.2.15, SMB2_CREATE_APP_INSTANCE_VERSION, the description of the StructureSize field has been changed from:</p> <p>StructureSize (2 bytes): The client MUST set this field to 24, indicating the size of this structure.</p> <p>Changed to:</p> <p>StructureSize (2 bytes): This field MUST be set to 24, indicating the size of this structure.</p> <p>In Section 3.3.5.9.13, Handling the SMB2_CREATE_APP_INSTANCE_ID and SMB2_CREATE_APP_INSTANCE_VERSION Create Contexts, the following has been added:</p> <p>The server MAY validate the StructureSize field of the create context.</p>
2018/10/29	<p>In Section 3.2.5.19.3, Receiving an Oplock Break Acknowledgment Response, the following has been changed from:</p> <p>If the client receives success in the response, no further processing is required. If the client receives an error in the response to the Oplock Break Acknowledgment, the client MUST set Open.OplockLevel to SMB2_OPLOCK_LEVEL_NONE.</p> <p>Changed to:</p> <p>If the Status field in the SMB2 header of the response to the Oplock Break Acknowledgment is zero, no further processing is required. Otherwise, the client MUST set Open.OplockLevel to SMB2_OPLOCK_LEVEL_NONE.</p> <p>In Section 3.2.5.19.4, Receiving a Lease Break Acknowledgment Response, the following has been changed from:</p> <p>No processing is required for this response.</p> <p>Changed to:</p> <p>If the Status field in the SMB2 header of the response to the Lease Break Acknowledgment is zero, no further processing is required. Otherwise, the client MUST set File.LeaseState to SMB2_LEASE_NONE and Open.OplockLevel to SMB2_OPLOCK_LEVEL_NONE.</p>
2018/09/17	<p>In Section 2.2.13, SMB2 CREATE Request, in the list of values for the CreateOptions field, the description for the FILE_NO_INTERMEDIATE_BUFFERING value has been corrected (a key change is that a missing "not" has been added to the condition).</p> <p>Changed from:</p> <p>CreateOptions (4 bytes): Specifies the options to be applied when creating or opening the file. Combinations of the bit positions listed below are valid, unless otherwise noted. This field MUST be constructed using the following values.&lt;31&gt;</p>

Errata Published*	Description	
	Value	Meaning
	...	...
	FILE_NO_INTERMEDIATE_BUFFERING 0x00000008	File buffering is not performed on this open; file data is retained in memory before writing or after reading it from the underlying storage.
	...	...
	Changed to:	
	CreateOptions (4 bytes): Specifies the options to be applied when creating or opening the file. Combinations of the bit positions listed below are valid, unless otherwise noted. This field <b>MUST</b> be constructed using the following values.<31>	
	Value	Meaning
	...	...
	FILE_NO_INTERMEDIATE_BUFFERING 0x00000008	File buffering is not performed on this open; file data is <b>not</b> retained in memory upon writing it to, or reading it from, the underlying storage.
	...	...

\*Date format: YYYY/MM/DD

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

This topic lists the Errata found in [MS-SMBD] 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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## [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-SSTR]: Smooth Streaming Protocol

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## [MS-SWN]: Service Witness Protocol

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Errata below are for Protocol Document Version [V11.0 – 2018/09/12](#).

Errata Published*	Description
2019/02/19	<p>In Section 7, Appendix B: Product Behavior Product Behavior, note 2 has been changed from:</p> <p>&lt;2&gt; Section 3.1.3: Windows Server 2012 sets this value to 0x00010001. Windows Server 2012 R2, Windows Server 2016, Windows Server operating system, and Windows Server 2019 set this value to 0xFFFFFFFF.</p> <p>Changed to:</p> <p>&lt;2&gt; Section 3.1.3: Windows Server 2012 sets this value to 0x00010001. Windows Server 2012 R2, Windows Server 2016, Windows Server operating system, and Windows Server 2019 set this value to 0x00020000.</p>

\*Date format: YYYY/MM/DD

## [MS-TCC]: Tethering Control Channel Protocol

**This topic lists the Errata found in [MS-TCC] 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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## [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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## [MS-TSTS]: Terminal Services Terminal Server Runtime Interface Protocol

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## [MS-TSWP]: Terminal Services Workspace Provisioning Protocol

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## [MS-UAMG]: Update Agent Management Protocol

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

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## [MS-W32T]: W32Time Remote Protocol

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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-WDSOSD]: Windows Deployment Services Operation System Deployment Protocol

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

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

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# [MS-WKST]: Workstation Service Remote Protocol

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Errata below are for Protocol Document Version [V28.0 – 2018/09/12](#).

