

# [MS-MNPR]: Microsoft NetMeeting Protocol Specification

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## Revision Summary

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# 1 Introduction

The Microsoft NetMeeting Protocol consists of a set of extensions to the T.120 protocols. This set includes extensions to the T.126 and T.127 protocols. In addition, the **NetMeeting** feature in Windows uses the **S20** protocol for application sharing as a replacement for T.128 functionality. NetMeeting also uses T.125 as a mechanism to transmit data for the Chat protocol. NetMeeting uses the Object Manager Protocol to provide the mechanism to coordinate object creation, deletion, and synchronization between two or more nodes in an established session.

The Microsoft NetMeeting Protocol maintains backward compatibility with T.120, as specified in [\[T120\]](#). Although these extensions use the same transport layer as the T.120 protocol, they do not impact the existing functionality of the T.120 protocol.

## 1.1 Glossary

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

### Protocol Data Unit (PDU)

The following terms are defined in the Glossary section of [\[RFC1006\]](#):

### Transfer Packet (TPKT)

The following terms are specific to this document:

**Application-Sharing Session:** A session that is established between two or more nodes that allows every node in the session to simultaneously view running applications that are hosted on a selected node. For example, one node may have an active document application that it would like to share with other nodes in the established session.

**Distributed Model:** In the **S20** protocol, a group of nodes where one node (the creator node) is responsible for creating an **application-sharing session** and other nodes are able to join that same session.

**Generic Conference Control (GCC):** A high-level protocol for passing conference control information during a conference between geographically dispersed computers. **GCC** provides a set of services for setting up and managing the conference. For example, it includes information such as who is currently in the roster and node authorization for conferencing primitives. Additionally, the **GCC** protocol is used by applications to coordinate independent use of the **MCS** channels. For more information about **GCC**, see [\[T124\]](#) section 6.

**Multicasting:** The process by which data is transmitted over a network to multiple recipients simultaneously.

**Multipoint Communication Service (MCS):** A key element in the infrastructure of [\[T120\]](#). **MCS** provides a general multipoint connection-oriented data service. It collects point-to-point transport connections and combines them to form a **multipoint domain**. Within that domain a large number of logical channels are provided that can provide one-to-one, one-to-many, and many-to-one data delivery. Nodes in an **MCS** domain are hierarchically organized in a tree structure. It takes the point-to-point transport connections that are provided by the layers below it and combines them to form a multipoint service to the layers above. Data delivery typically follows the most efficient path to the nodes that are to receive the data; however, a mechanism is provided to guarantee that data from multiple source nodes is received in the same sequence at all nodes. **MCS** acts as a resource provider to the layers above it, providing channels and token resources on demand. A large number of tokens are provided for

applications to use for coordinating events and processes. For more information about **MCS**, see [\[T122\]](#) section 6 and [\[T125\]](#) section 5.

**Multipoint Domain:** A hierarchical tree structure that is composed of point-to-point **MCS** connections that connect **MCS** providers together. In a **multipoint domain**, an application client can send data to different members of the domain and have access to tokens for resource passing and contention resolution. For more information about **MCS**, see [\[T122\]](#) section 6 and [\[T125\]](#) section 5.

**NetMeeting:** A feature of Windows that uses the Microsoft NetMeeting Protocol. This feature allows for voice, video, application-sharing, and text conferencing between two or more parties via TCP/UDP networks.

**S20:** A protocol that is used by NetMeeting for application-sharing. The **S20** protocol was originally known as Share v2.0.

**Share Roster:** A list that is built from a group of nodes on the same **application-sharing session**.

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

## 1.2 References

### 1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact [dochelp@microsoft.com](mailto:dochelp@microsoft.com). We will assist you in finding the relevant information. Please check the archive site, <http://msdn2.microsoft.com/en-us/library/E4BD6494-06AD-4aed-9823-445E921C9624>, as an additional source.

[MS-DTYP] Microsoft Corporation, "[Windows Data Types](#)", January 2007.

[MS-GLOS] Microsoft Corporation, "[Windows Protocols Master Glossary](#)", March 2007.

[MS-H245] Microsoft Corporation, "[H.245 Protocol: Microsoft Extensions](#)", September 2007.

[RFC1006] Rose, M. and Cass, D., "ISO Transport Service on Top of the TCP Version: 3 (TPKT)", RFC 1006, May 1987, <http://www.ietf.org/rfc/rfc1006.txt>

[T120] ITU-T, "Data protocols for multimedia conferencing," Recommendation T.120, January 2007, <http://www.itu.int/rec/T-REC-T.120-200701-P/en>

**Note** There is a charge to download the specification.

[T122] ITU-T, "Multipoint communication service - Service definition," Recommendation T.122, February 1998, <http://www.itu.int/rec/T-REC-T.122/en>

**Note** There is a charge to download the specification.

[T123] ITU-T, "Network-Specific Data Protocol Stacks for Multimedia Conferencing", Recommendation T.123, May 1999, <http://www.itu.int/rec/T-REC-T.123/en>

**Note** There is a charge to download the specification.



[T126] ITU-T, "Multipoint still image and annotation protocol," July 1997, <http://www.itu.int/rec/T-REC-T.126-199707-I/en>

**Note** There is a charge to download the specification.

[T127] ITU-T, "Multipoint binary file transfer protocol," August 1995, <http://www.itu.int/rec/T-REC-T.127-199508-I/en>

**Note** There is a charge to download the specification.

[X224] ITU-T, "Information technology - Open Systems Interconnection - Protocol for Providing the Connection-Mode Transport Service", Recommendation X.224, November 1995, <http://www.itu.int/rec/T-REC-X.224-199511-I/en>

**Note** There is a charge to download the specification.

### 1.2.2 Informative References

[MSFT-NET30] Microsoft Corporation, "NetMeeting 3.0 Resource Kit: Understanding the T.120 Standard," <http://www.microsoft.com/technet/archive/netmeeting/reskit/netmtg3/part3/chaptr10.msp?mfr=true>

[RFC1951] Deutsch, P., "DEFLATE Compressed Data Format Specification version 1.3", RFC 1951, May 1996, <http://www.ietf.org/rfc/rfc1951.txt>

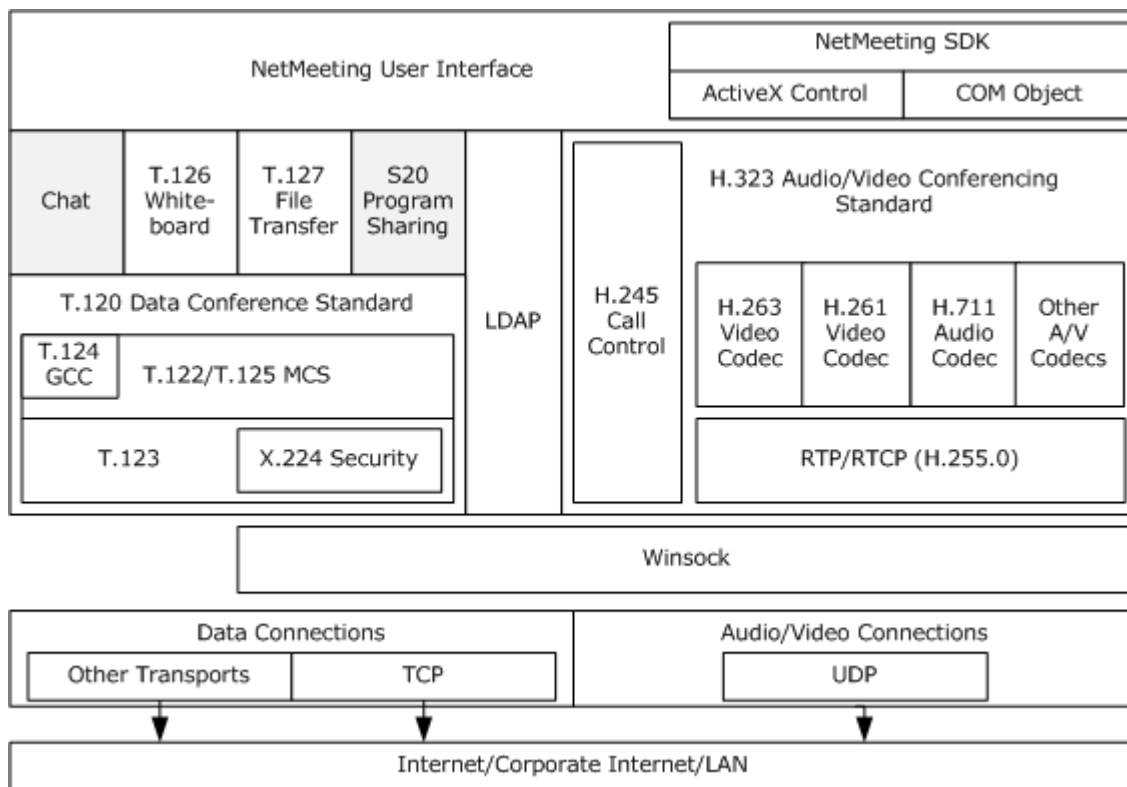
### 1.3 Protocol Overview (Synopsis)

This document describes extensions that are made by Microsoft to the T.120 protocol set. This document also describes extensions to the S20 protocol, which is a pre-T.120 protocol that is similar to T.120. It is also used for backward-compatibility with older implementations. <1>

The Microsoft extensions to the T.120 protocol set, as specified in the Microsoft NetMeeting Protocol, include:

- S20 Protocol: The S20 protocol is specific to an **application-sharing session**, which allows for the transmission of a screen view of a remote node's running applications.
- NetMeeting Object Manager Protocol: The NetMeeting Object Manager provides the mechanism to coordinate object creation, deletion, and synchronization between two or more nodes in an established session. For example, the shared whiteboard is represented as an object in each node. As operations are performed on this whiteboard, changes occur in the object that in turn, are replicated to the other nodes in a session with this protocol.
- Chat Protocol: A protocol for communicating textual data between nodes. The Chat protocol uses a T.125 channel through port 1503.
- Extensions to the T.127 Protocol: The T.127 protocol is used to transmit binary files between nodes.
- Extensions to the T.126 Protocol: The T.126 protocol is used to transmit bitmaps and other drawing primitives to support a shared whiteboard between nodes.

The following diagram illustrates the various components and their relationship to the entire NetMeeting protocol stack.



**Figure 1: NetMeeting protocol stack**

## 1.4 Relationship to Other Protocols

The Microsoft NetMeeting Protocol is implemented on top of the T.120 protocol set, as defined in [\[T120\]](#).

These extensions use the following ports and protocols:

- Port 389 Internet Locator Server [Transmission Control Protocol] (TCP/IP)
- Port 522 User Location Server (TCP/IP)
- Port 1503 T.120 (TCP/IP and TPKT)
- Port 1720 H.245 call setup (TCP/IP)
- Port 1731 Audio call control (TCP/IP)

## 1.5 Prerequisites/Preconditions

The Microsoft NetMeeting Protocol requires the TCP and UDP protocols as a transport layer.

## 1.6 Applicability Statement

The Microsoft NetMeeting Protocol is used for **multicasting** multimedia communication.

## **1.7 Versioning and Capability Negotiation**

The Microsoft NetMeeting Protocol does not have multiple versions.

## **1.8 Vendor-Extensible Fields**

None.

## **1.9 Standards Assignments**

The T.120 protocol uses the TCP port 1503. The Microsoft NetMeeting Protocol does not modify this.

## 2 Messages

The following sections specify how messages for the Microsoft NetMeeting Protocol are transported and their message syntax.

### 2.1 Commonly Referenced Data Structures, Values, and Definitions

The following data structures and values are referred to in multiple locations in this document: they are initially defined and then referenced again from within the document.

#### 2.1.1 Common Definitions

##### 2.1.1.1 The x,y Coordinate System

References to the x,y coordinate systems in this documentation are based on a system that defines the 0,0 position as the upper-left corner. Positive x numbers are defined as moving to the right in the coordinate system, and positive y numbers move down.

#### 2.1.2 Common Field Values

##### 2.1.2.1 BackMode

The **BackMode** enumeration describes the background color that is used to fill a specific region on a drawing surface.

```
typedef enum
{
    TRANSPARENT = 0x00000001,
    OPAQUE = 0x00000002
} BackMode;
```

**TRANSPARENT:** The region is filled with the background color before drawing is done.

**OPAQUE:** The region is not filled with the background color before drawing is done.

##### 2.1.2.2 BrushHatch

The **BrushHatch** enumeration describes the six predefined logical hatch brushes that are maintained by the graphics device interface (GDI). These are used as fill patterns on a drawing surface.

```
typedef enum
{
    HS_HORIZONTAL = 0x00000000,
    HS_VERTICAL = 0x00000001,
    HS_FDIAGONAL = 0x00000002,
    HS_BDIAGONAL = 0x00000003,
    HS_CROSS = 0x00000004,
    HS_DIAGCROSS = 0x00000005
} BrushHatch;
```

**HS\_HORIZONTAL:** The lines are horizontal.

**HS\_VERTICAL:** The lines are vertical.

**HS\_FDIAGONAL:** A 45-degree downward, left-to-right line.

**HS\_BDIAGONAL:** A 45-degree upward, right-to-left line.

**HS\_CROSS:** Both HS\_HORIZONTAL and HS\_VERTICAL lines.

**HS\_DIAGCROSS:** Both HS\_FDIAGONAL and HS\_BDIAGONAL lines.

### 2.1.2.3 BrushStyle

The **BrushStyle** enumeration defines style, color, and pattern of a physical brush to be used on a drawing surface.

```
typedef enum
{
    BS_SOLID = 0x00000000,
    BS_NULL = 0x00000001,
    BS_HATCHED = 0x00000002,
    BS_PATTERN = 0x00000003
} BrushStyle;
```

**BS\_SOLID:** The brush uses a solid style.

**BS\_NULL:** The brush is not drawn.

**BS\_HATCHED:** The brush uses a hatched style.

**BS\_PATTERN:** The pattern brush is defined by a device-independent bitmap (DIB) specification.

### 2.1.2.4 PenStyle

The **PenStyle** enumeration defines the style, width, and color of a pen to be used on a drawing surface.

```
typedef enum
{
    PS_SOLID = 0x00000000,
    PS_DASH = 0x00000001,
    PS_DOT = 0x00000002,
    PS_DASHDOT = 0x00000003,
    PS_DASHDOTDOT = 0x00000004,
    PS_NULL = 0x00000005,
    PS_INSIDEFRAME = 0x00000006
} PenStyle;
```

**PS\_SOLID:** The pen is solid.

**PS\_DASH:** The pen is dashed.

**PS\_DOT:** The pen is dotted.

**PS\_DASHDOT:** The pen has alternating dashes and dots.

**PS\_DASHDOTDOT:** The pen has alternating dashes and double dots.

**PS\_NULL:** The pen is invisible.

**PS\_INSIDEFRAME:** The pen is solid. When this pen is used with a bounding rectangle, the dimensions of the figure are shrunk so that it fits entirely in the bounding rectangle and takes into account the width of the pen. This applies only to geometric pens.

### 2.1.2.5 ROP2

The **ROP2** enumeration describes the binary raster operation codes that define how the graphics device interface (GDI) combines the bits from the selected pen with the bits in the destination bitmap.

```
typedef enum
{
    R2_BLACK = 0x00000001,
    R2_NOTMERGEPEN = 0x00000002,
    R2_MASKNOTPEN = 0x00000003,
    R2_NOTCOPYPEN = 0x00000004,
    R2_MASKPENNOT = 0x00000005,
    R2_NOT = 0x00000006,
    R2_XORPEN = 0x00000007,
    R2_NOTMASKPEN = 0x00000008,
    R2_MASKPEN = 0x00000009,
    R2_NOTXORPEN = 0x0000000A,
    R2_NOP = 0x0000000B,
    R2_MERGENOTPEN = 0x0000000C,
    R2_COPYPEN = 0x0000000D,
    R2_MERGEENNOT = 0x0000000E,
    R2_MERGEEN = 0x0000000F,
    R2_WHITE = 0x00000010
} ROP2;
```

**R2\_BLACK:** The pixel is always drawn as black.

**R2\_NOTMERGEPEN:** The pixel is the inverse of the R2\_MERGEEN color.

**R2\_MASKNOTPEN:** The pixel is a combination of the colors that are common to both the screen and the inverse of the pen.

**R2\_NOTCOPYPEN:** The pixel is the inverse of the pen color.

**R2\_MASKPENNOT:** The pixel is a combination of the colors that are common to both the pen and the inverse of the screen.

**R2\_NOT:** The pixel is the inverse of the screen color.

**R2\_XORPEN:** The pixel is a combination of the colors in the pen and in the screen, but not in both.

**R2\_NOTMASKPEN:** The pixel is the inverse of the R2\_MASKPEN color.

**R2\_MASKPEN:** The pixel is a combination of the colors that are common to both the pen and the screen.

**R2\_NOTXORPEN:** The pixel is the inverse of the R2\_XORPEN color.

- R2\_NOP:** The pixel remains unchanged.
- R2\_MERGENOTPEN:** The pixel is a combination of the screen color and the inverse of the pen color.
- R2\_COPYPEN:** The pixel always has the color of the pen.
- R2\_MERGEPENNOT:** The pixel is a combination of the pen color and the inverse of the screen color.
- R2\_MERGEPEN:** The pixel is a combination of the pen color and the screen color.
- R2\_WHITE:** The pixel is always drawn as white.

## 2.2 Transport

The Microsoft NetMeeting Protocol specifies transport layers as in [\[T120\]](#).

The Ethernet, IP, TCP, and TPKT layers MUST be present. [X.224](#), T.125, and the Microsoft NetMeeting Protocol MAY be present. User data MUST be present as the last bytes in each package or message.

## 2.3 Message Syntax

### 2.3.1 Application Sharing

The Microsoft NetMeeting Protocol specifies a method of application sharing over the T.120 **Multipoint Communication Service (MCS)** layer by using the [S20 MCS Channel](#).

The T.120 standard is specified in [\[T120\]](#).

Note that all unsigned 16-bit and unsigned 32-bit values are specified in little-endian format. The packet version and type bit fields are transferred as a single unsigned 16-bit integer variable. Depending on the client and the server hardware architectures, multiple-byte little-endian versus big-endian reordering can determine how this variable is marshaled by the sender and interpreted by the receiver.

#### 2.3.1.1 CPCALLCAPS

The CPCALLCAPS structure defines the capabilities of an application-sharing session node.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
numCapabilities																pad1															
General																															
...																															
...																															





...	
...	
...	
...	
...	
...	
(Bitmaps cont'd for 2 rows)	
...	Cursor
...	
...	Palette
...	
...	Share
...	
...	

**numCapabilities (2 bytes):** MUST be set to 0x0007.

**pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**General (24 bytes):** A [PROTCAPS\\_GENERAL](#) packet that describes the general capabilities of the node.

**Screen (28 bytes):** A [PROTCAPS\\_SCREEN](#) packet that describes the screen capabilities of the node.

**Orders (38 bytes):** A [PROTCAPS\\_ORDERS](#) packet that describes the orders supported by the node.

**Bitmaps (40 bytes):** A [PROTCAPS\\_BITMAPCACHE](#) packet that describes the bitmap cache of the node.

**Cursor (8 bytes):** A [PROTCAPS\\_CM](#) packet that describes the cursor capabilities of the node.

**Palette (8 bytes):** A [PROTCAPS\\_PM](#) packet that describes the palette cache of the node.

**Share (8 bytes):** A [PROTCAPS\\_SC](#) packet that identifies the user.

#### 2.3.1.1.1 PROTCAPS\_BITMAPCACHE

The PROTCAPS\_BITMAPCACHE structure describes the bitmap cache that is used by a node of an application-sharing session.

The caps\* elements define the allowance of bitmap caching for the S20 protocol. Bitmap caching enables increased performance by allowing a remote node to send bitmap information and assign it a reference that can be used later instead of retransmitting the bitmap information again. The protocol allows for three bitmap cache sizes:

- Small: 16x16xBPP (bits per pixel)
- Medium: 32x32xBPP
- Large: 64x64xBPP

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	30	1
capID																capSize															
Unused																															
...																															
...																															
capsSmallCacheNumEntries																capsSmallCacheCellSize															
capsMediumCacheNumEntries																capsMediumCacheCellSize															
capsLargeCacheNumEntries																capsLargeCacheCellSize															
obsolete1																obsolete2															
obsolete3																obsolete4															
obsolete5																obsolete6															

**capID (2 bytes):** MUST be set to 0x0004.

**capSize (2 bytes):** MUST be set to 0x0028 (40).

**Unused (12 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**capsSmallCacheNumEntries (2 bytes):** The number of entries in the small bitmap cache that is allocated on the local node.

- capsSmallCacheCellSize (2 bytes):** The size, in bytes, of bitmaps in the small bitmap cache that is allocated on the local node.
- capsMediumCacheNumEntries (2 bytes):** The number of entries in the medium bitmap cache that is allocated on the local node.
- capsMediumCacheCellSize (2 bytes):** The size, in bytes, of bitmaps in the medium bitmap cache that is allocated on the local node.
- capsLargeCacheNumEntries (2 bytes):** The number of entries in the large bitmap cache that is allocated on the local node.
- capsLargeCacheCellSize (2 bytes):** The size, in bytes, of bitmaps in the large bitmap cache that is allocated on the local node.
- obsolete1 (2 bytes):** MUST be set to 0x7FFF.
- obsolete2 (2 bytes):** MUST be set to 0x7FFF.
- obsolete3 (2 bytes):** MUST be set to 0x7FFF.
- obsolete4 (2 bytes):** MUST be set to 0x7FFF.
- obsolete5 (2 bytes):** MUST be set to 0x7FFF.
- obsolete6 (2 bytes):** MUST be set to 0x7FFF.

2.3.1.1.2 PROTCAPS\_CM

The PROTCAPS\_CM structure describes the cursor capabilities of an application-sharing session node.

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
capID																capSize															
capsSupportsColorCursors																capsCursorCacheSize															

- capID (2 bytes):** MUST be set to 0x0008.
- capSize (2 bytes):** MUST be set to 0x0008.
- capsSupportsColorCursors (2 bytes):** MUST be set to 0x0000 or 0x0001. If set to 0x0001, the node supports color cursors. If set to 0x0000, the node does not support color cursors.

Name	Value
COLOR_CURSOR_NOT_SUPPORTED	0x0000
COLOR_CURSOR_SUPPORTED	0x0001

- capsCursorCacheSize (2 bytes):** The number of elements that the cursor cache for the node can contain.

### 2.3.1.1.3 PROTCAPS\_GENERAL

The PROTCAPS\_GENERAL structure describes the general capabilities of an application-sharing session node.

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
capID																capSize															
OS																OSVersion															
version																supportsDOS6Compression															
genCompressionType																typeFlags															
supportsCapsUpdate																supportsRemoteUnshare															
genCompressionLevel																pad1															

**capID (2 bytes):** MUST be set to 0x0001.

**capSize (2 bytes):** MUST be set to 0x00018 (24).

**OS (2 bytes):** MUST be set to 0x0001 for a Windows operating system.

**OSVersion (2 bytes):** The version of the Windows operating system that is being used, if any.

Value	Meaning
CAPS_WINDOWS_31 0x0001	Windows 3.1
CAPS_WINDOWS_95 0x0002	Windows Me, Windows 98, or Windows 95
CAPS_WINDOWS_NT 0x0003	Windows XP or Windows 2000

**version (2 bytes):** The following values indicate which version of conferencing software is supported by the node:

Value	Meaning
CAPS_VERSION_20 0x0200	Supports only NetMeeting 2.x.
CAPS_VERSION_30 0x0300	Supports versions 2.x and 3 of NetMeeting. If this value is enabled, full-screen application sharing is enabled as well as passing control of shared applications to other nodes.

**supportsDOS6Compression (2 bytes):** Obsolete and MUST be set to 0x0002.

**genCompressionType (2 bytes):** The following values indicate the types of compression that are supported by the node:

Value	Meaning
0x0000	No compression format is supported.
CT_NO_DICTIONARY 0x0001	Uses compression without a persistent dictionary.
CT_PERSIST_DICTIONARY 0x0002	Uses compression with a persistent dictionary for each type of S20_DATA message.

Compression is applied to the [S20\\_DATA](#) packet payloads that are larger than, or equal to, 4096 bytes. For more information, see [\[RFC1951\]](#).

**typeFlags (2 bytes):** Flags indicating the mode that the conferencing software is running in:

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5
0	0	0	0	0	0	0	0	0	0	0	0	0	0	U	S

Where the bits are defined as:

Value	Description
U	If no user is currently logged on for this session, set this bit to 1.
S	If the node is running in the background and waiting for a connection, set this bit to 1.

Bits marked 0 MUST be set to 0.

**supportsCapsUpdate (2 bytes):** MUST be set to 0x0000 or 0x0001. If set to 0x0001, the node supports receiving capability changes. If set to 0x0000, the node does not support receiving capability changes.

Value	Meaning
0x0000	Does not support receiving capability changes.
0x0001	Supports receiving capability changes.

**supportsRemoteUnshare (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**genCompressionLevel (2 bytes):** The following values indicate the level of compression that are supported by the node:

Value	Meaning
CAPS_GEN_COMPRESSION_LEVEL_0 0x0001	Only compression that has a persistent dictionary for each type of S20_DATA message is supported.

Value	Meaning
CAPS_GEN_COMPRESSION_LEVEL_1 0x0002	Any compression method that is supported by both the sender and receiver is allowed.

**pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

#### 2.3.1.1.4 PROTCAPS\_ORDERS

The PROTCAPS\_ORDERS structure describes the orders that are supported by a node of an application-sharing session.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
capID																capSize															
capsDisplayDriver																															
...																															
...																															
...																															
capsSaveBitmapSize																															
capsSaveBitmapXGranularity																capsSaveBitmapYGranularity															
capsSaveBitmapMaxSaveLevel																capsMaxOrderLevel															
capsNumFonts																capsEncodingLevel															
capsOrders																															
...																															
...																															
...																															
...																															
...																															

...	
...	
capsfFonts	pad1
capsSendSaveBitmapSize	
capsReceiveSaveBitmapSize	
capsfSendScroll	pad2

**capID (2 bytes):** MUST be set to 0x0003.

**capSize (2 bytes):** MUST be set to 0x0054 (84).

**capsDisplayDriver (16 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**capsSaveBitmapSize (4 bytes):** The bitmap size that the node uses for [SaveBitmap](#) orders. MUST be set to 0x00027100 (160000).

**capsSaveBitmapXGranularity (2 bytes):** MUST be set to 0x0001.

**capsSaveBitmapYGranularity (2 bytes):** MUST be set to 0x0014 (20).

**capsSaveBitmapMaxSaveLevel (2 bytes):** MUST be set to 0x0000.

**capsMaxOrderLevel (2 bytes):** MUST be set to 0x0001.

**capsNumFonts (2 bytes):** MUST be set to 0x0000.

**capsEncodingLevel (2 bytes):** MUST be set to 0x0002.

**capsOrders (32 bytes):** An array of bytes that contain 1, to indicate support for a specified order; and 0, to indicate lack of support for a specified order.

Value	Meaning
0x00	Support for a <a href="#">DstBlt</a> order that contains a raster transfer of a rectangle.
0x01	Support for a <a href="#">PatBlt</a> order that contains a brush paint.
0x02	Support for a <a href="#">ScreenBlt</a> order that contains a bit-block transfer between regions of the screen.
0x03	Reserved. MUST be set to 1 and ignored upon receipt.
0x04	Reserved. MUST be set to 1 and ignored upon receipt.
0x05	Support for a <a href="#">TextOrder</a> that contains a string.
0x06	Support for an <a href="#">ExtTextOrder</a> that contains a string to be displayed and positions for the individual characters.

Value	Meaning
0x07	Support for a <a href="#">RectangleOrder</a> that contains a rectangle.
0x08	Support for a <a href="#">LineOrder</a> that contains a line.
0x09	Reserved. MUST be set to 1 and ignored upon receipt.
0x0A	Support for an <a href="#">OpaqueRect</a> order that contains an opaque rectangle.
0x0B	Support for a <a href="#">SaveBitmap</a> order that contains a region of the screen that the receiver MUST save or restore.
0x0C	Reserved. MUST be set to 0 and ignored upon receipt.
0x0D	Support for a <a href="#">MemBlit</a> order that contains a transfer from the bitmap cache to the screen.
0x0E	Support for a <a href="#">Mem3Blit</a> order that contains a transfer from the bitmap cache to the screen through a brush.
0x0F	Support for a <a href="#">PolygonOrder</a> that contains a polygon.
0x10	Support for a <a href="#">PieOrder</a> that contains a pie wedge.
0x11	Support for an <a href="#">EllipseOrder</a> that contains an ellipse.
0x12	Support for an <a href="#">ArcOrder</a> that contains an arc.
0x13	Support for a <a href="#">ChordOrder</a> that contains a chord.
0x14	Support for a <a href="#">PolyBezierOrder</a> that contains one or more Bezier curves.
0x15	Support for a <a href="#">RoundRectOrder</a> that contains a rectangle with rounded corners.
0x16	The last ten bytes for orders are undefined.
0x17	Reserved. MUST be set to 0 and ignored upon receipt.
0x18	Reserved. MUST be set to 0 and ignored upon receipt.
0x19	Reserved. MUST be set to 0 and ignored upon receipt.
0x1A	Reserved. MUST be set to 0 and ignored upon receipt.
0x1B	Reserved. MUST be set to 0 and ignored upon receipt.
0x1C	Reserved. MUST be set to 0 and ignored upon receipt.
0x1D	Reserved. MUST be set to 0 and ignored upon receipt.
0x1E	Reserved. MUST be set to 0 and ignored upon receipt.
0x1F	Reserved. MUST be set to 0 and ignored upon receipt.
0x20	Reserved. MUST be set to 0 and ignored upon receipt.

**capsfFonts (2 bytes):** MUST be set to 0x03B5.

**pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.



**capsSendSaveBitmapSize (4 bytes):** MUST be set to 0x00027100 (160000).

**capsReceiveSaveBitmapSize (4 bytes):** MUST be set to 0x00027100 (160000).

**capsfSendScroll (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**pad2 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

#### 2.3.1.1.5 PROTCAPS\_PM

The PROTCAPS\_PM structure describes the palette cache of an application-sharing session node.

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
capID																capSize															
capsColorTableCacheSize																pad1															

**capID (2 bytes):** MUST be set to 0x000A (10).

**capSize (2 bytes):** MUST be set to 0x0008.

**capsColorTableCacheSize (2 bytes):** MUST be set to 0x0006.

**pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

#### 2.3.1.1.6 PROTCAPS\_SC

The PROTCAPS\_SC structure identifies the user.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	30	1
capID																capSize															
gccID																															

**capID (2 bytes):** MUST be set to 0x0009.

**capSize (2 bytes):** MUST be set to 0x0008.

**gccID (4 bytes):** The same user identifier that is used in the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

#### 2.3.1.1.7 PROTCAPS\_SCREEN

The PROTCAPS\_SCREEN structure describes the screen capabilities of an application-sharing session node.

0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1
capID																capSize															
capsBPP																capsSupports1BPP															
capsSupports4BPP																capsSupports8BPP															
capsScreenWidth																capsScreenHeight															
capsSupportsV1Compression																capsSupportsDesktopResize															
capsSupportsV2Compression																pad1															
capsSupports24BPP																pad2															

**capID (2 bytes):** MUST be set to 0x0002.

**capSize (2 bytes):** MUST be set to 0x001C (28).

**capsBPP (2 bytes):** MUST be set to the bits per pixel currently in use by the node.

**capsSupports1BPP (2 bytes):** MUST be set to 0x0000 or 0x0001. If set to 0x0001, the node supports 1-bit-per-pixel screens. If set to 0x0000, the node does not support 1-bit-per-pixel screens.

Value	Meaning
0x0000	Does not support 1-bit-per-pixel screens.
0x0001	Supports 1-bpp screens.

**capsSupports4BPP (2 bytes):** MUST be set to 0x0000 or 0x0001. If set to 0x0001, the node supports 4-bits-per-pixel screens. If set to 0x0000, the node does not support 4-bits-per-pixel screens.

Value	Meaning
0x0000	Does not support 4-bpp screens.
0x0001	Supports 4-bpp screens.

**capsSupports8BPP (2 bytes):** MUST be set to 0x0000 or 0x0001. If set to 0x0001, the node supports 8-bits-per-pixel screens. If set to 0x0000, the node does not support 8-bits-per-pixel screens.

Value	Meaning
0x0000	Does not support 8-bpp screens.
0x0001	Supports 8-bpp screens.

**capsScreenWidth (2 bytes):** MUST be set to the width, in pixels, of the screen that is currently in use by the node.

**capsScreenHeight (2 bytes):** MUST be set to the height, in pixels, of the screen that is currently in use by the node.

**capsSupportsV1Compression (2 bytes):** MUST be set to 0x0000 or 0x0001. If set to 0x0001, the node supports NetMeeting 2.x compression of bitmaps. If set to 0x0000, the node does not support NetMeeting 2.x compression of bitmaps.

Value	Meaning
0x0000	Does not support NetMeeting 2.x compression of bitmaps.
0x0001	Supports NetMeeting 2.x compression of bitmaps.

**capsSupportsDesktopResize (2 bytes):** MUST be set to 0x0000 or 0x0001. If set to 0x0001, the node supports resizing its desktop. If set to 0x0000, the node does not support resizing its desktop.

Value	Meaning
0x0000	Does not support desktop resizing.
0x0001	Supports desktop resizing.

**capsSupportsV2Compression (2 bytes):** MUST be set to 0x0000 or 0x0001. If set to 0x0001, the node supports NetMeeting 3 compression of bitmaps. If set to 0x0000, the node does not support NetMeeting 3 compression of bitmaps.

Value	Meaning
0x0000	Does not support NetMeeting 3 compression of bitmaps.
0x0001	Supports NetMeeting 3 compression of bitmaps.

**pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**capsSupports24BPP (2 bytes):** MUST be set to 0x0000 or 0x0001. If set to 0x0001, the node supports 24-bits-per-pixel screens. If set to 0x0000, the node does not support 24-bits-per-pixel screens.

Value	Meaning
0x0000	Does not support 24-bpp screens.
0x0001	Supports 24-bpp screens.

**pad2 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

### 2.3.1.2 S20\_CREATE

The S20\_CREATE packet is sent by a host to create a new application-sharing session.

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
length																Version/Type															
user																Correlator															
...																lenName															
lenCaps																nameData (variable)															
...																															
capsData																															
...																															
...																															
...																															
...																															
...																															
...																															
(capsData cont'd for 31 rows)																															
...																															

**length (2 bytes):** The length, in bytes, of the packet.

**Version/Type (2 bytes):** MUST be set to 0x0032.

**user (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [T122] layer. For more information about the MCS user ID, see [T122] section 3 (Definitions) in the ITU-T Recommendation.

**Correlator (4 bytes):** The unique identifier for the new session. The first two bytes are the MCS user identifier (above) followed by a monotonically increasing 2-byte sequence number that starts at zero.

**lenName (2 bytes):** The length, in bytes, of **nameData**.

**lenCaps (2 bytes):** The length, in bytes, of **capsData**.

**nameData (variable):** The null-terminated ANSI name of the user, up to 65535 characters in length.

**capsData (158 bytes):** A [CPCALLCAPS](#) structure that describes the capabilities of the sender.

**2.3.1.3 S20\_COLLISION**

The S20\_COLLISION packet is sent to indicate that an application-sharing session already exists with the correlator that is specified in the original [S20\\_CREATE](#) packet.

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
Length																Version/Type															
User																correlator															
...																															

**Length (2 bytes):** The length, in bytes, of the packet.

**Version/Type (2 bytes):** MUST be set to 0x0032.

**User (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**correlator (4 bytes):** The unique identifier for the new session. The first two bytes are the MCS user identifier (above), followed by a monotonically increasing 2-byte sequence number that starts at zero.

**2.3.1.4 S20\_DATA**

The S20\_DATA packet is used by a host or client to send data to an application-sharing session.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
Version/Type																user															
Correlator																															
ackID										stream										dataLength											
datatype										compressionType										compressedLength											
data (variable)																															
...																															

**Version/Type (2 bytes):** MUST be set to 0x0032.

**user (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**Correlator (4 bytes):** The unique identifier for the new session. The first two bytes are the MCS user identifier (above) followed by a monotonically increasing 2-byte sequence number that starts at zero.

**ackID (1 byte):** Reserved. Should be set to 0 and ignored.

**stream (1 byte):** The type of stream message being transmitted.

Value	Meaning
STREAM_UPDATES 0x01	Sends window update information.
STREAM_MISC 0x02	Sends cursor update information.
STREAM_UNUSED 0x03	Reserved. MUST be set to 0 and ignored.
STREAM_INPUT 0x04	Sends mouse movement update information.

**dataLength (2 bytes):** The combined uncompressed size, in bytes, of the following **data** fields: **datatype**, **compressionType**, and **compressedLength**.

**datatype (1 byte):** The following values indicate the contents of the **data** field.

Value	Meaning
DT_AWC	An <a href="#">ActiveWindowPDU</a> packet.

Value	Meaning
0x17	
DT_CA 0x14	A <a href="#">Control Order for Application Sharing</a> packet. This type of packet will be sent if <b>CAPS_VERSION_20</b> is set in the <b>version</b> field in the <a href="#">PROTCAPS_GENERAL</a> structure.
DT_CA30 0x15	A <a href="#">Control Order for Application Sharing Enhanced</a> packet. This type of packet will be sent if <b>CAPS_VERSION_30</b> is set from the version field in the PROTCAPS_GENERAL structure.
DT_CM 0x1B	A <a href="#">Cursor Management Order</a> packet.
DT_CPC 0x20	A <a href="#">Screen Capabilities Update</a> packet.
DT_FH 0x0B	A <a href="#">Font List</a> packet.
DT_HET30 0x16	For a <a href="#">Host Tracking</a> packet.
DT_HET 0x19	For a NetMeeting 2 compatible Host Tracking packet.
DT_IM 0x1C	An <a href="#">Input PDU</a> packet.
DT_SNI 0x1F	A <a href="#">Synchronization Order</a> packet.
DT_SWL 0x18	A <a href="#">Shared Window List</a> packet.
DT_UP 0x02	An <a href="#">Update Order</a> packet.

**compressionType (1 byte):** The following values indicate the type of compression that is used for the **data** field:

Value	Meaning
0x00	Uncompressed.
CT_NO_DICTIONARY 0x01	Uses compression without a persistent dictionary.
CT_PERSIST_DICTIONARY 0x02	Uses compression with a persistent dictionary for each type of S20_DATA message.

Compression is applied to the S20\_DATA packet payloads that are larger than or equal to 4,096 bytes. For more information, see [\[RFC1951\]](#).

**compressedLength (2 bytes):** The combined size, in bytes, of **data** when it is compressed, **datatype**, **compressionType**, and **compressedLength**.

**data (variable):** One of the data structures that are appropriate to the value of the **datatype** field.

### 2.3.1.4.1 ActiveWindowPDU

The ActiveWindowPDU order manages the currently active, shared window.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
Msg																unused															
data1																															
data2																															

**Msg (2 bytes):** The following values indicate the window message.

Value	Meaning
AWC_MSG_ACTIVE_CHANGE_LOCAL 0x0001	The foreground window has changed.
AWC_MSG_ACTIVE_CHANGE_SHARED 0x0002	The shared window state has changed.
AWC_MSG_ACTIVE_CHANGE_INVISIBLE 0x0003	The shared window has become invisible.
AWC_MSG_ACTIVATE_WINDOW 0x8001	The sender is requesting activation of the shared window.
AWC_MSG_RESTORE_WINDOW 0x8003	The sender is requesting restoration of the shared window.
AWC_MSG_SAS 0x8005	The sender is sending a CTRL+ALT+DELETE key sequence.

**unused (2 bytes):** MUST be set to 0xFFFF.

**data1 (4 bytes):** If **msg** is set to one of the following values, this field MUST be set to the unique identifier for the window that is being application-shared. Otherwise, this field is unused.

- AWC\_MSG\_ACTIVE\_CHANGE\_LOCAL
- AWC\_MSG\_ACTIVE\_CHANGE\_SHARED
- AWC\_MSG\_ACTIVE\_CHANGE\_INVISIBLE
- AWC\_MSG\_ACTIVATE\_WINDOW
- AWC\_MSG\_RESTORE\_WINDOW

**data2 (4 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.



### 2.3.1.4.2 Cursor Management Orders

The following cursor management orders update the cursor position and shape of the receiver:

Name	Description
<a href="#">CursorId</a>	Instructs the receiver to display a system cursor.
<a href="#">CursorMove</a>	Contains a cursor movement.
<a href="#">SendMonoCursor</a>	Contains a monochrome cursor that the receiver SHOULD display.
<a href="#">SendColorCursor</a>	Contains a color cursor that the receiver SHOULD display.
<a href="#">SendColorCursorCacheId</a>	Contains the cache identifier of a cursor that the receiver SHOULD display.

#### 2.3.1.4.2.1 CursorId

The CursorId order instructs the receiver to display a system cursor.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
type																flags															
idc																															

**type (2 bytes):** MUST be set to 0x0001.

**flags (2 bytes):** MUST be set to 0x0000.

**idc (4 bytes):** MUST be set to one of the cursor identifiers to display from the following list.

Value	Meaning
CM_IDC_NULL 0x00000000	The cursor is hidden.
CM_IDC_ARROW 0x00007F00	The standard arrow cursor is displayed.

#### 2.3.1.4.2.2 CursorMove

The CursorMove order contains a cursor movement.

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
type																operation															
xPos																yPos															

**type (2 bytes):** MUST be set to 0x0003.

**operation (2 bytes):** One of the following values that describes the operation.

Value	Meaning
default 0x0000	The receiver SHOULD only move the cursor to the specified location when the receiver is in control of the session.
CM_SYNC_CURSORPOS 0x0001	The receiver SHOULD always move the cursor to the specified location.

**xPos (2 bytes):** The new x-coordinate, in screen coordinates, of the cursor.

**yPos (2 bytes):** The new y-coordinate, in screen coordinates, of the cursor.

#### 2.3.1.4.2.3 SendColorCursor

The SendColorCursor order contains a color cursor that the receiver SHOULD use.

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
Type																Flags															
cacheIndex																xHotSpot															
yHotSpot																Width															
Height																cbANDMask															
cbXORMask																aBits (variable)															
...																															

**Type (2 bytes):** MUST be set to 0x0006.

**Flags (2 bytes):** MUST be set to 0x0000.

**cacheIndex (2 bytes):** Specifies a cache identifier to reference this cursor in future cursor operations instead of having to send the cursor data repeatedly in its entirety. Used in subsequent calls to [SendColorCursorCacheId](#).

**xHotSpot (2 bytes):** The hot spot x-coordinate within the cursor. The hot spot of a cursor is the point to which Windows refers when tracking the cursor position. By default, the hot spot is set to the upper-left corner of the cursor (coordinates 0,0).

**yHotSpot (2 bytes):** The hot spot y-coordinate within the cursor. The hot spot of a cursor is the point to which Windows refers when tracking the cursor position. By default, the hot spot is set to the upper-left corner of the cursor (coordinates 0,0).

**Width (2 bytes):** The width, in pixels, of the cursor.

**Height (2 bytes):** The height, in pixels, of the cursor.

**cbANDMask (2 bytes):** The length, in bytes, of the **AND** mask of **aBits**.

**cbXORMask (2 bytes):** The length, in bytes, of the color **XOR** bitmap of **aBits**.

**aBits (variable):** The bits for a color **XOR** bitmap, followed by the bits for an **AND** mask.

2.3.1.4.2.4 SendColorCursorCacheId

The SendColorCursorCacheId order contains the cache identifier of a cursor that the receiver SHOULD use.

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
Type																flags															
cacheIndex																															

**Type (2 bytes):** MUST be set to 0x0007.

**flags (2 bytes):** MUST be set to 0x0000.

**cacheIndex (2 bytes):** The cache identifier of the cursor that the receiver SHOULD display.

2.3.1.4.2.5 SendMonoCursor

The SendMonoCursor order contains a monochrome cursor that the receiver SHOULD use.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
Type																flags															
xHotSpot																yHotSpot															
Width																height															
cbBits																aBits (variable)															
...																															

**Type (2 bytes):** MUST be set to 0x0002.

**flags (2 bytes):** MUST be set to 0x0000.

**xHotSpot (2 bytes):** The hot spot x-coordinate within the cursor. The hot spot of a cursor is the point to which the host node refers when tracking the cursor position. By default, the hot spot is set to the upper-left corner of the cursor (coordinates 0,0).

**yHotSpot (2 bytes):** The hot spot y-coordinate within the cursor. The hot spot of a cursor is the point to which Windows refers when tracking the cursor position. By default, the hot spot is set to the upper-left corner of the cursor (coordinates 0,0).

**Width (2 bytes):** The width, in pixels, of the cursor.

**height (2 bytes):** The height, in pixels, of the cursor.

**cbBits (2 bytes):** The length, in bytes, of **aBits**.

**aBits (variable):** The bits for a monochrome **XOR** mask, followed by the bits for a monochrome **AND** mask.

### 2.3.1.4.3 Control Orders for Application Sharing

The Control Orders for Application Sharing are specified below.

Name	Description
<a href="#">Cooperate</a>	Indicates whether the sender is cooperating in controlling the host.
<a href="#">Granted Control</a>	Indicates that the sender has accepted control by the receiver.
<a href="#">Notify State</a>	Indicates whether the sender is currently controllable.
<a href="#">Request Control</a>	Requests control of the receiver by the sender.