Errata Published*	Description
2018/11/12	<p>In Section 3.2.4.8, NetrUseGetInfo (Opnum 9), changed from:</p> <p>...</p> <p>The server MUST fill the return structures as follows:</p> <ul style="list-style-type: none"><li>• If the Level member is 0, the server MUST return the information about the connection by filling the USE_INFO_0_CONTAINER (section 2.2.5.25) structure in the Buffer field of the InfoStruct parameter as follows. USE_INFO_0_CONTAINER contains an array of USE_INFO_0 structures.<ul style="list-style-type: none"><li>• ui0_local set to Connection.local</li><li>• ui0_remote set to Connection.Remote</li></ul></li><li>• If the Level member is 1, the server MUST return the information about the connection by filling the USE_INFO_1_CONTAINER (section 2.2.5.26) structure in the Buffer field of the InfoStruct parameter as follows. USE_INFO_1_CONTAINER contains an array of USE_INFO_1 structures.<ul style="list-style-type: none"><li>• ui1_local set to Connection.local</li><li>• ui1_remote set to Connection.remote</li><li>• ui1_password set to NULL</li><li>• ui1_status set to Connection.status</li><li>• ui1_asg_type set to Connection.asgtype</li><li>• ui1_refcount set to Connection.refcount</li><li>• ui1_usecount set to Connection.useCount</li></ul></li><li>• If the Level member is 2, the server MUST return the information about the connection by filling the USE_INFO_2_CONTAINER (section 2.2.5.27) structure in the Buffer field of the InfoStruct parameter as follows. USE_INFO_2_CONTAINER contains an array of USE_INFO_2 structures.<ul style="list-style-type: none"><li>• ui2_local set to Connection.local</li><li>• ui2_remote set to Connection.remote</li><li>• ui2_password set to NULL</li><li>• ui2_status set to Connection.status</li><li>• ui2_asg_type set to Connection.asgtype</li><li>• ui2_refcount set to Connection.refcount</li><li>• ui2_usecount set to Connection.useCount</li><li>• ui2_domainname set to Connection.domain</li></ul></li><li>• If the Level member is 3, the server MUST return the information about the connection by filling the USE_INFO_3_CONTAINER structure in the Buffer field of the InfoStruct parameter as follows. USE_INFO_3_CONTAINER contains an array of</li></ul>

Errata Published*	Description
	<p>USE_INFO_3 structures.</p> <ul style="list-style-type: none"> <li>• ui2_local set to Connection.local</li> <li>• ui2_remote set to Connection.remote</li> <li>• ui2_password set to NULL</li> <li>• ui2_status set to Connection.status</li> <li>• ui2_asg_type set to Connection.asgtype</li> <li>• ui2_refcount set to Connection.refcount</li> <li>• ui2_usecount set to Connection.useCount</li> <li>• ui2_domainname set to Connection.domain</li> <li>• ui2_flag set to 0</li> </ul> <p>The server MUST invoke the event to end the client impersonation ([MS-RPCE] section 3.3.3.4.3.3).</p> <p>Changed to:</p> <p>...</p> <p>The server MUST fill the return structures as follows:</p> <ul style="list-style-type: none"> <li>• If the Level member is 0, the server MUST return the information about the connection by filling the USE_INFO_0_CONTAINER (section 2.2.5.25) structure in the Buffer field of the InfoStruct parameter as follows. USE_INFO_0_CONTAINER contains an array of USE_INFO_0 structures. <ul style="list-style-type: none"> <li>• ui0_local set to Connection.local</li> <li>• ui0_remote set to Connection.Remote</li> </ul> </li> <li>• If the Level member is 1, the server MUST return the information about the connection by filling the USE_INFO_1_CONTAINER (section 2.2.5.26) structure in the Buffer field of the InfoStruct parameter as follows. USE_INFO_1_CONTAINER contains an array of USE_INFO_1 structures. <ul style="list-style-type: none"> <li>• ui1_local set to Connection.local</li> <li>• ui1_remote set to Connection.remote</li> <li>• ui1_password set to NULL</li> <li>• ui1_status set to Connection.status</li> <li>• ui1_asg_type set to Connection.asgtype</li> <li>• ui1_refcount set to Connection.refcount</li> <li>• ui1_usecount set to Connection.usecount</li> </ul> </li> <li>• If the Level member is 2 or 3, the server MUST return the information about the connection by filling the USE_INFO_2_CONTAINER (section 2.2.5.27) structure in the Buffer field of the InfoStruct parameter as follows. USE_INFO_2_CONTAINER contains an array of USE_INFO_2 structures. <ul style="list-style-type: none"> <li>• ui2_local set to Connection.local</li> <li>• ui2_remote set to Connection.remote</li> <li>• ui2_password set to NULL</li> <li>• ui2_status set to Connection.status</li> <li>• ui2_asg_type set to Connection.asgtype</li> <li>• ui2_refcount set to Connection.refcount</li> <li>• ui2_usecount set to Connection.usecount</li> <li>• ui2_username set to Connection.username</li> <li>• ui2_domainname set to Connection.domain</li> </ul> </li> </ul> <p>The server MUST invoke the event to end the client impersonation ([MS-RPCE] section 3.3.3.4.3.3).</p>
2018/11/12	In Section 3.2.4.13, NetrJoinDomain2 (Opnum 22), changed from:

Errata Published*	Description																						
	<table border="1" data-bbox="500 233 1398 768"> <thead> <tr> <th data-bbox="508 233 954 279">Value/code</th> <th data-bbox="958 233 1390 279">Meaning</th> </tr> </thead> <tbody> <tr> <td data-bbox="508 283 954 329">...</td> <td data-bbox="958 283 1390 329">...</td> </tr> <tr> <td data-bbox="508 333 954 642">NETSETUP_MACHINE_PWD_PASSED 0x00000080</td> <td data-bbox="958 333 1390 642">Indicates that the Password parameter SHOULD&lt;58&gt; specify the password for the machine joining the domain. This flag is valid only for unsecured joins, which MUST be indicated by setting the NETSETUP_JOIN_UNSECURE flag. If this flag is set, the value of Password determines the value stored for the computer password during the join process.</td> </tr> <tr> <td data-bbox="508 646 954 693">...</td> <td data-bbox="958 646 1390 693">...</td> </tr> <tr> <td data-bbox="508 697 954 764">NETSETUP_INSTALL_INVOCATION 0x00040000</td> <td data-bbox="958 697 1390 764">Indicates that the protocol method was invoked during installation</td> </tr> </tbody> </table> <p data-bbox="483 814 618 840">Changed to:</p> <table border="1" data-bbox="500 877 1398 1671"> <thead> <tr> <th data-bbox="508 877 954 924">Value/code</th> <th data-bbox="958 877 1390 924">Meaning</th> </tr> </thead> <tbody> <tr> <td data-bbox="508 928 954 974">...</td> <td data-bbox="958 928 1390 974">...</td> </tr> <tr> <td data-bbox="508 978 954 1367">NETSETUP_MACHINE_PWD_PASSED 0x00000080</td> <td data-bbox="958 978 1390 1367">Indicates that the Password parameter SHOULD&lt;58&gt; specify the password for the machine joining the domain. This flag is valid only for unsecured joins, which MUST be indicated by setting the NETSETUP_JOIN_UNSECURE flag, or read-only joins, which MUST be indicated by setting the NETSETUP_JOIN_READONLY flag. If this flag is set, the value of Password determines the value stored for the computer password during the join process.</td> </tr> <tr> <td data-bbox="508 1371 954 1417">...</td> <td data-bbox="958 1371 1390 1417">...</td> </tr> <tr> <td data-bbox="508 1421 954 1593">NETSETUP_JOIN_READONLY 0x00000800</td> <td data-bbox="958 1421 1390 1593">Specifies that the join SHOULD &lt;121&gt; be performed in a read-only manner against an existing account object. This option is intended to enable the server to join a domain using a read-only domain controller.</td> </tr> <tr> <td data-bbox="508 1598 954 1665">NETSETUP_INSTALL_INVOCATION 0x00040000</td> <td data-bbox="958 1598 1390 1665">Indicates that the protocol method was invoked during installation</td> </tr> </tbody> </table> <p data-bbox="483 1682 1398 1734">&lt;121&gt; Section 3.2.4.13: Windows NT, Windows 2000, Windows XP, Windows Server 2003, and Windows Server 2003 R2 do not implement this option.</p> <p data-bbox="483 1776 1341 1801">In Section 3.2.4.13.3, Domain Join Specific Message Processing, changed from:</p>	Value/code	Meaning	...	...	NETSETUP_MACHINE_PWD_PASSED 0x00000080	Indicates that the Password parameter SHOULD<58> specify the password for the machine joining the domain. This flag is valid only for unsecured joins, which MUST be indicated by setting the NETSETUP_JOIN_UNSECURE flag. If this flag is set, the value of Password determines the value stored for the computer password during the join process.	...	...	NETSETUP_INSTALL_INVOCATION 0x00040000	Indicates that the protocol method was invoked during installation	Value/code	Meaning	...	...	NETSETUP_MACHINE_PWD_PASSED 0x00000080	Indicates that the Password parameter SHOULD<58> specify the password for the machine joining the domain. This flag is valid only for unsecured joins, which MUST be indicated by setting the NETSETUP_JOIN_UNSECURE flag, or read-only joins, which MUST be indicated by setting the NETSETUP_JOIN_READONLY flag. If this flag is set, the value of Password determines the value stored for the computer password during the join process.	...	...	NETSETUP_JOIN_READONLY 0x00000800	Specifies that the join SHOULD <121> be performed in a read-only manner against an existing account object. This option is intended to enable the server to join a domain using a read-only domain controller.	NETSETUP_INSTALL_INVOCATION 0x00040000	Indicates that the protocol method was invoked during installation
Value/code	Meaning																						
...	...																						
NETSETUP_MACHINE_PWD_PASSED 0x00000080	Indicates that the Password parameter SHOULD<58> specify the password for the machine joining the domain. This flag is valid only for unsecured joins, which MUST be indicated by setting the NETSETUP_JOIN_UNSECURE flag. If this flag is set, the value of Password determines the value stored for the computer password during the join process.																						
...	...																						
NETSETUP_INSTALL_INVOCATION 0x00040000	Indicates that the protocol method was invoked during installation																						
Value/code	Meaning																						
...	...																						
NETSETUP_MACHINE_PWD_PASSED 0x00000080	Indicates that the Password parameter SHOULD<58> specify the password for the machine joining the domain. This flag is valid only for unsecured joins, which MUST be indicated by setting the NETSETUP_JOIN_UNSECURE flag, or read-only joins, which MUST be indicated by setting the NETSETUP_JOIN_READONLY flag. If this flag is set, the value of Password determines the value stored for the computer password during the join process.																						
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NETSETUP_INSTALL_INVOCATION 0x00040000	Indicates that the protocol method was invoked during installation																						