#### 2.3.1.4.3.1 Cooperate

The Cooperate order indicates whether the sender is cooperating in controlling the host.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
msg																unused1															
unused2																															

**msg (2 bytes):** If set to 0x0003, the sender is not cooperating with host control. If set to 0x0004, the sender is cooperating to control the host. MUST be set to one of these values.

Value	Meaning
0x0003	The sender is not cooperating with host control.
0x0004	The sender is cooperating with host control.

**unused1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**unused2 (4 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

This order is provided for backward compatibility with NetMeeting version 2.

#### 2.3.1.4.3.2 Granted Control

The Granted Control order indicates that the sender has accepted control by the receiver.

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
Msg																controllerId															
CcontrolGeneration																															

**Msg (2 bytes):** MUST be set to 0x0002.

**controllerId (2 bytes):** The identifier of the user-granted control. This is the user identifier of the node that is in control; or zero, if no node is in control.

**CcontrolGeneration (4 bytes):** The initial sequence number of the control operation. Whenever the server receives a Granted Control order, it saves the value in this field as the current control generation sequence number. After the server sends a Granted Control order that contains the current control generation sequence number, it increments that sequence number for use in a future Granted Control order, by the value of the local identifier of the user. This identifier is obtained from S20 packets, such as [S20\\_CREATE](#) or [S20\\_JOIN](#).

This order is provided for backward compatibility with NetMeeting version 2.

#### 2.3.1.4.3.3 Notify State

The Notify State order is broadcast to indicate whether the sender is currently controllable.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
Msg																state															
controllerId																															

**Msg (2 bytes):** MUST be set to 0x0000.

**state (2 bytes):** MUST be set to 0x0000 or 0x0001. If set to 0x0001, the sender is controllable. If set to 0x0000, the sender is not controllable.

Value	Meaning
0x0000	The sender is not controllable.
0x0001	The sender is controllable.

**controllerId (4 bytes):** The identifier of the client that is currently in control. If no client is in control, it is set to 0x00000000.

This order is provided for backward compatibility with NetMeeting version 2.

#### 2.3.1.4.3.4 Request Control

The Request Control order requests control of the receiver by the sender.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
Msg																unused1															
unused2																															

**Msg (2 bytes):** MUST be set to 0x0001.

**unused1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**unused2 (4 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

This order is provided for backward compatibility with NetMeeting version 2.

#### 2.3.1.4.4 Control Orders for Application Sharing Enhanced

The following Control Orders for Enhanced Application Sharing are specified below.

Name	Description
<a href="#">Control Pause</a>	Informs the receiver that the sender has paused or resumed session control.
<a href="#">Control Released</a>	Indicates that the sender is releasing control.

Name	Description
<a href="#">Control Revoked</a>	Indicates that the sender has revoked control by the receiver.
<a href="#">Give Control</a>	Queries the ability of the receiver to accept session control.
<a href="#">Give Control Reply</a>	Accepts or declines the request of the receiver to give control to the sender.
<a href="#">Pass Control</a>	Passes control from the sender to the receiver.
<a href="#">Take Control</a>	Requests control of the receiver by the sender.
<a href="#">Take Control Reply</a>	Accepts or declines the request of the receiver to control the sender.

#### 2.3.1.4.4.1 Control Pause

The Control Pause order informs the receiver that the sender has paused or unpaused control.

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
Msg																															
viewerControlId																															
hostControlId																															

**Msg (4 bytes):** MUST contain either the value 0x00008003 for a pause or the value 0x00008004 for an unpaused.

Value	Meaning
0x00008003	Pause.
0x00008004	Unpause.

**viewerControlId (4 bytes):** The unique identifier that is sent with the initial [Take Control](#) or [Give Control Reply](#) order.

**hostControlId (4 bytes):** The unique identifier that is sent with the initial [Take Control Reply](#) or [Give Control](#) order.

#### 2.3.1.4.4.2 Control Released

The Control Released order indicates that the sender is releasing control.

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
Msg																															
viewerControlId																															
hostControlId																															

**Msg (4 bytes):** MUST contain the value 0x00008001.

**viewerControlId (4 bytes):** The unique identifier that is sent with the initial [Take Control](#) or [Give Control Reply](#) order.

**hostControlId (4 bytes):** The unique identifier that is sent with the initial [Take Control Reply](#) or [Give Control](#) order.

#### 2.3.1.4.4.3 Control Revoked

The Control Revoked order indicates that the sender has revoked control by the receiver.

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
Msg																															
viewerControlId																															
hostControlId																															

**Msg (4 bytes):** MUST contain the value 0x00008002.

**viewerControlId (4 bytes):** The unique identifier that is sent with the initial [Take Control](#) or [Give Control Reply](#) order.

**hostControlId (4 bytes):** The unique identifier that is sent with the initial [Take Control Reply](#) or [Give Control](#) order.

#### 2.3.1.4.4.4 Give Control

The Give Control order asks the receiver if it is willing to accept session control.



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
Msg																															
hostControlId																															
mcsPassFrom																															

**Msg (4 bytes):** MUST contain the value 0x00000003.

**hostControlId (4 bytes):** The unique identifier that is used to match requests and replies. This field can contain any 32-bit value except 0. The value is not globally unique. This is generated in the local node by incrementing a UINT counter. The counter wraps around if necessary, but 0 is never a valid value.

**mcsPassFrom (4 bytes):** The user identifier who is passing control. This field is set to 0x00000000 if the host is passing control.

#### 2.3.1.4.4.5 Give Control Reply

The Give Control Reply order accepts or declines the request of the receiver to give control to the sender.

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
msg																															
hostControlId																															
mcsPassFrom																															
result																															
viewerControlId																															

**msg (4 bytes):** MUST contain the value 0x00000004.

**hostControlId (4 bytes):** The unique identifier that is used to match requests and replies. This field can contain any 32-bit value except 0. The value is not globally unique. This is generated in the local node by incrementing a UINT counter. The counter wraps around if necessary, but 0 is never a valid value.

**mcsPassFrom (4 bytes):** The user identifier who is passing control. This field is set to 0x00000000 if the host is passing control.

**result (4 bytes):** One of the following values indicating the response of the sender.

Value	Meaning
CARERESULT_CONFIRMED 0x00000000	The request was granted.
CARERESULT_DENIED 0x00000001	The request was denied.
CARERESULT_DENIED_BUSY 0x00000002	The request was denied because the user was occupied.
CARERESULT_DENIED_USER 0x00000003	The request was denied because the user rejected the request.
CARERESULT_DENIED_WRONGSTATE 0x00000004	The request was denied because the receiver was not in an acceptable state to accept control.
CARERESULT_DENIED_TIMEOUT 0x00000005	The request was denied due to user time-out.

**viewerControlId (4 bytes):** The unique identifier that is used to match requests and replies. This field can contain any 32-bit value except 0. The value is not globally unique. This is generated in the local node by incrementing a UINT counter. The counter wraps around if necessary, but 0 is never a valid value.

#### 2.3.1.4.4.6 Pass Control

The Pass Control order passes control from the sender to the receiver.

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
Msg																															
viewerControlID																															
hostControlId																															
mcsPassTo																															

**Msg (4 bytes):** MUST contain the value 0x00000005.

**viewerControlID (4 bytes):** The unique controller request identifier that is used to match requests and replies from [Take Control](#).

**hostControlId (4 bytes):** The unique identifier that is used to match requests and replies. This field can contain any 32-bit value except 0. The value is not globally unique. This is generated in the local node by incrementing a UINT counter. The counter wraps around if necessary, but 0 is never a valid value.

**mcsPassTo (4 bytes):** The user identifier to which the sender wants to pass control.

#### 2.3.1.4.4.7 Take Control

The Take Control order requests control of the receiver by the sender.

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
Msg																															
viewerControlId																															

**Msg (4 bytes):** MUST contain the value 0x00000001.

**viewerControlId (4 bytes):** The unique identifier that is used to match requests and replies. This field can contain any 32-bit value except 0. The value is not globally unique. This is generated in the local node by incrementing a UINT counter. The counter wraps around if necessary, but 0 is never a valid value.

#### 2.3.1.4.4.8 Take Control Reply

The Take Control Reply order accepts or declines the request of the receiver to control the sender.

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
Msg																															
viewerControlId																															
result																															
hostControlId																															

**Msg (4 bytes):** MUST contain the value 0x00000002.

**viewerControlId (4 bytes):** The unique identifier that is used to match requests and replies. This field can contain any 32-bit value except 0. The value is not globally unique. This is generated in the local node by incrementing a UINT counter. The counter wraps around if necessary, but 0 is never a valid value.

**result (4 bytes):** One of the following values indicating the response of the sender.

Value	Meaning
CARERESULT_CONFIRMED 0x00000000	The request was granted.
CARERESULT_DENIED 0x00000001	The request was denied.

Value	Meaning
CARERESULT_DENIED_BUSY 0x00000002	The request was denied because the user was occupied.
CARERESULT_DENIED_USER 0x00000003	The request was denied because the user rejected the request.
CARERESULT_DENIED_WRONGSTATE 0x00000004	The request was denied because the receiver was not in an acceptable state to accept control.
CARERESULT_DENIED_TIMEOUT 0x00000005	The request was denied because of a user time-out.

**hostControlId (4 bytes):** The unique identifier that is used to match requests and replies. This field can contain any 32-bit value except 0. The value is not globally unique. This is generated in the local node by incrementing a UINT counter. The counter wraps around if necessary, but 0 is never a valid value.

#### 2.3.1.4.5 Font List

The Font List order describes the fonts that the sender has installed.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	30	1
cFonts																cbFontSize															
aFonts (variable)																															
...																															

**cFonts (2 bytes):** The number of [NETWORKFONT](#) structures in **aFonts**.

**cbFontSize (2 bytes):** MUST be set to 0x00000032 (50).

**aFonts (variable):** An array of **NETWORKFONT** structures. The length of this field is specified by **cFonts**.

##### 2.3.1.4.5.1 NETWORKFONT

The NETWORKFONT structure is the font description that is sent across the network when negotiating font support.

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
nfFaceName																															
...																															
...																															
...																															
...																															
...																															
...																															
nfFontFlags																nfAveWidth															
nfAveHeight																nfAspectX															
nfAspectY																nfSigFats															
nfSigThins																nfSigSymbol															
nfCodePage																nfMaxAscent															

**nfFaceName (32 bytes):** A 32-byte ASCII array that specifies the null-terminated face name of the font. There can be 31 characters maximum with a zero at the end.

**nfFontFlags (2 bytes):** Flags that indicate the font control to use:

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	0	0	0	0	0	0	B	T	0	0	S	U	I	F	P

Where the bits are defined as:

Value	Description
B	The font is aligned on the text baseline.

Value	Description
T	The font is a TrueType font.
S	The font is struck out.
U	The font is underlined.
I	The font is italic.
F	The font is scalable.
P	The font has a fixed pitch.

Bits marked 0 MUST be set to 0.

**nfAveWidth (2 bytes):** The average width of the characters in the font, generally defined as the width of the letter "x".[<2>](#)

**nfAveHeight (2 bytes):** The amount that characters are placed relative to the baseline minus the internal leading amount for characters. Internal leading is the space where accent marks are often placed.[<3>](#)

**nfAspectX (2 bytes):** The horizontal aspect of the device for which the font was designed.[<4>](#)

**nfAspectY (2 bytes):** The vertical aspect of the device for which the font was designed.[<5>](#)

**nfSigFats (2 bytes):** The signature of the font, expressed as the sum of the width, in pixels, of the characters from 0 through 9, uppercase letters from A through Z, and the symbols @, \$, %, and &, divided by two.[<6>](#)

**nfSigThins (2 bytes):** The signature of the font, expressed as the sum of the width, in pixels, of the characters with ASCII codes from 0x02 through 0x7E, minus **nfSigFats** before dividing by two, with the sum divided by two.[<7>](#)

**nfSigSymbol (2 bytes):** The signature of the font, expressed as the sum of the width, in pixels, of the characters with ASCII codes from 0x00 through 0x18 and from 0x80 through 0xFE.[<8>](#)

**nfCodePage (2 bytes):** Either the codepage of the font or one of the following codepages:[<9>](#)

Value	Meaning
WIN_ANSI 0x0000	The codepage is Windows ANSI.
OEM_FONT 0x00FF	The codepage is for an OEM font.
Unknown 0xFFFF	The codepage is unknown.

**nfMaxAscent (2 bytes):** For fixed size fonts, set to 0x0064.[<10>](#)

### 2.3.1.4.6 Host Tracking

The Host Tracking order notifies the receiver that the sender is starting or stopping application sharing.

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
Msg																hostState															

**Msg (2 bytes):** MUST be set to 0x0001.

**hostState (2 bytes):** Informs the receiver of the sharing state of the sender.

Value	Meaning
HET_NOTHOSTING 0x0000	The sender is no longer sharing applications or the desktop.
HET_APPSSHARED 0x0001	The sender is sharing one or more applications.
HET_DESKTOPSHARED 0xFFFF	The sender is sharing the entire desktop. This flag MAY NOT be included in <a href="#">S20_DATA</a> packets that have a <b>datatype</b> set to DT_HET30.

### 2.3.1.4.7 Input PDU

The Input PDU packet contains one or more input orders.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
numEvents																unused															
aEvents (variable)																															
...																															

**numEvents (2 bytes):** The number of [IMEVENT](#) structures that are contained in **aEvents**.

**unused (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**aEvents (variable):** An array of **IMEVENT** structures.

#### 2.3.1.4.7.1 IMEVENT

The **IMEVENT** structure defines keyboard and mouse events.

```
typedef struct tagIMEVENT {  
    UINT32 timeMS;  
    UINT16 type;
```

```

union {
    IMKEYBOARD keyboard;
    IMMOUSE mouse;
} data;
} IMEVENT;

```

**timeMS:** The time the message was generated, specified as the number of milliseconds since the sending computer was started.

**type:** One of the following **IMEVENT** values, indicating the type of the event:

Value	Meaning
IM_TYPE_SYNC 0x0000	Obsolete after version 2.
IM_TYPE_ASCII 0x0001	The event consists of standard keyboard input.
IM_TYPE_VK1 0x0002	The event consists of virtual keyboard keys, such as ALT, CTRL, or SHIFT.
IM_TYPE_VK2 0x0003	The event consists of keyboard hot keys (also called keyboard shortcuts).
IM_TYPE_3BUTTON 0x8001	The event consists of mouse input.

**data:** If the **IMEVENT** type equals IM\_TYPE\_3BUTTON, data will contain the [IMMOUSE](#) packet. Otherwise, all other **IMEVENT** types will contain [IMKEYBOARD](#) packets.

### 2.3.1.4.7.1.1 IMKEYBOARD

The IMKEYBOARD packet specifies a keyboard event from the sender.

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
flags																keycode															

**flags (2 bytes):** Flags from a WM\_KEYUP or WM\_SYSKEYUP message are combined by using the bitwise OR operation of the following values: [<11>](#)

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
U	D	A	Q	0	0	0	E	0	0	0	0	0	0	0	R

Where the bits are defined as:



Value	Description
U IM_FLAG_KEYBOARD_RELEASE	If specified, the event is a key release. If neither this value nor IM_FLAG_KEYBOARD_DOWN is specified, the event is a simple key press.
D IM_FLAG_KEYBOARD_DOWN	If specified, the event is a repeated key. If neither this value nor IM_FLAG_KEYBOARD_RELEASE is specified, the event is a simple key press.
A IM_FLAG_KEYBOARD_ALT_DOWN	The event is a keystroke from the numeric keypad.
Q IM_FLAG_KEYBOARD_QUIET	The event SHOULD NOT be injected on the receiver.
E IM_FLAG_KEYBOARD_EXTENDED	The event consists of an extended key. This flag is only set for the NUM LOCK key.
R IM_FLAG_KEYBOARD_RIGHT	The modifier in the event is located on the right side of the keyboard. This flag is only set for the SHIFT key.

Bits marked 0 are obtained from either the WM\_KEYUP or WM\_SYSKEYUP events.

**keycode (2 bytes):** The virtual key code of the keyboard event.

#### 2.3.1.4.7.1.2 IMMOUSE

The IMMOUSE packet specifies a mouse event from the sender.

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
flags																x															
y																															

**flags (2 bytes):** A bitmap of the following values describing the event.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	B	C	D	E	F	G	H	R	O	O	O	O	O	O	O

Where the bits are defined as:

Value	Description
A IM_FLAG_MOUSE_DOWN	The user pressed a mouse button.

Value	Description
B IM_FLAG_MOUSE_BUTTON3	The user pressed the third mouse button.
C IM_FLAG_MOUSE_BUTTON2	The user pressed the second mouse button.
D IM_FLAG_MOUSE_BUTTON1	The user pressed the first mouse button.
E IM_FLAG_MOUSE_MOVE	The user moved the mouse.
F IM_FLAG_MOUSE_DOUBLE	The user double-clicked the mouse.
G IM_FLAG_MOUSE_WHEEL	The user rotated the mouse wheel.
H IM_FLAG_MOUSE_DIRECTION	If specified, the mouse wheel is rotating backward. If not specified, the wheel is rotating forward.
R IM_FLAG_MOUSE_ROTATION_MASK	When the mouse wheel is rotated, the amount is masked with this value and encoded in the <b>flags</b> field. The rotation flag is already masked with IM_FLAG_MOUSE_DIRECTION (flag H).

Bits marked 0 are part of the IM\_FLAG\_MOUSE\_ROTATION\_MASK.

**x (2 bytes):** The new x-coordinate of the cursor in screen coordinates.

**y (2 bytes):** The new y-coordinate of the cursor in screen coordinates.

#### 2.3.1.4.8 Shared Window List

The Shared Window List order describes the windows of the sender to the receiver.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
msg																flags															
numWindows																Tick															
Token																Reserved															
aWindows (variable)																															
...																															
windowText (variable)																															
...																															
nonRectInfo (variable)																															
...																															

**msg (2 bytes):** MUST be set to 0x0001.

**flags (2 bytes):** A bitmap of the following value.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S

Where the bits are defined as:

Value	Description
S	The receiver SHOULD resend its entire window list. This message is only sent by NetMeeting 2.x clients.

Bits marked "0" MUST be ignored.

**numWindows (2 bytes):** The number of [SWLWINATTRIBUTES](#) structures in the **aWindows** field.

**Tick (2 bytes):** The time the message was generated, which is specified as the number of milliseconds since the sending computer was started.

**Token (2 bytes):** The sequence number that is incremented with each window list message that is sent. Only NetMeeting 2.x clients look at this value.

**Reserved (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**aWindows (variable):** An array of SWLWINATTRIBUTES structures that describe the properties of each window. The length of this field is specified by **numWindows**.

**windowText (variable):** An array of null-terminated ASCII strings that indicate the window titles of each shared window.

Titles consist of null-terminated strings of up to SWL\_MAX\_WINDOW\_TITLE\_SEND characters; SWL\_MAX\_WINDOW\_TITLE\_SEND is 50. If the title is NULL, the string is 0x00FF.

Titles appear in the same order as the corresponding windows in the SWLWINATTRIBUTES structure. Windows MUST only be shown on the shared-application taskbar of the client if the SWL\_FLAG\_WINDOW\_HOSTED and SWL\_FLAG\_WINDOW\_TASKBAR flags in SWLWINATTRIBUTES are set.

**nonRectInfo (variable):** If a window has a nonrectangular shape, this field contains nonrectangular data in a [SWLPACKETCHUNK](#) structure.

The list of windows has an associated z-order that can be used to divide the viewer window of the receiver into the following region types.

- Any portion of a shared window that is not covered by an obscuring window results in a region of the client viewer that visibly shows graphics data from the host.
- Any portion of an obscuring window that covers up a shared window results in a region of the client viewer that is obscured.
- Any portion of the desktop of the sender that is not shared or obscured is represented as a non-shared area.

The list that is sent can be either the full list of shared and obscuring windows, or simply updates to the existing list.

**2.3.1.4.8.1 SWLPACKETCHUNK**

The SWLPACKETCHUNK structure contains the shape of non-rectangular windows in a [shared window list](#).

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
Size																idChunk															
aNonRectData (variable)																															
...																															

**Size (2 bytes):** The size, in bytes, of this structure.

**idChunk (2 bytes):** MUST be set to 0x524E.

**aNonRectData (variable):** Contains an array of non-rectangular shapes that are constructed as an array of [RectangleData](#) structures.

This structure MUST be word-aligned with the other fields in a shared window list.

#### 2.3.1.4.8.1.1 NonRectData

The NonRectData packet contains an array of [RectangleData](#) that are the components of non-rectangular shapes.

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
Length																rectangles (variable)															
...																															

**Length (2 bytes):** The number of RectangleData structures that are used to compose the shape.

**rectangles (variable):** Contains an array of RectangleData structures.

##### 2.3.1.4.8.1.1.1 RectangleData

The RectangleData packet contains information about rectangle data.

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
DeltaLeft																DeltaTop															
DeltaRight																DeltaBottom															

**DeltaLeft (2 bytes):** The difference between the left edge of the last rectangle and the current rectangle, expressed in pixels. For the first rectangle, the last edge is considered to have a value of 0x0000.

**DeltaTop (2 bytes):** The difference between the top edge of the last rectangle and the current rectangle, expressed in pixels. For the first rectangle, the last edge is considered to have a value of 0x0000.

**DeltaRight (2 bytes):** The difference between the right edge of the last rectangle and the current rectangle, expressed in pixels. For the first rectangle, the last edge is considered to have a value of 0x0000.

**DeltaBottom (2 bytes):** The difference between the bottom edge of the last rectangle and the current rectangle, expressed in pixels. For the first rectangle, the last edge is considered to have a value of 0x0000.

#### 2.3.1.4.8.2 SWLWINATTRIBUTES

The SWLWINATTRIBUTES structure describes a window.

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
winId																															
Extra																															
ownerWinID																															
Flags																															
Position																															
...																															

**winId (4 bytes):** MUST be set to the identifier of this window. If the window is not shared, this field MUST be set to 0x00000000.

**Extra (4 bytes):** If the flags field contains the value SWL\_FLAG\_WINDOW\_HOSTED, this field MUST be set to the identifier of the thread that created the window. If the **flags** field does not contain SWL\_FLAG\_WINDOW\_HOSTED, this field MUST be set to 0x00000000.

**ownerWinID (4 bytes):** MUST be set to the identifier of the window that is closest to the desktop in the parent chain of this window.

**Flags (4 bytes):** A 32-bit bitmap of the following flags.

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
0	0	0	0	0	0	0	0	0	0	0	0	0	A	0	B	0	0	0	0	0	0	0	0	0	0	C	0	0	D	E	F

Where the bits are defined as:

Value	Description
A SWL_FLAG_WINDOW_MINIMIZED	The window is minimized.
B SWL_FLAG_WINDOW_TAGGABLE	Set for compatibility with NetMeeting 2.x clients. This flag SHOULD be set if the window is shared and has either the WS_EX_APPWINDOW or WS_CAPTION styles.
C SWL_FLAG_WINDOW_HOSTED	If set, the window is shared. If not set, the window is obscuring another window.
D SWL_FLAG_WINDOW_TOPMOST	Set for compatibility with NetMeeting 2.x clients. This flag SHOULD be set if the window has the style WS_EX_TOPMOST but not the style

Value	Description
	WS_EX_TRANSPARENT.
E SWL_FLAG_WINDOW_TASKBAR	Indicates that the window title is displayed on the taskbar and the window is shared.
F SWL_FLAG_WINDOW_NONRECTANGLE	Indicates that the window does not have a rectangular shape. The shape is contained in the <b>nonRectInfo</b> field of the <a href="#">Shared Window List</a> .

Bits marked 0 MUST be 0.

**Position (8 bytes):** A [TSHR\\_RECT16](#) structure that specifies the left, top, right, and lower edges of the region, in order.

#### 2.3.1.4.9 Synchronization Order

The Synchronization Order packet indicates to the client that it SHOULD begin processing for this application-sharing session.

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
Message																destination															

**Message (2 bytes):** MUST be set to 0x0001.

**destination (2 bytes):** The MCS layer identifier of the client for which this order is intended. If the identifier matches that of the receiving client, it SHOULD begin to process messages.

#### 2.3.1.4.10 Update Orders

The Update Orders packet contains one or more update orders.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	30	1
updateType																padding															
cOrders																sendBPP															
data (variable)																															
...																															

**updateType (2 bytes):** One of the following values, which indicate the type of update orders that are contained in the structure.

Value	Meaning
UPD_ORDERS 0x0000	The packet can contain one or more of the orders that are defined in the <a href="#">Order Type</a> enumeration. Possible values for the Order Type enumeration are defined in section <a href="#">2.3.1.4.10.1.20</a> .
UPD_SCREEN_DATA 0x0001	Contains an <a href="#">UpdateBitmapPDU</a> order that updates a region of the screen.
UPD_PALETTE 0x0002	Contains an <a href="#">UpdatePalettePDU</a> order that describes the palette of UpdateBitmapPDU orders.
UPD_SYNC 0x0003	Contains an <a href="#">UpdateSynchronizePDU</a> order that resets the state of the connection.

If this field is set to 0x0000, this packet can contain any of the following orders:

Name	Description
<a href="#">ArcOrder</a>	Contains an arc.
<a href="#">CacheBitmapOrder</a>	Contains a bitmap to be cached.
<a href="#">CacheColorTableOrder</a>	Contains a color table to be cached.
<a href="#">ChordOrder</a>	Contains a chord.
<a href="#">DesktopScroll</a>	Contains a desktop scroll.
<a href="#">DstBlt</a>	Contains a raster transfer of a rectangle.
<a href="#">EllipseOrder</a>	Contains an ellipse.
<a href="#">ExtTextOrder</a>	Contains a string to be displayed and positions for the individual characters.
<a href="#">LineOrder</a>	Contains a line.
<a href="#">MemBlt</a>	Contains a transfer from the bitmap cache to the screen.
<a href="#">Mem3Blt</a>	Contains a transfer from the bitmap cache to the screen through a brush.
<a href="#">OpaqueRect</a>	Contains an opaque rectangle.
<a href="#">PatBlt</a>	Contains a brush paint.
<a href="#">PieOrder</a>	Contains a pie wedge.
<a href="#">PolyBezierOrder</a>	Contains one or more Bezier curves.
<a href="#">PolygonOrder</a>	Contains a polygon.
<a href="#">RectangleOrder</a>	Contains a rectangle.
<a href="#">RoundRectOrder</a>	Contains a rectangle that has rounded corners.
<a href="#">SaveBitmap</a>	Contains a region of the screen that the receiver SHOULD save or restore.
<a href="#">ScreenBlt</a>	Contains a bit-block transfer between regions of the screen.



Name	Description
<a href="#">TextOrder</a>	Contains a string.

**padding (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**cOrders (2 bytes):** The number of orders that are contained in **data**.

**sendBPP (2 bytes):** The bits per pixel that are in use by the sending application-sharing session node.

**data (variable):** An array of orders that are appropriate to the value of **updateType**.

### 2.3.1.4.10.1 Common Values for Multiple Parameters

Various order structures are described in this section.

#### 2.3.1.4.10.1.1 ArcOrder

The ArcOrder packet contains an arc.

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
pControlFlags								OrderType (optional)								FieldBytes															
Bounds (optional)																															
...																															
...																															
...								BackMode (optional)																							
...								nLeftRect (optional)																							
...								nTopRect (optional)																							
...								nRightRect (optional)																							
...								nBottomRect (optional)																							
...								nXStart (optional)																							
...								nYStart (optional)																							

...	nXEnd (optional)
...	nYEnd (optional)
...	BackColor (optional)
ROP2 (optional)	
PenStyle (optional)	
PenWidth (optional)	
PenColor (optional)	ArcDirection (optional)
...	

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_STANDARD\_ENC from the [OE2 Control Flags](#) enumeration. If the order differs in type from the last order that is sent, this field contains the bitwise **AND** of the value OE2\_CF\_TYPE\_CHANGE. If the bounding rectangle has changed since the last order of the same type, this field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS. If the coordinates of the bounding rectangle are specified as deltas from the last bounding rectangle that is used, this field contains the bitwise **AND** of the value OE2\_CF\_DELTACOORDS.

**OrderType (1 byte):** If the order differs in type from the last, this field MUST contain the value OE2\_ARC\_ORDER from the [Order Types](#) enumeration. If the order is the same type as the last, this field is not present.

**FieldBytes (2 bytes):** A 16-bit field, with each bit indicating which of the fields that follow **Bounds** is present. A bit set to 1 indicates that the field is present and its value has changed since the same order type was last sent.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	0

Where the bits are defined as:

Value	Description
A	The BackMode value is present.
B	The nLeftRect value is present.
C	The nTopRect value is present.
D	The nRightRect value is present.

Value	Description
E	The nBottomRect value is present.
F	The nXStart value is present.
G	The nYStart value is present.
H	The nXEnd value is present.
I	The nYEnd value is present.
J	The BackColor value is present.
K	The ROP2 value is present.
L	The PenStyle value is present.
M	The PenWidth value is present.
N	The PenColor value is present.
O	The ArcDirection value is present.

Bits that are marked 0 MUST be set to 0.

**Bounds (13 bytes):** A byte array of a [BoundsData](#) structure. This field is present only if **pControlFlags** contains the bitwise **AND** of the value OE2\_CF\_BOUNDS from the **OE2 Control Flags** enumeration.

**BackMode (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents one of the BackMode values that are defined in section [2.1.2.1](#) and that specify how the foreground and background SHOULD be mixed.

**nLeftRect (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the left edge of the bounding rectangle in screen coordinates.

**nTopRect (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the top edge of the bounding rectangle in screen coordinates.

**nRightRect (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the right edge of the bounding rectangle in screen coordinates.

**nBottomRect (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the bottom edge of the bounding rectangle in screen coordinates.

**nXStart (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the x-coordinate of the first radial endpoint.

**nYStart (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the y-coordinate of the first radial endpoint.

**nXEnd (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the x-coordinate of the second radial endpoint.

**nYEnd (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the y-coordinate of the second radial endpoint.

**BackColor (3 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the background color value that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**ROP2 (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents one of the ROP2 values that are defined in section [2.1.2.5](#) and that specify the mix mode of the foreground.

**PenStyle (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the ne of the PenStyle values that are defined in section [2.1.2.4](#).

**PenWidth (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the width, in pixels, of the pen.

**PenColor (3 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the color value of the pen that specifies a byte array of a TSHR\_COLOR structure.

**ArcDirection (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the direction in which the arc SHOULD be drawn. Possible values are as follows:

Value	Meaning
ORD_ARC_COUNTERCLOCKWISE 0x00000001	The arc SHOULD be drawn counterclockwise.
ORD_ARC_CLOCKWISE 0x00000002	The arc SHOULD be drawn clockwise.

#### 2.3.1.4.10.1.2 CacheBitmapOrder

The CacheBitmapOrder packet contains a bitmap to be cached.

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
pControlFlags								cbOrderDataLength																fOrderFlags							
...								bmcPacketType								cacheId								unused							
cxSubBitmapWidth								cxSubBitmapHeight								Bpp								cbBitmapBits							
...								iCacheEntry																Data (variable)							
...																															

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_UNENCODED from the [OE2 Control Flags](#) enumeration.

**cbOrderDataLength (2 bytes):** The length of the data that follows the **fOrderFlags** field.

**fOrderFlags (2 bytes):** MUST contain the value 0x0008.

**bmcPacketType (1 byte):** MUST be set to either 0 for uncompressed or 2 for compressed.

**cacheId (1 byte):** The identifier of the cache in which the bitmap SHOULD be stored.

**unused (1 byte):** Reserved. MUST be set to 0 and ignored upon receipt.

**cxSubBitmapWidth (1 byte):** The width, in pixels, of the bitmap.

**cxSubBitmapHeight (1 byte):** The height, in pixels, of the bitmap.

**Bpp (1 byte):** The bits, per pixel, of the bitmap.

**cbBitmapBits (2 bytes):** The length, in bytes, of **Data**.

**iCacheEntry (2 bytes):** The first byte is an index that specifies which bitmap cache is to be used (small, medium, large). The second byte is the index within the cache for the bitmap.

**Data (variable):** Either the uncompressed bitmap data or a [Compressed Bitmap](#) structure.

2.3.1.4.10.1.3 CacheColorTableOrder

The CacheColorTableOrder packet contains a color table to be cached.

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
pControlFlags									cbOrderDataLength															fOrderFlags							
...									bmcPacketType							Index							colorTableSize								
...									Data (variable)																						
...																															

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_UNENCODED from the [OE2 Control Flags](#) enumeration.

**cbOrderDataLength (2 bytes):** The length of the data that follows the **fOrderFlags** field.

**fOrderFlags (2 bytes):** MUST contain the value 0x0008.

**bmcPacketType (1 byte):** MUST be set to 0x01.

**Index (1 byte):** The index of the color table in the cache to be stored for future reference.

**colorTableSize (2 bytes):** The number of [TSHR\\_RGBQUAD](#) structures in the **Data** field.

**Data (variable):** An array of TSHR\_RGBQUAD structures.

2.3.1.4.10.1.4 ChordOrder

The ChordOrder packet contains a chord.

0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1
pControlFlags								OrderType (optional)								FieldBytes															
...								Bounds (optional)																							
...																															
...																															
...																BackMode (optional)															
...																nLeftRect (optional)															
...																nTopRect (optional)															
...																nRightRect (optional)															
...																nBottomRect (optional)															
...																nXStart (optional)															
...																nYStart (optional)															
...																nXEnd (optional)															
...																nYEnd (optional)															
...																BackColor (optional)															
...								ForeColor (optional)																							
BrushOrgX (optional)																															
BrushOrgY (optional)																															
BrushStyle (optional)																															
BrushHatch																															

BrushExtra	
...	ROP2 (optional)
...	PenStyle (optional)
...	PenWidth (optional)
...	PenColor (optional)
...	ArcDirection (optional)
...	

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_STANDARD\_ENC from the [OE2 Control Flags](#) enumeration. If the order differs in type from the last order that is sent, this field contains the bitwise **AND** of the value OE2\_CF\_TYPE\_CHANGE. If the bounding rectangle has changed since the last order of the same type, this field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS. If the coordinates of the bounding rectangle are specified as deltas from the last bounding rectangle used, this field contains the bitwise **AND** of the value OE2\_CF\_DELTACOORDS.

**OrderType (1 byte):** If the order differs in type from the last, this field MUST contain the value OE2\_CHORD\_ORDER from the [Order Types](#) enumeration. If the order is the same type as the last, this field is not present.

**FieldBytes (3 bytes):** A 24-bit field, with each bit indicating which of the fields that follow **Bounds** is present. A bit that is set to 1 indicates that the field is present and its value has changed since the same order type was last sent.

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
0	0	0	0	0	0	0	0	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	0	0	0	0	0

Where the bits are defined as:

Value	Description
A	The BackMode value is present.
B	The nLeftRect value is present.
C	The nTopRect value is present.
D	The nRightRect value is present.
E	The nBottomRect value is present.

Value	Description
F	The nXStart value is present.
G	The nYStart value is present.
H	The nXEnd value is present.
I	The nYEnd value is present.
J	The BackColor value is present.
K	The ForeColor value is present.
L	The BrushOrgX value is present.
M	The BrushOrgY value is present.
N	The BrushStyle value is present.
O	The ROP2 value is present.
P	The PenStyle value is present.
Q	The PenWidth value is present.
R	The PenColor value is present.
S	The ArcDirection value is present.

Bits marked with 0 MUST be 0.

**Bounds (13 bytes):** A byte array of a [BoundsData](#) structure. This field is present only if **pControlFlags** contains the bitwise **AND** of the value OE2\_CF\_BOUNDS from the **OE2 Control Flags** enumeration.

**BackMode (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents one of the BackMode values that are defined in section [2.1.2.1](#) and that specify how the foreground and background SHOULD be mixed.

**nLeftRect (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the left edge of the bounding rectangle, in screen coordinates.

**nTopRect (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the top edge of the bounding rectangle, in screen coordinates.

**nRightRect (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the right edge of the bounding rectangle, in screen coordinates.

**nBottomRect (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the bottom edge of the bounding rectangle, in screen coordinates.

**nXStart (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the x-coordinate of the first radial endpoint.

**nYStart (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the y-coordinate of the first radial endpoint.



**nXEnd (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the x-coordinate of the second radial endpoint.

**nYEnd (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the y-coordinate of the second radial endpoint.

**BackColor (3 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the background color value that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**ForeColor (3 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the foreground color value that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**BrushOrgX (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the x-offset at which the brush begins. The offset is based on window coordinates where the origin of (0,0) is upper left.

**BrushOrgY (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the y-offset at which the brush begins. The offset is based on window coordinates where the origin of (0,0) is upper left.

**BrushStyle (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents one of the BrushStyle values that are defined in section [2.1.2.3](#).

**BrushHatch (4 bytes):** If **BrushStyle** is set to BS\_PATTERN, this field is the first byte of the 64-by-64 pixel monochrome bitmap of the brush, laid out in top-to-bottom, left-to-right order. If set to BS\_HATCHED, the **BrushStyle** values that are defined in section [2.1.2.2](#) specify the orientation of the lines that are used to create the hatch. Otherwise, this field is not used.

**BrushExtra (7 bytes):** If **BrushStyle** is set to BS\_PATTERN, this field is the last seven bytes of the 64-by-64 pixel monochrome bitmap of the brush, laid out in top-to-bottom, left-to-right order. Otherwise, this field is not used.

**ROP2 (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents one of the ROP2 values that are defined in section [2.1.2.5](#) and that specify the mix mode of the foreground.

**PenStyle (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents one of the PenStyle values that are defined in section [2.1.2.4](#).

**PenWidth (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the width, in pixels, of the pen.

**PenColor (3 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the color value of the pen and is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**ArcDirection (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This field represents one of the following values and indicates the direction in which the arc SHOULD be drawn.

Value	Meaning
ORD_ARC_COUNTERCLOCKWISE 0x00000001	The arc SHOULD be drawn counterclockwise.

Value	Meaning
ORD_ARC_CLOCKWISE 0x00000002	The arc SHOULD be drawn clockwise.

### 2.3.1.4.10.1.5 Compressed Bitmap

The Compressed Bitmap structure describes a compressed 4-bits-per-pixel or 8-bits-per-pixel bitmap.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
cbCompFirstRowSize																cbCompMainBodySize															
cbScanWidth																cbUncompressedSize															
data (variable)																															
...																															

**cbCompFirstRowSize (2 bytes):** MUST be set to 0x0000.

**cbCompMainBodySize (2 bytes):** The size, in bytes, of the **data** field.

**cbScanWidth (2 bytes):** The width, in bytes, of each bitmap row. This value MUST be divisible by 4.

**cbUncompressedSize (2 bytes):** The uncompressed size, in bytes, of the bitmap.

**data (variable):** An array of codes that describe compressed structures in the bitmap. The following steps MUST be taken to decode structures.

1. If the highest order 2 bits of the first byte do not consist entirely of ones, compare the highest order 3 bits to the 3-bit structure codes and choose the appropriate fields.
2. If the highest order 3 bits of the first byte do not consist entirely of ones, compare the highest order 4 bits to the 4-bit structure codes and choose the appropriate fields.
3. Otherwise, compare the byte to the 8-bit structure codes and choose the appropriate fields.

3-Bit Structure Codes	Meaning
MEGA_BG_RUN 000	A run where each byte matches the uncompressed byte from the previous line and the other 5 bits of the code are all 0. The length of the run, in bytes, is 32 plus the value (a number between 0 and 255) that is contained in the next byte. If this code occurs on the first line, the last line SHOULD be considered to have the value 0x00.
BG_RUN 000	A run where each byte matches the uncompressed byte from the previous line and the other 5 bits of the code are not all 0. The length of the run, in bytes, is the other 5 bits of the byte. If this code occurs on the first line, the last line SHOULD be considered to have

3-Bit Structure Codes	Meaning
	the value 0x00.
MEGA_FG_RUN 001	A run where each byte is the <b>XOR</b> of the uncompressed byte from the previous line with the foreground color and the other 5 bits of the code are all 0. The length of the run, in bytes, is 32 plus the value (a number between 0 and 255) that is contained in the next byte. If this code occurs on the first line, the foreground color alone SHOULD be used.
FG_RUN 001	A run where each byte is the <b>XOR</b> of the uncompressed byte from the previous line that has the foreground color, and the other 5 bits of the byte are not all 0. The length of the run, in bytes, is the other 5 bits of the byte. If this code occurs on the first line, the foreground color alone SHOULD be used.
MEGA_FG_BG_IMAGE 010	A run where the other 5 bits of the code are all 0 and each byte is either the matching uncompressed byte from the previous line or the <b>XOR</b> of that byte with the foreground color. The length of the run, in bytes, is 1 plus the value (a number between 0 and 255) that is contained in the next byte. The data is specified in the following bytes: a 1 bit signifies the <b>XOR</b> of the byte from the previous line that has the foreground color and a 0 bit signifies that byte alone. If this code occurs on the first line, the last line SHOULD be considered to have the value 0x00.
FG_BG_IMAGE 010	A run where the other 5 bits of the code are all not 0 and each byte is either the matching uncompressed byte from the previous line or the <b>XOR</b> of that byte with the foreground color. The length of the run, in bytes, is 8 multiplied by the value (a number between 0 and 31) of the other 5 bits of the byte. The data is specified in the following bytes: a 1 bit signifies the <b>XOR</b> of the byte from the previous line that has the foreground color and a 0 bit signifies that byte alone. If this code occurs on the first line, the last line SHOULD be considered to have the value 0x00.
MEGA_COLOR_RUN 011	A single-color run where the other 5 bits of the code are all 0. The length of the run, in bytes, is 32 plus the value (a number between 0 and 255) that is contained in the next byte. The color is specified in the following byte.
COLOR_RUN 011	A single-color run where the other 5 bits of the code are not all 0. The length of the run, in bytes, is the other 5 bits of the byte. The color is specified in the following byte.
MEGA_COLOR_IMAGE 100	An uncompressed run where the other 5 bits of the code are all 0. The length of the run, in bytes, is 32 plus the value (a number between 0 and 255) that is contained in the next byte. The data is specified in the following bytes as 1 pixel per byte.
COLOR_IMAGE 100	An uncompressed run where the other 5 bits of the code are not all 0. The length of the run, in bytes, is the other 5 bits of the byte. The data is specified in the following bytes as 1 pixel per byte.
MEGA_PACKED_CLR_IMAGE 101	An uncompressed run where the other 5 bits of the code are all 0. The length of the run, in bytes, is 32 plus the value (a number between 0 and 255) that is contained in the next byte. The data is specified in the following bytes as 2 pixels per byte, because of the high-order nibble of all colors in the run that contains 0.

3-Bit Structure Codes	Meaning
PACKED_COLOR_IMAGE 101	An uncompressed run where the other 5 bits of the code are not all 0. The length of the run, in bytes, is the other 5 bits of the byte. The data is specified in the following bytes as 2 pixels per byte, because of the high-order nibble of all colors in the run that contains 0.

4-Bit Structure Codes	Meaning
SET_FG_MEGA_FG_RUN 1100	A run where each byte is the <b>XOR</b> of the uncompressed byte from the previous line that has a new foreground color and the other 4 bits of the code are all 0. The length of the run, in bytes, is 16 plus the value (a number between 0 and 255) that is contained in the next byte. The new foreground color is specified in the following byte. If this code occurs on the first line, the foreground color alone SHOULD be used.
SET_FG_FG_RUN 1100	A run where each byte is the <b>XOR</b> of the uncompressed byte from the previous line that has a new foreground color and the other 4 bits of the code are not all 0. The length of the run, in bytes, is the other 4 bits of the byte. The new foreground color is specified in the following byte. If this code occurs on the first line, the foreground color alone SHOULD be used.
SET_FG_MEGA_FG_BG 1101	A run where the other 4 bits of the code are all 0 and each byte is either the matching uncompressed byte from the previous line or the <b>XOR</b> of that byte with the foreground color. The length of the run, in bytes, is 1 plus the value (a number between 0 and 255) that is contained in the next byte. The new foreground color is specified in the byte after the length. The data is specified in the following bytes: a 1 bit signifies the <b>XOR</b> of the byte from the previous line that has the new foreground color and a 0 bit signifies that byte alone. If this code occurs on the first line, the last line SHOULD be considered to have the value 0x00.
SET_FG_FG_BG 1101	A run where the other 4 bits of the code are not all 0 and each byte is either the matching uncompressed byte from the previous line or the <b>XOR</b> of that byte with the foreground color. The length of the run, in bytes, is 8 multiplied by the value (a number between 0 and 15) of the other 4 bits of the byte. The new foreground color is specified in the next byte. The data is specified in the following bytes: a 1 bit that signifies the <b>XOR</b> of the byte from the previous line that has the new foreground color and a 0 bit that signifies that byte alone. If this code occurs on the first line, the last line SHOULD be considered to have the value 0x00.
MEGA_DITHERED_RUN 1110	An alternating run of two colors where the other 4 bits of the code are all 0. The length of the run, in bytes, is 16 plus the value (a number between 0 and 255) that is contained in the next byte. The colors are specified in the following two bytes as one byte each.
DITHERED_RUN 1110	An alternating run of two colors where the other 4 bits of the code are not all 0. The length of the run, in bytes, is the other 4 bits of the byte. The colors are specified in the following 2 bytes as one byte each.