Errata Published*	Description
	<p>The following statements define the sequence of message-processing operations:</p> <ol style="list-style-type: none"> <li>1. If the NETSETUP_MACHINE_PWD_PASSED bit is set in Options, and the NETSETUP_JOIN_UNSECURE bit is not set in Options, the server MUST return ERROR_INVALID_PARAMETER. Otherwise, message processing continues.</li> <li>2. If the NETSETUP_MACHINE_PWD_PASSED bit is set in Options, and AccountName is not NULL, the server MUST return ERROR_INVALID_PARAMETER. Otherwise, message processing continues.</li> <li>3. If the NETSETUP_MACHINE_PWD_PASSED bit is set in Options, and either Password is NULL or the length of the PasswordString is zero, the server MUST return ERROR_PASSWORD_RESTRICTION. Otherwise, message processing continues.</li> <li>4. If the NETSETUP_MACHINE_PWD_PASSED bit is set in Options, the value of PasswordString MUST be copied to the value of ComputerPasswordString, and PasswordString MUST be set to NULL.</li> <li>5. If the server processing the message is already joined to a domain, and the NETSETUP_DOMAIN_JOIN_IF_JOINED bit is not set in Options, the server MUST return NERR_SetupAlreadyJoined. Otherwise, message processing continues.</li> </ol> <p>...</p> <ol style="list-style-type: none"> <li>6. If DomainNameString contains the character "\",... The specified domain controller MUST be validated by invoking the DsrGetDcNameEx2 method ([MS-NRPC] section 3.5.4.3.1) on the DomainControllerString computer, specifying the following parameters: ...  <ul style="list-style-type: none"> <li>• Flags = B   J   R</li> </ul>           ...            If the call fails, or the returned domain controller name does not match DomainControllerString, the server MUST invoke the DsrGetDcNameEx2 method ([MS-NRPC] section 3.5.4.3.1) on the DomainControllerString computer, specifying the following parameters: ...  <ul style="list-style-type: none"> <li>• Flags = B   J   S</li> </ul>           ...</li> </ol> <p>29. The following LDAP attributes...</p> <p>Changed to:</p> <p>The following statements define the sequence of message-processing operations:</p> <ol style="list-style-type: none"> <li>1. If the NETSETUP_MACHINE_PWD_PASSED bit is set in Options, and the NETSETUP_JOIN_UNSECURE bit is not set in Options, the server MUST return ERROR_INVALID_PARAMETER. Otherwise, message processing continues.</li> <li>2. If the NETSETUP_MACHINE_PWD_PASSED bit is set in Options, and AccountName is not NULL, the server MUST return ERROR_INVALID_PARAMETER. Otherwise, message processing continues.</li> <li>3. If the NETSETUP_MACHINE_PWD_PASSED bit is set in Options, and either Password is NULL or the length of the PasswordString is zero, the server MUST return ERROR_PASSWORD_RESTRICTION. Otherwise, message processing continues.</li> <li>4. If the NETSETUP_MACHINE_PWD_PASSED bit is set in Options, the value of PasswordString MUST be copied to the value of ComputerPasswordString, and PasswordString MUST be set to NULL.</li> <li>5. If the NETSETUP_JOIN_READONLY bit is set in Options, and NETSETUP_MACHINE_PWD_PASSED bit is not set in Options, the server MUST return</li> </ol>