8-Bit Structure Codes	Meaning
MEGA_MEGA_BG_RUN 11110000	A run where each byte matches the uncompressed byte from the previous line. The length of the run, in bytes, is specified in the next 2 bytes between 1 and 65,536. If this code occurs on the first line, the last line SHOULD be considered to have the value 0x00.
MEGA_MEGA_FG_RUN 11110001	A run where each byte is the <b>XOR</b> of the uncompressed byte from the previous line that has the foreground color. The length of the run, in bytes, is specified in the next 2 bytes between 1 and 65,536. If this code occurs on the first line, the foreground color alone SHOULD be used.
MEGA_MEGA_FGBG 11110010	A long run where each byte is either the uncompressed byte from the previous line or the <b>XOR</b> of that byte that has the foreground color. The length of the run, in bytes, is specified in the next two bytes, a value between 1 and 65,536. The data is specified in the following bytes: a 1 bit signifies the <b>XOR</b> of the byte from the previous line that has the foreground color and a 0 bit signifies that byte alone. If this code occurs on the first line, the last line SHOULD be considered to have the value 0x00.
MEGA_MEGA_COLOR_RUN 11110011	A long single-color run of pixels. The length of the run, in bytes, is specified in the next 2 bytes, a value between 1 and 65,536. The color is specified in the following byte.
MEGA_MEGA_CLR_IMG 11110100	A long, uncompressed run of pixels. The length of the run, in bytes, is specified in the next 2 bytes, a value between 1 and 65,536. The data is specified in the following bytes as 1 pixel per byte.
MEGA_MEGA_PACKED_CLR 11110101	A long, uncompressed run of pixels that are packed 2 pixels to a byte. The length of the run, in bytes, is specified in the next 2 bytes between 1 and 65,536. The data is specified in the following bytes as 2 pixels per byte, due to the high-order nibble of all colors in the run that contains 0.
MEGA_MEGA_SET_FG_RUN 11110110	A long run where each byte is the <b>XOR</b> of the uncompressed byte from the previous line with a new foreground color. The length of the run, in bytes, is specified in the next two bytes between 1 and 65,536. The new foreground color is specified in the following byte. If this code occurs on the first line, the foreground color alone SHOULD be used.
MEGA_MEGA_SET_FGBG 11110111	A long run where each byte is either the uncompressed byte from the previous line or the <b>XOR</b> of that byte with a new foreground color. The length of the run, in bytes, is specified in the next 2 bytes between 1 and 65,536. The new foreground color is specified in the byte after the length. The data is specified in the following bytes, with a 1 bit signifying the <b>XOR</b> of the byte from the previous line that has the foreground color and a 0 bit signifying that byte alone. If this code occurs on the first line, the last line SHOULD be considered to have the value 0x00.
MEGA_MEGA_DITHER 11111000	A long alternating run of two colors. The length of the run, in bytes, is specified in the next 2 bytes between 1 and 65,536. The colors are specified in the following 2 bytes as 1 byte each.
SPECIAL_FGBG_CODE_1 11111001	The 2 bytes that are the <b>XOR</b> of the uncompressed bytes from the previous line that has the foreground color, followed by the 6 uncompressed bytes of the previous line. If this code occurs on the

8-Bit Structure Codes	Meaning
	first line, the last line SHOULD be considered to have the value 0x00.
SPECIAL_FGBG_CODE_2 11111010	A byte that is the <b>XOR</b> of the uncompressed bytes from the previous line that has the foreground color, an uncompressed byte from the previous line, another <b>XOR</b> byte, and finally 5 uncompressed bytes. If this code occurs on the first line, the last line SHOULD be considered to have the value 0x00.
BLACK 11111101	A single black pixel.
WHITE 11111110	A single white pixel.
START_LOSSY 11111111	A code specifying that all the following codes SHOULD have their byte count doubled: MEGA_COLOR_IMAGE, COLOR_IMAGE, MEGA_PACKED_CLR_IMAGE, PACKED_COLOR_IMAGE, MEGA_MEGA_CLR_IMG, and MEGA_MEGA_PACKED_CLR. Pixel pairs that begin with black SHOULD render as two black pixels followed by two of the next pixel. All other pairs SHOULD render dithered.

By default, the foreground color is assumed to be 0xFF (white). This color can be changed at any point in the bitmap for all the pixels through the use of the following codes:

SET\_FG\_MEGA\_FG\_RUN, SET\_FG\_FG\_RUN, SET\_FG\_MEGA\_FG\_BG, SET\_FG\_FG\_BG, MEGA\_MEGA\_SET\_FG\_RUN, or MEGA\_MEGA\_SET\_FGBG.

Encoding MAY NOT cross the boundary between the first line and the rest of the bitmap.

Any sequence of two BG\_RUN codes MUST be separated by a single byte, which is the XOR of the byte from the previous line with the foreground color. The same applies to any combination of MEGA\_MEGA\_BG\_RUN, MEGA\_BG\_RUN, and BG\_RUN.

Note that 4 bits-per-pixel images MUST be expanded to a full byte before compression.

#### 2.3.1.4.10.1.6 DesktopScroll

The DesktopScroll packet contains a desktop scroll.

0	1	2	3	4	5	6	7	8	9	0 <sup>1</sup>	1	2	3	4	5	6	7	8	9	0 <sup>2</sup>	1	2	3	4	5	6	7	8	9	0 <sup>3</sup>	1
pControlFlags								OrderType (optional)								FieldBytes								Bounds (optional)							
...																															
...																															
...																															
xOrigin (optional)																															
yOrigin (optional)																															

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_STANDARD\_ENC from the [OE2 Control Flags](#) enumeration. If the order differs in type from the last order that was sent, this field MUST contain the bitwise **AND** of the value OE2\_CF\_TYPE\_CHANGE. If the bounding rectangle has changed since the last order of the same type, this field MUST contain the bitwise **AND** of the value OE2\_CF\_BOUNDS. If the coordinates of the bounding rectangle are specified as deltas from the last bounding rectangle that was used, this field contains the bitwise **AND** of the value OE2\_CF\_DELTACOORDS.

**OrderType (1 byte):** If the order differs in type from the last, this field MUST contain the value OE2\_DESKSCROLL\_ORDER from the [Order Types](#) enumeration. If the order is the same type as the last, this field is not present.

**FieldBytes (1 byte):** An 8-bit field, with each bit indicating which of the fields that follow **Bounds** is present. A bit set to 1 indicates that the field is present and its value has changed since the same order type was last sent.

0	1	2	3	4	5	6	7
A	B	0	0	0	0	0	0

Where the bits are defined as:

Value	Description
A	The xOrigin value is present.
B	The yOrigin value is present.

Bits marked with 0 MUST be 0.

**Bounds (13 bytes):** A byte array of a [BoundsData](#) structure. This field is present only if **pControlFlags** contains the bitwise **AND** of the value OE2\_CF\_BOUNDS from the **OE2 Control Flags** enumeration.

**xOrigin (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the x-coordinate where the origin of the receiver's view of the desktop SHOULD be moved.

**yOrigin (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the y-coordinate where the origin of the receiver's view of the desktop SHOULD be moved.

#### 2.3.1.4.10.1.7 DstBlt

The DstBlt order contains a raster transfer of a rectangle.

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
pControlFlags								OrderType (optional)								FieldBytes								Bounds (optional)							
...																															
...																															
...																															
nLeftRect (optional)																															
nTopRect (optional)																															
nWidth (optional)																															
nHeight (optional)																															
bRop (optional)																															

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_STANDARD\_ENC from the [OE2 Control Flags](#) enumeration. If the order differs in type from the last order that was sent, this field contains the bitwise **AND** of the value OE2\_CF\_TYPE\_CHANGE. If the bounding rectangle has changed since the last order of the same type, this field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS. If the coordinates of the bounding rectangle are specified as deltas from the last bounding rectangle that was used, this field contains the bitwise **AND** of the value OE2\_CF\_DELTACOORDS.

**OrderType (1 byte):** If the order differs in type from the last, this field MUST contain the value OE2\_DSTBLT\_ORDER from the [Order Types](#) enumeration. If the order is the same type as the last, this field will not be present.

**FieldBytes (1 byte):** An 8-bit field, with each bit indicating which of the fields that follow **Bounds** is present. A bit set to 1 indicates that the field is present and its value has changed since the same order type was last sent.



0	1	2	3	4	5	6	7
A	B	C	D	E	0	0	0

Where the bits are defined as:

Value	Description
A	The nLeftRect value is present.
B	The nTopRect value is present.
C	The nWidth value is present.
D	The nHeight value is present.
E	The bRop value is present.

Bits marked with 0 MUST be 0.

**Bounds (13 bytes):** A byte array of a [BoundsData](#) structure. This field is present only if **pControlFlags** contains the bitwise **AND** of the value OE2\_CF\_BOUNDS from the **OE2 Control Flags** enumeration.

**nLeftRect (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the left edge of the rectangle in screen coordinates.

**nTopRect (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the top edge of the rectangle in screen coordinates.

**nWidth (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the width of the rectangle in pixels.

**nHeight (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the height, in pixels, of the rectangle.

**bRop (1 byte):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the high-order byte of a Windows GDI ternary raster operation code.

#### 2.3.1.4.10.1.8 EllipseOrder

The EllipseOrder packet contains an ellipse.

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
pControlFlags								OrderType (optional)								FieldBytes															
Bounds (optional)																															
...																															

...		
...	BackMode (optional)	
...	nLeftRect (optional)	
...	nTopRect (optional)	
...	nRightRect (optional)	
...	nBottomRect (optional)	
...	BackColor (optional)	
ForeColor (optional)		BrushOrgX (optional)
...		BrushOrgY (optional)
...		BrushStyle (optional)
...		BrushHatch
...		BrushExtra
...		
...	ROP2 (optional)	
...	PenStyle (optional)	
...	PenWidth (optional)	
...	PenColor (optional)	
...		

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_STANDARD\_ENC from the [OE2 Control Flags](#) enumeration. If the order differs in type from the last order sent, this field contains the bitwise **AND** of the value OE2\_CF\_TYPE\_CHANGE. If the bounding rectangle has changed since the last order of the same type, this field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS. If the coordinates of the bounding rectangle are specified as deltas from the last bounding rectangle that was used, this field contains the bitwise **AND** of the value OE2\_CF\_DELTACOORDS.

**OrderType (1 byte):** If the order differs in type from the last, this field MUST contain the value OE2\_ELLIPSE\_ORDER from the [Order Types](#) enumeration. If the order is the same type as the last, this field is not present.

**FieldBytes (2 bytes):** A 16-bit field, with each bit indicating which of the fields that follow **Bounds** is present. A bit set to 1 indicates that the field is present and its value has changed since the same order type was last sent.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	O

Where the bits are defined as:

Value	Description
A	The BackMode value is present.
B	The nLeftRect value is present.
C	The nTopRect value is present.
D	The nRightRect value is present.
E	The nBottomRect value is present.
F	The BackColor value is present.
G	The ForeColor value is present.
H	The BrushOrgX value is present.
I	The BrushOrgY value is present.
J	The BrushStyle value is present.
K	The ROP2 value is present.
L	The PenStyle value is present.
M	The PenWidth value is present.
N	The PenColor value is present.

Bits marked with 0 MUST be 0.

**Bounds (13 bytes):** A byte array of a [BoundsData](#) structure. This field is present only if **pControlFlags** contains the bitwise **AND** of the value OE2\_CF\_BOUNDS from the **OE2 Control Flags** enumeration.

**BackMode (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents one of the BackMode values that are defined in section [2.1.2.1](#) and that specify how the foreground and background SHOULD be mixed.

**nLeftRect (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the left edge of the bounding rectangle in screen coordinates.

**nTopRect (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the top edge of the bounding rectangle in screen coordinates.

**nRightRect (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the right edge of the bounding rectangle in screen coordinates.

**nBottomRect (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the bottom edge of the bounding rectangle in screen coordinates.

**BackColor (3 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the background color value that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**ForeColor (3 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the foreground color value that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**BrushOrgX (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the x-offset where the brush begins. The offset is based on window coordinates where the origin (0,0) is upper left.

**BrushOrgY (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the y-offset at which the brush begins. The offset is based on window coordinates where the origin (0,0) is upper left.

**BrushStyle (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents one of the [BrushStyle](#) values that are defined in section [2.1.2.3](#).

**BrushHatch (4 bytes):** If **BrushStyle** is set to BS\_PATTERN, this field is the first byte of the 64-by-64 pixel monochrome bitmap of the brush, laid out in top-to-bottom, left-to-right order. If set to BS\_HATCHED, one of the BrushHatch values that are defined in section [2.1.2.2](#) specifies the orientation of the lines that are used to create the hatch. Otherwise, this field is not used.

**BrushExtra (7 bytes):** If **BrushStyle** is set to BS\_PATTERN, this field is the last seven bytes of the 64-by-64 pixel monochrome bitmap of the brush, laid out in top-to-bottom, left-to-right order. Otherwise, this field is not used.

**ROP2 (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents one of the [ROP2](#) values that are defined in section [2.1.2.5](#) and that specify the mix mode of the foreground.

**PenStyle (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents one of the [PenStyle](#) values that are defined in section [2.1.2.4](#).

**PenWidth (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the width, in pixels, of the pen.

**PenColor (3 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the color value of the pen, which is specified by a byte array of a [TSHR\\_COLOR](#) structure.

### 2.3.1.4.10.1.9 ExtTextOrder

The ExtTextOrder packet contains a string to be displayed and positions for the individual characters.

0	1	2	3	4	5	6	7	8	9	0 <sup>1</sup>	1	2	3	4	5	6	7	8	9	0 <sup>2</sup>	1	2	3	4	5	6	7	8	9	0 <sup>3</sup>	1
pControlFlags								OrderType (optional)								FieldBytes															
Bounds (optional)																															
...																															
...																															
...								BackMode (optional)																nXStart (optional)							
...																								nYStart (optional)							
...																								BackColor (optional)							
...																ForeColor (optional)															
...								CharExtra																							
...								BreakExtra																							
...								BreakCount																							
...								FontHeight (optional)																							
...								FontWidth (optional)																							
...								FontWeight (optional)																							
...								FontFlags (optional)																							
...								FontIndex (optional)																							
...								fuOptions																Left (optional)							
...																								Top (optional)							

...	Right (optional)
...	Bottom (optional)
...	String (variable)
...	
deltaX (variable)	
...	

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_STANDARD\_ENC from the [OE2 Control Flags](#) enumeration. If the order differs in type from the last order that was sent, this field contains the bitwise **AND** of the value OE2\_CF\_TYPE\_CHANGE. If the bounding rectangle has changed since the last order of the same type, this field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS. If the coordinates of the bounding rectangle are specified as deltas from the last bounding rectangle that was used, this field contains the bitwise **AND** of the value OE2\_CF\_DELTACOORDS.

**OrderType (1 byte):** If the order differs in type from the last, this field MUST contain the value OE2\_EXTTEXTOUT\_ORDER from the [Order Types](#) enumeration. If the order is the same type as the last, this field is not present.

**FieldBytes (2 bytes):** A 16-bit field, with each bit indicating which of the fields that follow **Bounds** is present. A bit set to 1 indicates that the field is present and its value has changed since the same order type was last sent.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P

Where the bits are defined as:

Value	Description
A	The BackMode value is present.
B	The nXStart value is present.
C	The nYStart value is present.
D	The BackColor value is present.
E	The ForeColor value is present.
F	The FontHeight value is present.
G	The FontWidth value is present.

Value	Description
H	The FontWeight value is present.
I	The FontFlags value is present.
J	The FontIndex value is present.
K	The Left value is present.
L	The Top value is present.
M	The Right value is present.
N	The Bottom value is present.

Bits marked with 0 MUST be 0.

**Bounds (13 bytes):** A byte array of a [BoundsData](#) structure. This field is present only if **pControlFlags** contains the bitwise **AND** of the value OE2\_CF\_BOUNDS from the **OE2 Control Flags** enumeration.

**BackMode (2 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents one of the following values, which specify how the foreground and background SHOULD be mixed.

Value	Meaning
TRANSPARENT 0x0001	The region SHOULD be filled with the background color before the drawing is finished.
OPAQUE 0x0002	The region SHOULD NOT be filled with the background color before the drawing is finished.

**nXStart (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the x-coordinate of the string in the window.

**nYStart (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the y-coordinate of the string within the window.

**BackColor (3 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the background color value that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**ForeColor (3 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the foreground color value that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**CharExtra (4 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**BreakExtra (4 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**BreakCount (4 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**FontHeight (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the height of the font, in logical units. [<12>](#)

**FontWidth (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the width of the font, in logical units. [<13>](#13)

**FontWeight (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the weight of the font, in logical units between 0x00000000 (0) and 0x000003E8 (1000).

**FontFlags (4 bytes):** A bitmap of the following values MUST be present if the corresponding bit from **FieldBytes** is set, indicating attributes of the font.

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
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	T	K	U	I	S	P

Where the bits are defined as:

Value	Description
P	The text SHOULD use a fixed pitch.
S	The text SHOULD use a fixed size.
I	The text SHOULD be italic.
U	The text SHOULD be underlined.
K	The text SHOULD be struck out.
T	The text SHOULD be drawn with a TrueType font.

**FontIndex (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the index of the font in the font table. The font index is an index into an array of font names. For example, 0x41 is the first index into the remote font table that starts with the character 'A'.

**fuOptions (2 bytes):** A bitmap of the following values MUST be present if the corresponding bit from **FieldBytes** is set, indicating the actions to apply to the text.

Value	Meaning
ETO_OPAQUE 0x0002	The background color fills the rectangle before the text is drawn.
ETO_CLIPPED 0x0004	The text is clipped to the rectangle.

**Left (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the window coordinates of the left edge of the rectangle.

**Top (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the window coordinates of the top edge of the rectangle.



**Right (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the window coordinates of the right edge of the rectangle.

**Bottom (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the window's coordinates of the bottom edge of the rectangle.

**String (variable):** A value MUST be present that represents the text to be drawn. The first byte of the string is an integer that indicates the length of the string. The string can be from 1 to 256 bytes in length.

**deltaX (variable):** A value MUST be present that represents an array of delta positions between the letters of the string. The first 2 bytes of the array represent the length of the array as an integer. The entries that follow correspond directly to the characters in **String** and specify the delta distance to the subsequent character. This field can be from 2 to 257 bytes in length.

#### **2.3.1.4.10.1.10 LineOrder**

The LineOrder packet contains a line.

0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1
pControlFlags								OrderType (optional)								FieldBytes															
Bounds (optional)																															
...																															
...																															
...								BackMode																							
...								nXStart (optional)																							
...								nYStart (optional)																							
...								nXEnd (optional)																							
...								nYEnd (optional)																							
...								BackColor (optional)																							
ROP2 (optional)																															
PenStyle (optional)																															
PenWidth (optional)																															
PenColor (optional)																															

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_STANDARD\_ENC from the [OE2 Control Flags](#) enumeration. If the order differs in type from the last order that was sent, this field contains the bitwise **AND** of the value OE2\_CF\_TYPE\_CHANGE. If the bounding rectangle has changed since the last order of the same type, this field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS. If the coordinates of the bounding rectangle are specified as deltas from the last bounding rectangle that was used, this field contains the bitwise **AND** of the value OE2\_CF\_DELTACOORDS.

**OrderType (1 byte):** If the order differs in type from the last, this field MUST contain the value OE2\_LINETO\_ORDER from the [Order Types](#) enumeration. If the order is the same type as the last, this field is not present.

**FieldBytes (2 bytes):** A 16-bit field, with each bit indicating which of the fields that follow is present. A bit set to 1 indicates that the field is present and its value has changed since the same order type was last sent.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	B	C	D	E	F	G	H	I	0	0	0	0	0	0	0

Where the bits are defined as:

Value	Description
A	The <b>nXStart</b> value is present.
B	The <b>nYStart</b> value is present.
C	The <b>nXEnd</b> value is present.
D	The <b>nYEnd</b> value is present.
E	The <b>BackColor</b> value is present.
F	The <b>ROP2</b> value is present.
G	The <b>PenStyle</b> value is present.
H	The <b>PenWidth</b> value is present.
I	The <b>PenColor</b> value is present.

Bits that are marked with 0 MUST be set to zero.

**Bounds (13 bytes):** A byte array of a [BoundsData](#) structure. This field is present only if the **pControlFlags** field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS from the **OE2 Control Flags** enumeration.

**BackMode (4 bytes):** One of the BackMode values that are specified in section [2.1.2.1](#) MUST be present to specify how the foreground and background SHOULD be mixed.

**nXStart (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the x-coordinate within the window for the start of the line.

**nYStart (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the y-coordinate within the window for the start of the line.

**nXEnd (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the x-coordinate within the window for the end of the line.

**nYEnd (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the y-coordinate within the window for the end of the line.

**BackColor (3 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This field represents the background color value that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

- ROP2 (4 bytes):** MUST be present if the corresponding bit from **FieldBytes** is set. This represents the ROP2 values that are specified in section [2.1.2.5](#).
- PenStyle (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the PenStyle values that are specified in section [2.1.2.4](#).
- PenWidth (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the width, in pixels, of the pen.
- PenColor (3 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the color value of the pen that is specified by a byte array of a TSHR\_COLOR structure.

### 2.3.1.4.10.1.11 Mem3Blt

The Mem3Blt packet contains a transfer from the bitmap cache to the screen through a brush.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
pControlFlags								OrderType (optional)								FieldBytes															
Bounds (optional)																															
...																															
...																															
...								cacheId																nLeftRect (optional)							
...																								nTopRect (optional)							
...																								nWidth (optional)							
...																								nHeight (optional)							
...																								bRop (optional)							
...																								nXSrc (optional)							
...																								nYSrc (optional)							
...																								BackColor (optional)							
...																ForeColor (optional)															

...	BrushOrgX (optional)
...	BrushOrgY (optional)
...	BrushStyle (optional)
...	BrushHatch
...	BrushExtra
...	
cacheIndex (optional)	

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_STANDARD\_ENC from the [OE2 Control Flags](#) enumeration. If the order differs in type from the last order that was sent, this field contains the bitwise **AND** of the value OE2\_CF\_TYPE\_CHANGE. If the bounding rectangle has changed since the last order of the same type, this field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS. If the coordinates of the bounding rectangle are specified as deltas from the last bounding rectangle that was used, this field contains the bitwise **AND** of the value OE2\_CF\_DELTACOORDS.

**OrderType (1 byte):** If the order differs in type from the last, this field MUST contain the value OE2\_MEM3BLT\_R2\_ORDER from the [Order Types](#) enumeration. If the order is the same type as the last, this field is not present.

**FieldBytes (2 bytes):** A 16-bit field, with each bit indicating which of the fields that follow **Bounds** is present. A bit set to 1 indicates that the field is present and its value has changed since the same order type was last sent.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	B	C	D	E	F	G	H	I	J	K	L	M	0	0	0

Where the bits are defined as:

Value	Description
A	The <b>nLeftRect</b> value is present.
B	The <b>nTopRect</b> value is present.
C	The <b>nWidth</b> value is present.
D	The <b>nHeight</b> value is present.
E	The <b>bRop</b> value is present.

Value	Description
F	The <b>nXSrc</b> value is present.
G	The <b>nYSrc</b> value is present.
H	The <b>BackColor</b> value is present.
I	The <b>ForeColor</b> value is present.
J	The <b>BrushOrgX</b> value is present.
K	The <b>BrushOrgY</b> value is present.
L	The <b>BrushStyle</b> value is present.
M	The <b>cacheIndex</b> value is present.

Bits marked with 0 MUST be set to 0.

**Bounds (13 bytes):** A byte array of a [BoundsData](#) structure. This field is present only if the **pControlFlags** field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS from the **OE2 Control Flags** enumeration.

**cacheId (2 bytes):** The first byte is an index that specifies which bitmap cache (small, medium, or large) is to be used. The second byte is the index within the cache for the bitmap.

**nLeftRect (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the x-coordinate within the window of the left edge of the target rectangle.

**nTopRect (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the y-coordinate within the window of the upper edge of the target rectangle.

**nWidth (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the width of the target rectangle in pixels.

**nHeight (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the height of the target rectangle in pixels.

**bRop (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the high-order byte of a Windows GDI ternary raster operation code.

**nXSrc (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the x-coordinate within the window of the left side of the source rectangle within the source bitmap in the cache.

**nYSrc (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the y-coordinate within the window of the upper edge of the source rectangle within the source bitmap in the cache.

**BackColor (3 bytes):** Value MUST be present if corresponding bit from **FieldBytes** is set. This represents the background color value that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**ForeColor (3 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the foreground color value that is specified by a byte array of a TSHR\_COLOR structure.

**BrushOrgX (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the x-offset at which the brush begins. The offset is based on window coordinates where the origin of (0,0) is upper left.

**BrushOrgY (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the y-offset at which the brush begins. The offset is based on window coordinates where the origin of (0,0) is upper left.

**BrushStyle (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the BrushStyle values that are specified in section [2.1.2.3](#).

**BrushHatch (4 bytes):** If **BrushStyle** is set to BS\_PATTERN, this field is the first byte of the 64-by-64 pixel monochrome bitmap of the brush, laid out in top-to-bottom, left-to-right order. If set to BS\_HATCHED, the BrushHatch values that are specified in section [2.1.2.2](#) specify the orientation of the lines that are used to create the hatch. Otherwise, this field is not used.

**BrushExtra (7 bytes):** If **BrushStyle** is set to BS\_PATTERN, this field is the last seven bytes of the 64-by-64 pixel monochrome bitmap of the brush, laid out in top-to-bottom, left-to-right order. Otherwise, this field is not used.

**cacheIndex (2 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the identifier of the bitmap in the cache.

#### 2.3.1.4.10.1.12 MemBlt

The MemBlt packet contains a transfer from the bitmap cache to the screen.

0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1
pControlFlags								OrderType (optional)								FieldBytes															
Bounds (optional)																															
...																															
...																															
...								cacheId (optional)																nLeftRect (optional)							
...																								nTopRect (optional)							
...																								nWidth (optional)							
...																								nHeight (optional)							
...																								bRop (optional)							
...																								nXSrc (optional)							
...																								nYSrc (optional)							
...																								cacheIndex (optional)							
...																															

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_STANDARD\_ENC from the [OE2 Control Flags](#) enumeration. If the order differs in type from the last order that was sent, this field contains the bitwise **AND** of the value OE2\_CF\_TYPE\_CHANGE. If the bounding rectangle has changed since the last order of the same type, this field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS. If the coordinates of the bounding rectangle are specified as deltas from the last bounding rectangle that was used, this field contains the bitwise **AND** of the value OE2\_CF\_DELTACOORDS.

**OrderType (1 byte):** If the order differs in type from the last, this field MUST contain the value OE2\_MEMBLT\_R2\_ORDER from the [Order Types](#) enumeration. If the order is the same type as the last, this field is not present.

**FieldBytes (2 bytes):** A 16-bit field, with each bit indicating which of the fields that follow **Bounds** is present. A bit set to 1 indicates that the field is present and its value has changed since the same order type was last sent.



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	B	C	D	E	F	G	H	I	0	0	0	0	0	0	0

Where the bits are defined as:

Value	Description
A	The <b>cacheId</b> value is present.
B	The <b>nLeftRect</b> value is present.
C	The <b>nTopRect</b> value is present.
D	The <b>nWidth</b> value is present.
E	The <b>nHeight</b> value is present.
F	The <b>bRop</b> value is present.
G	The <b>nXSrc</b> value is present.
H	The <b>nYSrc</b> value is present.
I	The <b>cachIndex</b> value is present.

The bits marked with 0 MUST be set to 0.

**Bounds (13 bytes):** A byte array of a [BoundsData](#) structure. This field is present only if the **pControlFlags** field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS from the **OE2 Control Flags** enumeration.

**cacheId (2 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the identifier of the cache where the bitmap is stored. MUST be one of the following values.

Value	Meaning
0x0000	Small
0x0001	Medium
0x0002	Large

**nLeftRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the x-coordinate within the window of the left edge of the target rectangle.

**nTopRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the y-coordinate within the window of the upper edge of the target rectangle.

**nWidth (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the width, in pixels, of the target rectangle.

**nHeight (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the height, in pixels, of the target rectangle.

**bRop (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the high-order byte of a Windows GDI ternary raster operation code.

**nXSrc (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the x-coordinate within the window of the left side of the source rectangle within the source bitmap in the cache.

**nYSrc (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the y-coordinates of the top side of the source rectangle within the source bitmap in the cache.

**cacheIndex (2 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the identifier of the bitmap within the cache.

#### 2.3.1.4.10.1.13 OE2 Control Flags

The **OE2 Control Flags** enumeration defines the values that describe the contents and encoding of the [Update Order](#) that is related to drawing.

```
typedef enum
{
    OE2_CF_STANDARD_ENC = 0x01,
    OE2_CF_UNENCODED = 0x02,
    OE2_CF_BOUNDS = 0x04,
    OE2_CF_TYPE_CHANGE = 0x08,
    OE2_CF_DELTACOORDS = 0x10
} OE2_Control_Flags;
```

**OE2\_CF\_STANDARD\_ENC:** The order is encoded in the OE2 format.

**OE2\_CF\_UNENCODED:** The order is un-encoded.

**OE2\_CF\_BOUNDS:** The order contains a bounding rectangle for the drawing order.

**OE2\_CF\_TYPE\_CHANGE:** The order contains an order type that is different from the last.

**OE2\_CF\_DELTACOORDS:** The coordinates of the order-bounding rectangle are specified as single-byte delta values from those that are contained in the last order of the same type.

#### 2.3.1.4.10.1.14 OpaqueRect

The OpaqueRect packet contains an opaque rectangle.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
pControlFlags								OrderType (optional)								FieldBytes								Bounds (variable)							
...																															
nLeftRect (optional)																															
nTopRect (optional)																															
nRightRect (optional)																															
nBottomRect (optional)																															
ForeColor (optional)																															

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_STANDARD\_ENC from the [OE2 Control Flags](#) enumeration. If the order differs in type from the last order that was sent, this field contains the bitwise **AND** of the value OE2\_CF\_TYPE\_CHANGE. If the bounding rectangle has changed since the last order of the same type, this field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS. If the coordinates of the bounding rectangle are specified as deltas from the last bounding rectangle that was used, this field contains the bitwise **AND** of the value OE2\_CF\_DELTACOORDS.

**OrderType (1 byte):** If the order differs in type from the last, this field MUST contain the value OE2\_OPAQUERECT\_ORDER from the [Order Types](#) enumeration. If the order is the same type as the last, this field is not present.

**FieldBytes (1 byte):** An 8-bit field, with each bit indicating which of the fields that follow **Bounds** is present. A bit set to 1 indicates that the field is present and its value has changed since the same order type was last sent.

0	1	2	3	4	5	6	7
A	B	C	D	E	0	0	0

Where the bits are defined as:

Value	Description
A	The <b>nLeftRect</b> value is present.
B	The <b>nTopRect</b> value is present.
C	The <b>nRightRect</b> value is present.
D	The <b>nBottomRect</b> value is present.

Value	Description
E	The <b>ForeColor</b> value is present.

The bits that are marked with 0 MUST be set to 0.

**Bounds (variable):** A byte array of a [BoundsData](#) structure. This field is present only if **pControlFlags** contains the bitwise **AND** of the value OE2\_CF\_BOUNDS from the **OE2 Control Flags** enumeration.

**nLeftRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the window's x-coordinate of the left edge of the rectangle.

**nTopRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the window's y-coordinate of the top edge of the rectangle.

**nRightRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the window's x-coordinate of the right edge of the rectangle.

**nBottomRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the window's y-coordinate of the bottom edge of the rectangle.

**ForeColor (3 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the color of the rectangle that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

#### 2.3.1.4.10.1.15 BoundsData

The BoundsData structure describes a rectangular area. It encodes (x,y) values that are based on changes from the previous rectangular position. Each value can be either a 16-bit absolute value or an 8-bit delta value, depending on the amount of change that took place.

The first byte of the BoundsData structure represents a set of flags that specify the type of data that is contained in the BoundsData structure. The flag can represent either an absolute (16-bit) or delta (8-bit) value for each x or y value that is supplied. If the flag is not set, then that x or y value is not present in the BoundsData array. The possible flags are specified below.

For each boundary value, either an 8-bit delta or a 16-bit absolute value MAY be specified. The two possible forms of representation MUST NOT be specified at the same time for any particular boundary. For example, if **X\_DELTA\_LEFT** is present, **X\_ABSOLUTE\_LEFT** MUST NOT be present.

0	1	2	3	4	5	6	7	8	9	<sup>1</sup> 0	1	2	3	4	5	6	7	8	9	<sup>2</sup> 0	1	2	3	4	5	6	7	8	9	<sup>3</sup> 0	1
flags								X_ABSOLUTE_LEFT (optional)																Y_ABSOLUTE_TOP (optional)							
...								X_ABSOLUTE_RIGHT (optional)																Y_ABSOLUTE_BOTTOM (optional)							
...								X_DELTA_LEFT (optional)								Y_DELTA_TOP (optional)								X_DELTA_RIGHT (optional)							
Y_DELTA_BOTTOM (optional)																															

**flags (1 byte):** A set of flags that has one or more of the following bits set. The flag can represent either an absolute (16-bit) or delta (8-bit) value for each x or y value that is supplied. If a flag is not set, then that x or y value is not present in the BoundsData array.

The two possible forms of representation MUST NOT be specified at the same time for any particular boundary. For example, if bit A is enabled, bit E MUST NOT be enabled.

0	1	2	3	4	5	6	7
H	G	F	E	D	C	B	A

Where the bits are defined as:

Value	Description
A X_ABSOLUTE_LEFT	A 16-bit x (left) value is present.
B Y_ABSOLUTE_TOP	A 16-bit y (top) value is present.
C X_ABSOLUTE_RIGHT	A 16-bit x (right) value is present.
D Y_ABSOLUTE_BOTTOM	A 16-bit y (bottom) value is present.
E X_DELTA_LEFT	An 8-bit x (left) value is present.
F Y_DELTA_TOP	An 8-bit y (top) value is present.
G X_DELTA_RIGHT	An 8-bit x (right) value is present.

Value	Description
H Y_DELTA_BOTTOM	An 8-bit y (bottom) value is present.

**X\_ABSOLUTE\_LEFT (2 bytes):** A 16-bit x (left) value. Present when bit A is set in the **flags** field.

**Y\_ABSOLUTE\_TOP (2 bytes):** A 16-bit y (top) value. Present when bit B is set in the **flags** field.

**X\_ABSOLUTE\_RIGHT (2 bytes):** A 16-bit x (right) value. Present when bit C is set in the **flags** field.

**Y\_ABSOLUTE\_BOTTOM (2 bytes):** A 16-bit y (bottom) value. Present when bit D is set in the **flags** field.

**X\_DELTA\_LEFT (1 byte):** An 8-bit x (left) value. Present when bit E is set in the **flags** field.

**Y\_DELTA\_TOP (1 byte):** An 8-bit y (top) value. Present when bit F is set in the **flags** field.

**X\_DELTA\_RIGHT (1 byte):** An 8-bit x (right) value. Present when bit G is set in the **flags** field.

**Y\_DELTA\_BOTTOM (1 byte):** An 8-bit y (bottom) value. Present when bit H is set in the **flags** field.

#### 2.3.1.4.10.1.16 TSHR\_COLOR

The TSHR\_COLOR structure specifies a color value. Each color channel is represented by using a standard scale of 0-255.

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
Red									green									blue													

**Red (1 byte):** The color value that represents the red channel.

**green (1 byte):** The color value that represents the green channel.

**blue (1 byte):** The color value that represents the blue channel.

#### 2.3.1.4.10.1.17 TSHR\_RGBQUAD

The TSHR\_RGBQUAD structure specifies a color value to use. The TSHR\_RGBQUAD structure also contains a reserved field. Each color channel is represented by using a standard scale of 0-255.

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
rgbBlue									rgbGreen									rgbRed									rgbReserved				

**rgbBlue (1 byte):** The color value that represents the blue channel.

**rgbGreen (1 byte):** The color value that represents the green channel.

**rgbRed (1 byte):** The color value that represents the red channel.

**rgbReserved (1 byte):** Reserved. MUST be set to 0 and ignored upon receipt.

#### 2.3.1.4.10.1.18 TSHR\_POINT16

A TSHR\_POINT16 structure contains data that represents an (x,y) point. The scale and range of the structure depend on the use of TSHR\_POINT16 by the implementation.

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
X																Y															

**X (2 bytes):** The location of the point on the x-axis.

**y (2 bytes):** The location of the point on the y-axis.

#### 2.3.1.4.10.1.19 TSHR\_RECT16

The TSHR\_RECT16 structure specifies a rectangle that has coordinates that represent left, top, right, and bottom.

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
left																Top															
right																Bottom															

**left (2 bytes):** The x-coordinate of the left edge of the rectangle.

**Top (2 bytes):** The y-coordinate of the upper edge of the rectangle.

**right (2 bytes):** The x-coordinate of the right edge of the rectangle.

**Bottom (2 bytes):** The y-coordinate of the lower edge of the rectangle.

### 2.3.1.4.10.1.20 OrderTypes

The **OrderTypes** enumeration defines the types of application-sharing orders and what is contained in each order.

```
typedef enum
{
    OE2_DSTBLT_ORDER = 0x00,
    OE2_PATBLT_ORDER = 0x01,
    OE2_SCRBLT_ORDER = 0x02,
    OE2_TEXTOUT_ORDER = 0x05,
    OE2_EXTTEXTOUT_ORDER = 0x06,
    OE2_RECTANGLE_ORDER = 0x08,
    OE2_LINETO_ORDER = 0x09,
    OE2_OPAQUERECT_ORDER = 0x0A,
    OE2_SAVEBITMAP_ORDER = 0x0B,
    OE2_DESKSCROLL_ORDER = 0x0C,
    OE2_MEMBLT_R2_ORDER = 0x0D,
    OE2_MEM3BLT_R2_ORDER = 0x0E,
    OE2_POLYGON_ORDER = 0x0F,
    OE2_PIE_ORDER = 0x10,
    OE2_ELLIPSE_ORDER = 0x11,
    OE2_ARC_ORDER = 0x12,
    OE2_CHORD_ORDER = 0x13,
    OE2_POLYBEZIER_ORDER = 0x14,
    OE2_ROUNDRECT_ORDER = 0x15
} OrderTypes;
```

**OE2\_DSTBLT\_ORDER:** The order contains a raster transfer ([DstBlt](#)).

**OE2\_PATBLT\_ORDER:** The order contains a brush paint ([PatBlt](#)).

**OE2\_SCRBLT\_ORDER:** The order contains a bit-block transfer between regions of the screen ([ScreenBlt](#)).

**OE2\_TEXTOUT\_ORDER:** The order contains a string ([TextOrder](#)).

**OE2\_EXTTEXTOUT\_ORDER:** The order contains a string to be displayed and positions for the individual characters ([ExtTextOrder](#)).

**OE2\_RECTANGLE\_ORDER:** The order contains a rectangle ([RectangleOrder](#)).

**OE2\_LINETO\_ORDER:** The order contains a line ([LineOrder](#)).

**OE2\_OPAQUERECT\_ORDER:** The order contains an opaque rectangle ([OpaqueRect](#)).

**OE2\_SAVEBITMAP\_ORDER:** The order contains a region of the screen that the receiver SHOULD save or restore ([SaveBitmap](#)).

**OE2\_DESKSCROLL\_ORDER:** The order contains a desktop scroll operation ([DesktopScroll](#)).

**OE2\_MEMBLT\_R2\_ORDER:** The order contains a transfer from the bitmap cache to the screen ([MemBlt](#)).

**OE2\_MEM3BLT\_R2\_ORDER:** The order contains a transfer from the bitmap cache to the screen through a brush ([Mem3Blt](#)).



**OE2\_POLYGON\_ORDER:** The order contains a polygon ([PolygonOrder](#)).

**OE2\_PIE\_ORDER:** The order contains a pie wedge ([PieOrder](#)).

**OE2\_ELLIPSE\_ORDER:** The order contains an ellipse ([EllipseOrder](#)).

**OE2\_ARC\_ORDER:** The order contains an arc ([ArcOrder](#)).

**OE2\_CHORD\_ORDER:** The order contains a chord ([ChordOrder](#)).

**OE2\_POLYBEZIER\_ORDER:** The order contains one or more Bezier curves ([PolyBezierOrder](#)).

**OE2\_ROUNDRECT\_ORDER:** The order contains a rectangle that has rounded corners ([RoundRectOrder](#)).

#### 2.3.1.4.10.1.21 PatBlt

The PatBlt order paints the specified rectangle by using the brush that is currently selected in the specified device context. The brush pixels and the surface pixels are combined according to the specified raster operation.

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
pControlFlags								OrderType (optional)								FieldBytes															
Bounds (optional)																															
...																															
...																															
...								nLeftRect (optional)																							
...								nTopRect (optional)																							
...								nWidth (optional)																							
...								nHeight (optional)																							
...								bRop (optional)																							
...								BackColor (optional)																							
ForeColor (optional)																								BrushOrgX (optional)							
...																								BrushOrgY (optional)							

...	BrushStyle (optional)
...	BrushHatch
...	BrushExtra
...	
...	

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_STANDARD\_ENC from the [OE2 Control Flags](#) enumeration. If the order differs in type from the last order that was sent, this field contains the bitwise **AND** of the value OE2\_CF\_TYPE\_CHANGE. If the bounding rectangle has changed since the last order of the same type, this field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS. If the coordinates of the bounding rectangle are specified as deltas from the last bounding rectangle that was used, this field contains the bitwise **AND** of the value OE2\_CF\_DELTACOORDS.

**OrderType (1 byte):** If the order differs in type from the last, this field MUST contain the value OE2\_PATBLT\_ORDER from the [Order Types](#) enumeration. If the order is the same type as the last, this field is not present.

**FieldBytes (2 bytes):** A 16-bit field, with each bit indicating which of the fields that follows **Bounds** is present. A bit set to 1 indicates that the field is present and its value has changed since the same order type was last sent.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	B	C	D	E	F	G	H	I	J	0	0	0	0	0	0

Where the bits are defined as:

Value	Description
A	The nLeftRect value is present.
B	The nTopRect value is present.
C	The nWidth value is present.
D	The nHeight value is present.
E	The bRop value is present.
F	The BackColor value is present.
G	The ForeColor value is present.
H	The BrushOrgX value is present.

Value	Description
I	The BrushOrgY value is present.
J	The BrushStyle value is present.

The bits that are marked with 0 MUST be 0.

**Bounds (13 bytes):** A byte array of a [BoundsData](#) structure. This field is present only if the **pControlFlags** field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS from the **OE2 Control Flags** enumeration.

**nLeftRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the x-coordinate within the window of the left edge of the rectangle.

**nTopRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the y-coordinate within the window of the top edge of the rectangle.

**nWidth (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the width, in pixels, of the rectangle.

**nHeight (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the height, in pixels, of the rectangle.

**bRop (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the high-order byte of a Windows GDI ternary raster operation code.

**BackColor (3 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the background color value that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**ForeColor (3 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the foreground color value that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**BrushOrgX (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the x-offset at which the brush begins. The offset is based on window coordinates where the origin of (0,0) is upper left.

**BrushOrgY (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the y-offset at which the brush begins. The offset is based on window coordinates, where the origin of (0,0) is upper left.

**BrushStyle (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents one of the [BrushStyle](#) values that is specified in section [2.1.2.3](#).

**BrushHatch (4 bytes):** If **BrushStyle** is set to BS\_PATTERN, this field is the first byte of the 64-by-64 pixel monochrome bitmap of the brush, laid out in top-to-bottom, left-to-right order. If set to BS\_HATCHED, one of the BrushHatch values (as specified in section [2.1.2.2](#)) specifies the orientation of the lines that are used to create the hatch. Otherwise, this field is not used.

**BrushExtra (7 bytes):** If **BrushStyle** is set to BS\_PATTERN, this field is the last seven bytes of the 64-by-64 pixel monochrome bitmap of the brush, laid out in top-to-bottom, left-to-right order. Otherwise, this field is not used.

### 2.3.1.4.10.1.22 PieOrder

The PieOrder order contains a pie wedge.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1
pControlFlags								OrderType (optional)								FieldBytes															
...								Bounds (optional)																							
...																															
...																															
...																BackMode															
...																nLeftRect (optional)															
...																nTopRect (optional)															
...																nRightRect (optional)															
...																nBottomRect (optional)															
...																nXStart (optional)															
...																nYStart (optional)															
...																nXEnd (optional)															
...																nYEnd (optional)															
...																BackColor (optional)															
...								ForeColor (optional)																							
BrushOrgX (optional)																															
BrushOrgY (optional)																															
BrushStyle (optional)																															

BrushHatch	
BrushExtra	
...	ROP2 (optional)
...	PenStyle (optional)
...	PenWidth (optional)
...	PenColor (optional)
...	ArcDirection (optional)
...	

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_STANDARD\_ENC from the [OE2 Control Flags](#) enumeration. If the order differs in type from the last order that was sent, this field contains the bitwise **AND** of the value OE2\_CF\_TYPE\_CHANGE. If the bounding rectangle has changed since the last order of the same type, this field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS. If the coordinates of the bounding rectangle are specified as deltas from the last bounding rectangle that was used, this field contains the bitwise **AND** of the value OE2\_CF\_DELTACOORDS.

**OrderType (1 byte):** If the order differs in type from the last, this field MUST contain the value OE2\_PIE\_ORDER from the [Order Types](#) enumeration. If the order is the same type as the last, this field is not present.

**FieldBytes (3 bytes):** A 24-bit field, with each bit indicating which of the fields that follows **Bounds** is present. A bit set to 1 indicates that the field is present and its value has changed since the same order type was last sent.