Errata Published*	Description
	<p>ERROR_INVALID_PARAMETER. Otherwise, message processing continues.</p> <p>6. If the NETSETUP_JOIN_READONLY bit is set in Options, and the NETSETUP_ACCT_CREATE bit is set in Options, the server MUST return ERROR_INVALID_PARAMETER. Otherwise, message processing continues.</p> <p>7. If the NETSETUP_JOIN_READONLY bit is set in Options, the server MUST perform all subsequent message processing as if NETSETUP_DEFER_SPN_SET and NETSETUP_JOIN_UNSECURE bits are set in Options.</p> <p>8. If the server processing the message is already joined to a domain, and the NETSETUP_DOMAIN_JOIN_IF_JOINED bit is not set in Options, the server MUST return NERR_SetupAlreadyJoined. Otherwise, message processing continues....</p> <p>9. If DomainNameString contains the character "\",...</p> <p>The specified domain controller MUST be validated by invoking the DsrGetDcNameEx2 method ([MS-NRPC] section 3.5.4.3.1) on the DomainControllerString computer, specifying the following parameters:</p> <p>...</p> <ul style="list-style-type: none"> <li>• Flags : if NETSETUP_JOIN_READONLY bit is set in Options, set Flags = (B   R); otherwise set Flags to (B   J   R)</li> </ul> <p>...</p> <p>If the call fails, or the returned domain controller name does not match DomainControllerString, the server MUST invoke the DsrGetDcNameEx2 method ([MS-NRPC] section 3.5.4.3.1) on the DomainControllerString computer, specifying the following parameters:</p> <p>...</p> <ul style="list-style-type: none"> <li>• Flags : if NETSETUP_JOIN_READONLY bit is set in Options, set Flags = (B   S); otherwise set Flags to (B   J   S)</li> </ul> <p>...</p> <p>32. If the NETSETUP_JOIN_READONLY bit is not set in Options, the following LDAP attributes...</p>

\*Date format: YYYY/MM/DD

## [MS-WPO]: Windows Protocols Overview

This topic lists the Errata found in [MS-WPO] 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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## [MS-WSDS]: WS-Enumeration Directory Services Protocol Extensions

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

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

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

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