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
0	0	0	0	0	0	0	0	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	0	0	0	0	0	0

Where the bits are defined as:

Value	Description
A	The nLeftRect value is present.
B	The nTopRect value is present.
C	The nRightRect value is present.
D	The nBottomRect value is present.

Value	Description
E	The nXStart value is present.
F	The nYStart value is present.
G	The nXEnd value is present.
H	The nYEnd value is present.
I	The BackColor value is present.
J	The ForeColor value is present.
K	The BrushOrgX value is present.
L	The BrushOrgY value is present.
M	The BrushStyle value is present.
N	The ROP2 value is present.
O	The PenStyle value is present.
P	The PenWidth value is present.
Q	The PenColor value is present.
R	The ArcDirection value is present.

The bits that are marked with 0 MUST be 0.

**Bounds (13 bytes):** A byte array of a [BoundsData](#) structure. This field is present only if the **pControlFlags** field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS from the **OE2 Control Flags** enumeration.

**BackMode (4 bytes):** One of the BackMode values (as specified in section [2.1.2.1](#)) MUST be present to specify how the foreground and background SHOULD be mixed.

**nLeftRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the x-coordinate within the window of the left edge of the bounding rectangle.

**nTopRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the y-coordinate within the window of the upper edge of the bounding rectangle.

**nRightRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the x-coordinate within the window of the right edge of the bounding rectangle.

**nBottomRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the y-coordinate within the window of the bottom edge of the bounding rectangle.

**nXStart (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the x-coordinate of the first radial endpoint.

**nYStart (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the y-coordinate of the first radial endpoint.

**nXEnd (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the x-coordinate of the second radial endpoint.

**nYEnd (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the y-coordinate of the second radial endpoint.

**BackColor (3 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the background color value that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**ForeColor (3 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the foreground color value that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**BrushOrgX (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the x-offset at which the brush begins. The offset is based on window coordinates where the origin of (0,0) is upper left.

**BrushOrgY (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the y-offset at which the brush begins. The offset is based on window coordinates where the origin of (0,0) is upper left.

**BrushStyle (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents one of the [BrushStyle](#) values specified in section [2.1.2.3](#).

**BrushHatch (4 bytes):** If **BrushStyle** is set to BS\_PATTERN, this field is the first byte of the 64-by-64 pixel monochrome bitmap of the brush, laid out in top-to-bottom, left-to-right order. If set to BS\_HATCHED, one of the BrushHatch values that are specified in section [2.1.2.2](#) and that specify the orientation of the lines that are used to create the hatch. Otherwise, this field is not used.

**BrushExtra (7 bytes):** If **BrushStyle** is set to BS\_PATTERN, this field is the last seven bytes of the 64-by-64 pixel monochrome bitmap of the brush, laid out in top-to-bottom, left-to-right order. Otherwise, this field is not used.

**ROP2 (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents one of the [ROP2](#) values that are specified in section [2.1.2.5](#) and that specify the mix mode of the foreground.

**PenStyle (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents one of the [PenStyle](#) values that are specified in section [2.1.2.4](#).

**PenWidth (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the width, in pixels, of the pen.

**PenColor (3 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the color value of the pen that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**ArcDirection (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. MUST be one of the following values, which indicates the direction in which the arc SHOULD be drawn.

Value	Meaning
ORD_ARC_COUNTERCLOCKWISE 0x00000001	The arc SHOULD be drawn counterclockwise.
ORD_ARC_CLOCKWISE 0x00000002	The arc SHOULD be drawn clockwise.

### 2.3.1.4.10.1.23 PolyBezierOrder

The PolyBezierOrder packet contains one or more Bezier curves.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
pControlFlags								OrderType (optional)								FieldBytes								Bounds (optional)							
...																															
...																															
...																															
BackMode																															
BackColor (optional)																								ForeColor (optional)							
...																ROP2 (optional)															
...																PenStyle (optional)															
...																PenWidth (optional)															
...																PenColor (optional)															
...								aPoints (variable)																							
...																															

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_STANDARD\_ENC from the [OE2 Control Flags](#) enumeration. If the order differs in type from the last order that was sent, this field contains the bitwise **AND** of the value OE2\_CF\_TYPE\_CHANGE. If the bounding rectangle has changed since the last order of the same type, this field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS. If the coordinates of the bounding rectangle are specified as deltas from the last bounding rectangle that was used, this field contains the bitwise **AND** of the value OE2\_CF\_DELTACOORDS.



**OrderType (1 byte):** If the order differs in type from the last, this field MUST contain the value OE2\_POLYBEZIER\_ORDER from the [Order Types](#) enumeration. If the order is the same type as the last, this field is not present.

**FieldBytes (1 byte):** An 8-bit field, with each bit indicating which of the fields that follow the **Bounds** field is present. A bit set to 1 indicates that the field is present and its value has changed since the same order type was last sent.

0	1	2	3	4	5	6	7
A	B	C	D	E	F	0	0

Where the bits are defined as:

Value	Description
A	The BackColor value is present.
B	The ForeColor value is present.
C	The ROP2 value is present.
D	The PenStyle value is present.
E	The PenWidth value is present.
F	The PenColor value is present.

The bit that is marked with 0 MUST be 0.

**Bounds (13 bytes):** A byte array of a [BoundsData](#) structure. This field is present only if the **pControlFlags** field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS from the **OE2 Control Flags** enumeration.

**BackMode (4 bytes):** One of the [BackMode](#) values that are defined in section [2.1.2.1](#) MUST be present and specify how the foreground and background SHOULD be mixed.

**BackColor (3 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the background color value that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**ForeColor (3 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the foreground color value that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**ROP2 (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents one of the [ROP2](#) values that are defined in section [2.1.2.5](#) and that specify the mix mode of the foreground.

**PenStyle (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents one of the [PenStyle](#) values that are defined in section [2.1.2.4](#).

**PenWidth (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the width, in pixels, of the pen.

**PenColor (3 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the color value of the pen that is specified by a byte array of a TSHR\_COLOR structure.

**aPoints (variable):** An array of [TSHR\\_POINT16](#) structures that describe the curve. The first byte is the number of bytes of data. Two bytes for each point follow: one byte for the x-coordinate and one byte for the y-coordinate.

#### 2.3.1.4.10.1.24 PolygonOrder

The PolygonOrder packet contains a polygon.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	30	1
pControlFlags								OrderType (optional)								FieldBytes															
Bounds (optional)																															
...																															
...																															
...								BackMode																							
...								BackColor (optional)																							
ForeColor (optional)																								BrushOrgX (optional)							
...																								BrushOrgY (optional)							
...																								BrushStyle (optional)							
...																								BrushHatch							
...																								BrushExtra							
...																															
...																ROP2 (optional)															
...																PenStyle (optional)															
...																PenWidth (optional)															

...	PenColor (optional)
...	FillMode (optional)
...	aPoints (variable)
...	

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_STANDARD\_ENC from the [OE2 Control Flags](#) enumeration. If the order differs in type from the last order that was sent, this field contains the bitwise **AND** of the value OE2\_CF\_TYPE\_CHANGE. If the bounding rectangle has changed since the last order of the same type, this field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS. If the coordinates of the bounding rectangle are specified as deltas from the last bounding rectangle that was used, this field contains the bitwise **AND** of the value OE2\_CF\_DELTACOORDS.

**OrderType (1 byte):** If the order differs in type from the last, this field MUST contain the value OE2\_POLYGON\_ORDER from the [Order Types](#) enumeration. If the order is the same type as the last, this field is not present.

**FieldBytes (2 bytes):** A 16-bit field, with each bit indicating which of the fields that follow the **Bounds** field is present. A bit that is set to 1 indicates that the field is present and its value has changed since the same order type was last sent.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	B	C	D	E	F	G	H	I	J	0	0	0	0	0	0

Where the bits are defined as:

Value	Description
A	The BackColor value is present.
B	The ForeColor value is present.
C	The BrushOrgX value is present.
D	The BrushOrgY value is present.
E	The BrushStyle value is present.
F	The ROP2 value is present.
G	The PenStyle value is present.
H	The PenWidth value is present.
I	The PenColor value is present.
J	The FillMode value is present.

The bit that is marked with 0 MUST be 0.

**Bounds (13 bytes):** A byte array of a [BoundsData](#) structure. This field is present only if the **pControlFlags** field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS from the **OE2 Control Flags** enumeration.

**BackMode (4 bytes):** One of the [BackMode](#) values that are defined in section [2.1.2.1](#) MUST be present and specify how the foreground and background SHOULD be mixed.

**BackColor (3 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the background color value and is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**ForeColor (3 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the foreground color value and is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**BrushOrgX (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the x-offset at which the brush begins. The offset is based on window coordinates where the origin of (0,0) is upper left.

**BrushOrgY (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the y-offset at which the brush begins. The offset is based on window coordinates where the origin of (0,0) is upper left.

**BrushStyle (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents one of the [BrushStyle](#) values that are defined in section [2.1.2.3](#).

**BrushHatch (4 bytes):** If **BrushStyle** is set to BS\_PATTERN, this field is the first byte of the 64-by-64 pixel monochrome bitmap of the brush; it is laid out in top-to-bottom, left-to-right order. If set to BS\_HATCHED, one of the [BrushHatch](#) values that are defined in section [2.1.2.2](#) and that specify the orientation of the lines is used to create the hatch. Otherwise, this field is not used.

**BrushExtra (7 bytes):** If **BrushStyle** is set to BS\_PATTERN, this field is the last seven bytes of the 64-by-64 pixel monochrome bitmap of the brush; it is laid out in top-to-bottom, left-to-right order. Otherwise, this field is not used.

**ROP2 (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents one of the [ROP2](#) values that are defined in section [2.1.2.5](#) and that specify the mix mode of the foreground.

**PenStyle (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents one of the [PenStyle](#) values that are defined in section [2.1.2.4](#).

**PenWidth (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the width, in pixels, of the pen.

**PenColor (3 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the color value of the pen and is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**FillMode (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents one of the following values, which determine the fill mode of the polygon.

Value	Meaning
ALTERNATE 0x00000001	Fills the area between odd-numbered and even-numbered polygon sides on each scan line.
WINDING 0x00000002	Fills any region with a nonzero winding value.

**aPoints (variable):** An array of [TSHR\\_POINT16](#) structures that describe the curve. The first byte is the number of bytes of data. Two bytes for each point follow: one byte for the x-coordinate and one byte for the y-coordinate.

#### 2.3.1.4.10.1.25 RectangleOrder

The RectangleOrder packet contains a rectangle.

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
pControlFlags								OrderType (optional)								FieldBytes															
Bounds (optional)																															
...																															
...																															
...								BackMode																							
...								nLeftRect (optional)																							
...								nTopRect (optional)																							
...								nRightRect (optional)																							
...								nBottomRect (optional)																							
...								BackColor (optional)																							
ForeColor (optional)																								BrushOrgX (optional)							
...																								BrushOrgY (optional)							
...																								BrushStyle (optional)							

...	BrushHatch
...	BrushExtra
...	
...	ROP2 (optional)
...	PenStyle (optional)
...	PenWidth (optional)
...	PenColor (optional)
...	

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_STANDARD\_ENC from the [OE2 Control Flags](#) enumeration. If the order differs in type from the last order that was sent, this field contains the bitwise **AND** of the value OE2\_CF\_TYPE\_CHANGE. If the bounding rectangle has changed since the last order of the same type, this field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS. If the coordinates of the bounding rectangle are specified as deltas from the last bounding rectangle that was used, this field contains the bitwise **AND** of the value OE2\_CF\_DELTACOORDS.

**OrderType (1 byte):** If the order differs in type from the last, this field MUST contain the value OE2\_RECTANGLE\_ORDER from the [Order Types](#) enumeration. If the order is the same type as the last, this field is not present.

**FieldBytes (2 bytes):** A 16-bit field, with each bit indicating which of the fields that follow the **Bounds** field is present. A bit that is set to 1 indicates that the field is present and its value has changed since the same order type was last sent.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	B	C	D	E	F	G	H	I	J	K	L	M	0	0	0

Where the bits are defined as:

Value	Description
A	The nLeftRect value is present.
B	The nTopRect value is present.
C	The nRightRect value is present.
D	The nBottomRect value is present.

Value	Description
E	The BackColor value is present.
F	The ForeColor value is present.
G	The BrushOrgX value is present.
H	The BrushOrgY value is present.
I	The BrushStyle value is present.
J	The ROP2 value is present.
K	The PenStyle value is present.
L	The PenWidth value is present.
M	The PenColor value is present.

The bits that are marked with 0 MUST be 0.

**Bounds (13 bytes):** A byte array of a [BoundsData](#) structure. This field is present only if the **pControlFlags** field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS from the **OE2 Control Flags** enumeration.

**BackMode (4 bytes):** One of the [BackMode](#) values that are defined in section [2.1.2.1](#) MUST be present to specify how the foreground and background SHOULD be mixed.

**nLeftRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the x-coordinate within the window of the left edge of the rectangle.

**nTopRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the y-coordinate within the window of the top edge of the rectangle.

**nRightRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the x-coordinate within the window of the right edge of the rectangle.

**nBottomRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the y-coordinate within the window of the bottom edge of the rectangle.

**BackColor (3 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the background color value that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**ForeColor (3 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the foreground color value that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**BrushOrgX (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the x-offset at which the brush begins. The offset is based on window coordinates where the origin of (0,0) is upper left.

**BrushOrgY (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the y-offset at which the brush begins. The offset is based on window coordinates where the origin of (0,0) is upper left.

**BrushStyle (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents one of the [BrushStyle](#) values that are defined in section [2.1.2.3](#).

**BrushHatch (4 bytes):** If **BrushStyle** is set to BS\_PATTERN, this field is the first byte of the 64-by-64 pixel monochrome bitmap of the brush; it is laid out in top-to-bottom, left-to-right order. If set to BS\_HATCHED, the [BrushHatch](#) values that are defined in section [2.1.2.2](#) and that specify the orientation of the lines that are used to create the hatch. Otherwise, this field is not used.

**BrushExtra (7 bytes):** If **BrushStyle** is set to BS\_PATTERN, this field is the last seven bytes of the 64-by-64 pixel monochrome bitmap of the brush, laid out in top-to-bottom, left-to-right order. Otherwise, this field is not used.

**ROP2 (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents one of the [ROP2](#) values that are defined in section [2.1.2.5](#) and that specify the mix mode of the foreground.

**PenStyle (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents one of the [PenStyle](#) values that are defined in section [2.1.2.4](#).

**PenWidth (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the width, in pixels, of the pen.

**PenColor (3 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the color value of the pen that is specified by a byte array of a TSHR\_COLOR structure.

**2.3.1.4.10.1.26 RoundRectOrder**

The RoundRectOrder packet contains a rectangle that has rounded corners.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
pControlFlags								OrderType (optional)								FieldBytes															
...								Bounds (optional)																							
...																															
...																															
...																BackMode															
...																nLeftRect (optional)															



...	nTopRect (optional)
...	nRightRect (optional)
...	nBottomRect (optional)
...	nEllipseWidth (optional)
...	nEllipseHeight (optional)
...	BackColor (optional)
...	ForeColor (optional)
BrushOrgX (optional)	
BrushOrgY (optional)	
BrushStyle (optional)	
BrushHatch	BrushExtra
...	
ROP2 (optional)	
PenStyle (optional)	
PenWidth (optional)	
PenColor (optional)	

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_STANDARD\_ENC from the [OE2 Control Flags](#) enumeration. If the order differs in type from the last order that was sent, this field contains the bitwise **AND** of the value OE2\_CF\_TYPE\_CHANGE. If the bounding rectangle has changed since the last order of the same type, this field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS. If the coordinates of the bounding rectangle are specified as deltas from the last bounding rectangle that was used, this field contains the bitwise **AND** of the value OE2\_CF\_DELTACOORDS.

**OrderType (1 byte):** If the order differs in type from the last, this field MUST contain the value OE2\_ROUNDRECT\_ORDER from the [Order Types](#) enumeration. If the order is the same type as the last, this field is not present.

**FieldBytes (3 bytes):** A 24-bit field, with each bit indicating which of the fields that follow the **Bounds** field is present. A bit that is set to 1 indicates that the field is present and its value has changed since the same order type was last sent.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
0	0	0	0	0	0	0	0	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	0	0	0	0	0	0	0	0	0

Where the bits are defined as:

Value	Description
A	The nLeftRect value is present.
B	The nTopRect value is present.
C	The nRightRect value is present.
D	The nBottomRect value is present.
E	The nEllipseWidth value is present.
F	The nEllipseHeight value is present.
G	The BackColor value is present.
H	The ForeColor value is present.
I	The BrushOrgX value is present.
J	The BrushOrgY value is present.
K	The BrushStyle value is present.
L	The ROP2 value is present.
M	The PenStyle value is present.
N	The PenWidth value is present.
O	The PenColor value is present.

The bit that is marked with 0 MUST be 0.

**Bounds (13 bytes):** A byte array of a [BoundsData](#) structure. This field is present only if the **pControlFlags** field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS from the **OE2 Control Flags** enumeration.

**BackMode (4 bytes):** One of the [BackMode](#) values that are defined in section [2.1.2.1](#) MUST be present to specify how the foreground and background SHOULD be mixed.

**nLeftRect (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the x-coordinate within the window of the left edge of the rectangle.

**nTopRect (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the y-coordinate within the window of the top edge of the rectangle.

**nRightRect (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the x-coordinate within the window of the right edge of the rectangle.

**nBottomRect (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the y-coordinate within the window of the bottom edge of the rectangle.

**nEllipseWidth (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the width of the ellipse that is used to draw the rounded corners.

**nEllipseHeight (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the height of the ellipse that is used to draw the rounded corners.

**BackColor (3 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the background color value that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**ForeColor (3 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the foreground color value that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**BrushOrgX (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the x-offset at which the brush begins. The offset is based on window coordinates where the origin of (0,0) is upper left.

**BrushOrgY (4 bytes):** This value MUST be present if the corresponding bit from **FieldBytes** is set. This represents the y-offset at which the brush begins. The offset is based on window coordinates where the origin of (0,0) is upper left.

**BrushStyle (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents one of the [BrushStyle](#) values that are defined in section [2.1.2.3](#).

**BrushHatch (1 byte):** If **BrushStyle** is set to BS\_PATTERN, this field is the first byte of the 64-by-64 pixel monochrome bitmap of the brush; it is laid out in top-to-bottom, left-to-right order. If set to BS\_HATCHED, the [BrushHatch](#) values are defined in section [2.1.2.2](#) and specify the orientation of the lines that are used to create the hatch. Otherwise, this field is not used.

**BrushExtra (7 bytes):** If **BrushStyle** is set to BS\_PATTERN, this field is the last 7 bytes of the 64-by-64 pixel monochrome bitmap of the brush; it is laid out in top-to-bottom, left-to-right order. Otherwise, this field is not used.

**ROP2 (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents one of the [ROP2](#) values that are defined in section [2.1.2.5](#) and that specify the mix mode of the foreground.

**PenStyle (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents one of the [PenStyle](#) values that are defined in section [2.1.2.4](#).

**PenWidth (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the width, in pixels, of the pen.

**PenColor (3 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the color value of the pen that is specified by a byte array of a [TSHR\\_COLOR](#) structure.

### 2.3.1.4.10.1.27 SaveBitmap

The SaveBitmap order contains a region of the screen that the receiver SHOULD save or restore.

0	1	2	3	4	5	6	7	8	9	0 <sup>1</sup>	1	2	3	4	5	6	7	8	9	0 <sup>2</sup>	1	2	3	4	5	6	7	8	9	0 <sup>3</sup>	1
pControlFlags								OrderType (optional)								FieldBytes								Bounds (optional)							
...																															
...																															
...																															
SavedBitmapPosition (optional)																															
nLeftRect (optional)																															
nTopRect (optional)																															
nRightRect (optional)																															
nBottomRect (optional)																															
Operation																															

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_STANDARD\_ENC from the [OE2 Control Flags](#) enumeration. If the order differs in type from the last order that was sent, this field contains the bitwise **AND** of the value OE2\_CF\_TYPE\_CHANGE. If the bounding rectangle has changed since the last order of the same type, this field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS. If the coordinates of the bounding rectangle are specified as deltas from the last bounding rectangle that was used, this field contains the bitwise **AND** of the value OE2\_CF\_DELTACOORDS.

**OrderType (1 byte):** If the order differs in type from the last, this field MUST contain the value OE2\_SAVEBITMAP\_ORDER from the [Order Types](#) enumeration. If the order is the same type as the last, this field is not present.

**FieldBytes (1 byte):** An 8-bit field, with each bit indicating which of the fields that follow the **Bounds** field is present. A bit set to 1 indicates that the field is present and its value has changed since the same order type was last sent.

0	1	2	3	4	5	6	7
A	B	C	D	E	0	0	0

Where the bits are defined as:

Value	Description
A	The SavedBitmapPosition value is present.
B	The nLeftRect value is present.
C	The nTopRect value is present.
D	The nRightRect value is present.
E	The nBottomRect value is present.

The bits that are marked with 0 MUST be 0.

**Bounds (13 bytes):** A byte array of a [BoundsData](#) structure. This field is present only if the **pControlFlags** field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS from the **OE2 Control Flags** enumeration.

**SavedBitmapPosition (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the start position for the rectangle in the saved bitmap of the client.

**nLeftRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the x-coordinate within the window of the left edge of the rectangle.

**nTopRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the y-coordinate within the window of the top edge of the rectangle.

**nRightRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the x-coordinate within the window of the right edge of the rectangle.

**nBottomRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the y-coordinate within the window of the bottom edge of the rectangle.

**Operation (4 bytes):** MUST be set to 0x00000000 or 0x00000001. If set to 0x00000000, the receiver SHOULD save the referenced region of the screen. If set to 0x00000001, the receiver SHOULD restore the referenced region of the screen from the saved copy.

Value	Meaning
0x00000000	Should save the referenced screen region.
0x00000001	Should restore the referenced screen region.

### 2.3.1.4.10.1.28 ScreenBlit

The ScreenBlit order contains a bit-block transfer between regions of the screen.

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
pControlFlags								OrderType (optional)								FieldBytes								Bounds (optional)							
...																															
...																															
...																															
nLeftRect (optional)																															
nTopRect (optional)																															
nWidth (optional)																															
nHeight (optional)																															
bRop (optional)																															
nXSrc (optional)																															
nYSrc (optional)																															

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_STANDARD\_ENC from the [OE2 Control Flags](#) enumeration. If the order differs in type from the last order that was sent, this field contains the bitwise **AND** of the value OE2\_CF\_TYPE\_CHANGE. If the bounding rectangle has changed since the last order of the same type, this field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS. If the coordinates of the bounding rectangle are specified as deltas from the last bounding rectangle that was used, this field contains the bitwise **AND** of the value OE2\_CF\_DELTACOORDS.

**OrderType (1 byte):** If the order differs in type from the last, this field MUST contain the value OE2\_SCRBLT\_ORDER from the [Order Types](#) enumeration. If the order is the same type as the last, this field is not present.

**FieldBytes (1 byte):** An 8-bit field, with each bit indicating which of the fields that follow the **Bounds** field is present. A bit set to 1 indicates that the field is present and its value has changed since the same order type was last sent.

0	1	2	3	4	5	6	7
A	B	C	D	E	F	G	0

Where the bits are defined as:

Value	Description
A	The nLeftRect value is present.
B	The nTopRect value is present.
C	The nWidth value is present.
D	The nHeight value is present.
E	The bRop value is present.
F	The nXSrc value is present.
G	The nYSrc value is present.

The bits that are marked with 0 MUST be 0.

**Bounds (13 bytes):** A byte array of a [BoundsData](#) structure. This field is present only if the **pControlFlags** field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS from the **OE2 Control Flags** enumeration.

**nLeftRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the x-coordinate of the left edge of the target rectangle.

**nTopRect (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the y-coordinate top edge of the target rectangle.

**nWidth (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the width, in pixels, of the target rectangle.

**nHeight (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the height, in pixels, of the target rectangle.

**bRop (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the high-order byte of a Windows GDI ternary raster operation code.

**nXSrc (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the x-coordinate of the left side of the source rectangle.

**nYSrc (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the y-coordinate of the top side of the source rectangle.

#### 2.3.1.4.10.1.29 TextOrder

The TextOrder order contains a string.

0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1
pControlFlags								OrderType (optional)								FieldBytes															
Bounds (optional)																															
...																															
...																															
...								BackMode (optional)																							
...								nXStart (optional)																							
...								nYStart (optional)																							
...								BackColor (optional)																							
ForeColor (optional)																								CharExtra							
...																								BreakExtra							
...																								BreakCount							
...																								FontHeight (optional)							
...																								FontWidth (optional)							
...																								FontWeight (optional)							
...																								FontFlags (optional)							
...																								FontIndex (optional)							
...																								String (variable)							
...																															

**pControlFlags (1 byte):** MUST be set to the value OE2\_CF\_STANDARD\_ENC from the [OE2 Control Flags](#) enumeration. If the order differs in type from the last order that was sent, this field contains the bitwise **AND** of the value OE2\_CF\_TYPE\_CHANGE. If the bounding rectangle has changed since the last order of the same type, this field contains the bitwise **AND** of the



value OE2\_CF\_BOUNDS. If the coordinates of the bounding rectangle are specified as deltas from the last bounding rectangle that was used, this field contains the bitwise **AND** of the value OE2\_CF\_DELTACOORDS.

**OrderType (1 byte):** If the order differs in type from the last, this field **MUST** contain the value OE2\_TEXTOUT\_ORDER from the [Order Types](#) enumeration. If the order is the same type as the last, this field is not present.

**FieldBytes (2 bytes):** A 16-bit field, with each bit indicating which of the fields that follow the **Bounds** field is present. A bit set to 1 indicates that the field is present and its value has changed since the same order type was last sent.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	B	C	D	E	F	G	H	I	J	0	0	0	0	0	0

Where the bits are defined as:

Value	Description
A	The BackMode value is present.
B	The nXStart value is present.
C	The nYStart value is present.
D	The BackColor value is present.
E	The ForeColor value is present.
F	The FontHeight value is present.
G	The FontWidth value is present.
H	The FontWeight value is present.
I	The FontFlags value is present.
J	The FontIndex value is present.

The bits that are marked with 0 **MUST** be 0.

**Bounds (13 bytes):** A byte array of a [BoundsData](#) structure. This field is present only if the **pControlFlags** field contains the bitwise **AND** of the value OE2\_CF\_BOUNDS from the **OE2 Control Flags** enumeration.

**BackMode (4 bytes):** This value **MUST** be present if the corresponding bit from the **FieldBytes** field is set. This represents one of the [BackMode](#) values that are defined in section [2.1.2.1](#) and that specify how the foreground and background **SHOULD** be mixed.

**nXStart (4 bytes):** This value **MUST** be present if the corresponding bit from the **FieldBytes** field is set. This represents the window's x-coordinate of the string.

**nYStart (4 bytes):** This value **MUST** be present if the corresponding bit from the **FieldBytes** field is set. This represents the window's y-coordinate of the string.

**BackColor (3 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the background color value and is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**ForeColor (3 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the foreground color value and is specified by a byte array of a [TSHR\\_COLOR](#) structure.

**CharExtra (4 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**BreakExtra (4 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**BreakCount (4 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**FontHeight (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the height of the font, in logical units. [<14>](#)

**FontWidth (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the width of the font, in logical units. [<15>](#)

**FontWeight (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the weight of the font, in logical units from 0x00000000 through 0x000003E8 (1000).

**FontFlags (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents a bitmap of the following values, indicating attributes of the font.

Value	Meaning
NF_FIXED_PITCH 0x00000001	The text SHOULD use a fixed pitch.
NF_FIXED_SIZE 0x00000002	The text SHOULD use a fixed size.
NF_ITALIC 0x00000004	The text SHOULD be italic.
NF_UNDERLINE 0x00000008	The text SHOULD be underlined.
NF_STRIKEOUT 0x00000010	The text SHOULD be struck out.
NF_TRUETYPE 0x00000080	The text SHOULD be drawn with a TrueType font.

**FontIndex (4 bytes):** This value MUST be present if the corresponding bit from the **FieldBytes** field is set. This represents the index of the font in the font table. The font index is an index into an array of font names. For example, 0x41 is the first index into the remote font table that starts with the character 'A'.

**String (variable):** The text to be drawn. The first byte of the string is an integer that indicates the length of the string. The string may be from 1 to 256 bytes in length.

### 2.3.1.4.10.1.30 UpdateBitmapPDU

The UpdateBitmapPDU order updates a region of the screen.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
Position																															
...																															
realWidth																realHeight															
Format																compressed															
dataSize																data (variable)															
...																															

**Position (8 bytes):** A byte array of a [TSHR\\_RECT16](#) structure that specifies the left, upper, right, and lower edges of the region, in order.

**realWidth (2 bytes):** The width of the included bitmap, which MAY exceed the width that is specified in the **position** field because of padding in pixels.

**realHeight (2 bytes):** The height of the included bitmap, which MAY exceed the height that is specified in the **position** field because of padding in pixels.

**Format (2 bytes):** The bits per pixel of the bitmap.

**compressed (2 bytes):** MUST be set to 0x0000 or 0x0001. If set to 0x0001, the bitmap is compressed. If set to 0x0000, the bitmap is not compressed.

**dataSize (2 bytes):** The length, in bytes, of the **data**.

**data (variable):** Either the uncompressed bitmap data or a [Compressed Bitmap](#) structure.

### 2.3.1.4.10.1.31 UpdatePalettePDU

The UpdatePalettePDU order describes the palette for [UpdateBitmapPDU](#) orders.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
numColors																															
aColors (variable)																															
...																															

**numColors (4 bytes):** An integer that indicates the number of [TSHR\\_COLOR](#) structures in **aColors**.

**aColors (variable):** An array of TSHR\_COLOR structures, with each color specified as 1 byte each for the red, green, and blue components.

#### 2.3.1.4.10.1.32 UpdateSynchronizePDU

The UpdateSynchronizePDU order resets the state of the connection.

Note that the values "**cOrders**", "**sendBPP**", and "**data**" MUST NOT be sent.

#### 2.3.1.5 S20\_DELETE

The S20\_DELETE packet is sent by a host to remove a client from an application-sharing session.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
length																Version/Type															
user																correlator															
...																target															
lenName																capsData															

**length (2 bytes):** The length, in bytes, of the packet.

**Version/Type (2 bytes):** MUST be set to 0x0032.

**user (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**correlator (4 bytes):** The unique identifier for the new session. The first two bytes are the MCS user identifier (above) followed by a monotonically increasing 2-byte sequence number starting at zero.

**target (2 bytes):** The identifier of the node to remove from the session, which is obtained from the Multipoint Communication Service (MCS) layer.

**lenName (2 bytes):** MUST be set to the value 0x0000.

**capsData (1 byte):** Reserved. MUST be set to 0 and ignored upon receipt.

2.3.1.6 S20\_END

The S20\_END packet is sent by a host to end an application-sharing session.

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
length																Version/Type															
user																correlator															
...																lenName															
capsData																															

**length (2 bytes):** The length, in bytes, of the packet.

**Version/Type (2 bytes):** MUST be set to 0x0032.

**user (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**correlator (4 bytes):** The unique identifier for the new session. The first two bytes are the MCS user identifier (above) followed by a monotonically increasing 2-byte sequence number starting at zero.

**lenName (2 bytes):** SHOULD be set to the value 0x0000.

**capsData (1 byte):** Reserved. MUST be set to 0 and ignored upon receipt.

2.3.1.7 S20\_JOIN

The S20\_JOIN packet is sent by a client to join an existing application-sharing session.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
Length																Version/Type															
User																lenName															
lenCaps																nameData (variable)															
...																															
capsData																															
...																															
...																															
...																															
...																															
...																															
...																															
(capsData cont'd for 31 rows)																															
...																															

**Length (2 bytes):** The length, in bytes, of the packet.

**Version/Type (2 bytes):** MUST be set to 0x0032.

**User (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**lenName (2 bytes):** The length, in bytes, of **nameData**.

**lenCaps (2 bytes):** The length, in bytes, of **capsData**.

**nameData (variable):** The null-terminated ANSI name of the user. By default, the user supplies this name; otherwise, the computer name is used from GetComputerName().

**capsData (158 bytes):** A [CPCALLCAPS](#) structure that describes the capabilities of the sender.

### 2.3.1.8 S20\_LEAVE

The S20\_LEAVE packet is sent by a client to end its participation in an application-sharing session.

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
Length																Version/Type															
User																correlator															
...																															

**Length (2 bytes):** The length, in bytes, of the packet.

**Version/Type (2 bytes):** MUST be set to 0x0032.

**User (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Server (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**correlator (4 bytes):** The unique identifier for the new session. The first two bytes are the MCS user identifier (above) followed by a monotonically increasing 2-byte sequence number starting at zero.

### 2.3.1.9 S20\_RESPOND

The S20\_RESPOND packet is sent from a host or client to respond to an [S20\\_CREATE](#) or [S20\\_JOIN](#) message.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
Length																Version/Type															
User																correlator															
...																originator															
lenName																lenCaps															
nameData (variable)																															
...																															

capsData
...
...
...
...
...
...
...
(capsData cont'd for 31 rows)
...

**Length (2 bytes):** The length, in bytes, of the packet.

**Version/Type (2 bytes):** MUST be set to 0x0032.

**User (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**correlator (4 bytes):** The unique identifier for the new session. The first two bytes are the MCS user identifier (above) followed by a monotonically increasing 2-byte sequence number starting at zero.

**originator (2 bytes):** The identifier of the node to which this packet is in response, which is obtained from the Multipoint Communication Service (MCS) layer.

**lenName (2 bytes):** The length, in bytes, of **nameData**.

**lenCaps (2 bytes):** The length, in bytes, of **capsData**.

**nameData (variable):** The null-terminated ANSI name of the user. By default, the user supplies this name; otherwise, the computer name is used from GetComputerName().

**capsData (158 bytes):** A [CPCALLCAPS](#) structure that describes the capabilities of the sender.

### 2.3.2 Chat Protocol

The Microsoft NetMeeting Protocol allows for peers to exchange text communication data in a packet over port 1503. It should be noted that the Chat Protocol uses MCS for its transport layer.



0	1	2	3	4	5	6	7	8	9	0 <sup>1</sup>	1	2	3	4	5	6	7	8	9	0 <sup>2</sup>	1	2	3	4	5	6	7	8	9	0 <sup>3</sup>	1		
length										header																							
...																																	
data (variable)																																	
...																																	

**length (1 byte):** The length of the header, including this field. MUST be set to 0x08.

**header (7 bytes):** MUST be set to 0x0000000000000000.

**data (variable):** A null-terminated string that contains text data. Note that this string is in UTF-16 format and is transmitted in little-endian order.

### 2.3.3 File Transfer Protocol

Microsoft NetMeeting Protocol peers engage in File Transfer Protocol (FTP) through the International Telecommunications Union (ITU) T.127 standard, as specified in [\[T127\]](#), except for the following extensions.

Microsoft Extensions

For cases of NonStandardPDU messages in FTP, the following string constants are used.

Constant	Value
PROSHARE_STRING	"NetMeeting 1 MBFT"
PROSHARE_FILE_END_STRING	"NetMeeting 1 FileEnd"
PROSHARE_CHANNEL_LEAVE_STRING	"NetMeeting 1 ChannelLeave"

Sending NonStandardPDUs uses the following logic:

- If the NonStandardPDU is sent at the end of file transfer, the **protocol data unit (PDU)** is transferred with a PROSHARE\_FILE\_END\_STRING key.
- If the NonStandardPDU is sent while leaving the channel, the PDU is transferred with a PROSHARE\_CHANNEL\_LEAVE\_STRING key.
- Otherwise, the NonStandardPDU is sent with the PROSHARE\_STRING key.

The following members are optional.

Member	Description
<b>ASNHandle</b> ASNfile_request_handle; /*	A unique handle to reference the file throughout the file transfer operation. Its value is obtained from the ASNFile_OfferPDU structure.

Member	Description
optional */	
<b>ASNUserID</b> ASNmbft_ID; /* optional */	A unique handle to identify the user throughout the file transfer session. Its value is obtained from the ASNFile_OfferPDU structure.

### 2.3.4 NetMeeting Object Manager

The NetMeeting Object Manager provides a generic way to manage abstract data. It manages the creation, sequence, access control, update, and order of any abstract object in a session that has two or more nodes. The NetMeeting Object Manager protocol defines a set of four control packet types to be exchanged via the S20 protocol layer:

- Joiner
- Lock
- Wsgroup send
- Operation

Packets of type joiner, lock, and wsgroup send MUST be present as fixed-length data structures. The operation packet length varies per operation message type. The operation packet length MUST be used to determine whether a variable-length data packet follows. Each data packet MUST begin with an unsigned 32-bit integer length field. For more information on each packet type, refer to sections specified by the table below.

The late joiner protocol is defined as a subset of NetMeeting Object Manager messages. For more information, refer to [Late Joiner Protocol Overview \(section 3.1.5.3\)](#).

Packet name	Packet type	Description of Packet Function
<a href="#">OMNET_HELLO</a>	joiner	Requests userid discovery.
<a href="#">OMNET_WELCOME</a>	joiner	Replies to OMNET_HELLO.
<a href="#">OMNET_LOCK_REQ</a>	lock	Requests a lock on a workset/object.
<a href="#">OMNET_LOCK_GRANT</a>	lock	Grants a lock on a workset/object.
<a href="#">OMNET_LOCK_DENY</a>	lock	Denies a lock on a workset/object.
<a href="#">OMNET_LOCK_NOTIFY</a>	lock	Sends notification granting a lock request.
<a href="#">OMNET_UNLOCK</a>	lock	Unlocks a workset/object.
<a href="#">OMNET_WSGROUP_SEND_REQ</a>	wsgroup send	Requests the current contents of a workset group after a late join.
<a href="#">OMNET_WSGROUP_SEND_MIDWAY</a>	wsgroup send	Notifies a late joiner that it knows about all worksets currently in use.
<a href="#">OMNET_WSGROUP_SEND_COMPLETE</a>	wsgroup send	Notifies the late joiner that all workset group contents have been sent.

Packet name	Packet type	Description of Packet Function
<a href="#">OMNET_WSGROUP_SEND_DENY</a>	wsgroup send	Denies a late joiner catch-up request.
<a href="#">OMNET_WORKSET_CLEAR</a>	operation	Requests that an Object Manager delete the contents of a specific workset group.
<a href="#">OMNET_WORKSET_NEW</a>	operation	Notifies a late joiner of each workset in a workset group.
<a href="#">OMNET_WORKSET_CATCHUP</a>	operation	Notifies a late joiner of each workset in a workset group.
<a href="#">OMNET_OBJECT_ADD</a>	operation + data	Adds an object at a relative position in a workset list.
<a href="#">OMNET_OBJECT_CATCHUP</a>	operation + data	Notifies a late joiner of each object in a workset group.
<a href="#">OMNET_OBJECT_REPLACE</a>	operation + data	Replaces a workset list object with new data.
<a href="#">OMNET_OBJECT_UPDATE</a>	operation + data	Updates a workset list object with new data.
<a href="#">OMNET_OBJECT_DELETE</a>	operation	Deletes a specified object from a workset group.
<a href="#">OMNET_OBJECT_MOVE</a>	operation	Moves an object to a relative position in a workset list.
<a href="#">OMNET_MORE_DATA</a>	operation + data	Sends an operation header plus an object segment in a data packet. Invoked when an object cannot be sent in a single buffer.

#### 2.3.4.1 NetMeeting Object Manager Late Joiner Protocol

The [NetMeeting Object Manager](#) implements the late joiner protocol to bring a late-joining instance up-to-date with the current contents of the workset group. When a NetMeeting client registers with a workset group that exists in a domain, the client is treated as a "late joiner" for the workset group.

The late joiner instance sends a message to the domain announcing its arrival, and receives one or more replies from the current domain instances. Next, the late joiner instance selects one of the replying instances as its "helper". The helper instance polls the other domain instances, assembles a current copy of the workset, and sends it to the late joiner.

The late joiner Object Manager instance:

- Locks the Object Manager Workset group, ensuring that all other Object Manager instances in the domain keep their local workset group copies.
- Examines the Object Manager Workset group and determines the workset group MCS channel ID and the MCS user ID of an instance from which to request a workset group copy.
- Requests to join the workset group channel by broadcasting the [OMNET\\_HELLO](#) message and waiting for replies.

- Waits for one or more current instances to respond with an [OMNET\\_WELCOME](#) message.
- Selects one of the responding instances as its helper, and sends a high priority [OMNET\\_WSGROUP\\_SEND\\_REQ](#) message to the helper on its user ID channel.
- Unlocks the Object Manager workset group by broadcasting an OMNET\_UNLOCK message at low priority on the Object Manager control channel.

The helper Object Manager instance:

- Receives the OMNET\_WSGROUP\_SEND\_REQ message.
- Marks its copy of the workset group as non-discardable.
- Examines the workset and determines the MCS user IDs of the Object Manager instances which already have copies of the workset group.
- For each workset in the workset group, sends one [OMNET\\_WORKSET\\_NEW](#) message to the late joiner on its single-member channel.
- For each object in each workset within the workset group, sends one [OMNET\\_OBJECT\\_ADD](#) message to the late joiner on its single-member channel.
- Sends an [OMNET\\_WSGROUP\\_SEND\\_COMPLETE](#) message to advise the late joiner that it has caught up with the state of the workset group as of the initial join time.

#### 2.3.4.2 NetMeeting Object Manager Hello

A 'late joiner' Object Manager instance broadcasts an OMNET\_HELLO packet on the well-known ObManControl channel after attaching to a domain that contains an incoming call. Each receiving Object Manager instance responds with an [OMNET\\_WELCOME](#) message. This exchange enables a 'late joiner' instance to discover the user IDs of the other Object Manager instances in the domain. The 'late joiner' Object Manager instance later requests a copy of the ObManControl workset group from one of the responding instances.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
Sender																messageType															
capsLen																															
compressionCaps																															

**Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**messageType (2 bytes):** MUST be set to 0x000A.

**capsLen (4 bytes):** MUST be set to 0x00000004.

**compressionCaps (4 bytes):** The bitwise OR of OM\_CAPS\_ bits. MUST be one of the following values.

Name	Value
OM_CAPS_PKW_COMPRESSION	0x00000002
OM_CAPS_NO_COMPRESSION	0x00000004

### 2.3.4.3 NetMeeting Object Manager Lock Deny

An Object Manager instance replies to the sender of an [OMNET\\_LOCK\\_REQ](#) packet with an OMNET\_LOCK\_DENY packet to indicate an unsuccessful workset/object lock attempt.

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
Sender																messageType															
wsGroupID								worksetID								data1															
reserved																															

**Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**messageType (2 bytes):** MUST be set to 0x0017.

**wsGroupID (1 byte):** Workset Group ID (unique to the domain). This value is generated internally by the [NetMeeting Object Manager](#). It consists of a value from 0 to 63 that is checked for uniqueness among other NetMeeting nodes present on the network.

**worksetID (1 byte):** An 8-bit workset ID defined within a workset group.

**data1 (2 bytes):** Unsigned 16-bit integer correlator.

**reserved (4 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

### 2.3.4.4 NetMeeting Object Manager Lock Grant

An Object Manager instance replies to the sender of an [OMNET\\_LOCK\\_REQ](#) packet with an OMNET\_LOCK\_GRANT packet to indicate a successful workset/object lock attempt.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1				
Sender																messageType																			
wsGroupID										worksetID										data1															
reserved																																			

**Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**messageType (2 bytes):** MUST be set to 0x0016.

**wsGroupID (1 byte):** The workset group ID (unique to the domain). This value is generated internally by the [NetMeeting Object Manager](#). It consists of a value from 0 to 63 that is checked for uniqueness among other NetMeeting nodes present on the network.

**worksetID (1 byte):** An 8-bit workset ID defined within a workset group.

**data1 (2 bytes):** An unsigned 16-bit integer correlator.

**reserved (4 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

### 2.3.4.5 NetMeeting Object Manager Lock Notify

An Object Manager instance broadcasts an OMNET\_LOCK\_NOTIFY packet on the well-known ObManControl channel after relinquishing a workset lock to another Object Manager instance.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1				
Sender																messageType																			
wsGroupID										worksetID										data1															
reserved																																			

**Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**messageType (2 bytes):** MUST be set to 0x0019.

**wsGroupID (1 byte):** The workset group ID (unique to the domain). This value is generated internally by the [NetMeeting Object Manager](#). It consists of a value from 0 to 63 that is checked for uniqueness among other NetMeeting nodes present on the network.

**worksetID (1 byte):** An 8-bit workset ID defined within a workset group.

**data1 (2 bytes):** An unsigned 16-bit integer correlator used to identify the locking instance.

**reserved (4 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

2.3.4.6 NetMeeting Object Manager Lock Request

The OMNET\_LOCK\_REQ packet is the initial message of the NetMeeting Object Manager workset locking protocol. An Object Manager instance attempts to lock a workset by enumerating the User IDs of the other Object Manager instances currently using its workset group, and by adding these User IDs to a list of 'expected respondents'. If this list is non-empty, the locking Object Manager instance sends an OMNET\_LOCK\_REQ packet on the workset group channel to each Object Manager instance in the list.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
Sender																messageType															
wsGroupID								worksetID								data1															
reserved																															

**Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**messageType (2 bytes):** MUST be set to 0x0015.

**wsGroupID (1 byte):** The workset group ID (unique to the domain). This value is generated internally by the [NetMeeting Object Manager](#). It consists of a value from 0 to 63 that is checked for uniqueness among other NetMeeting nodes present on the network.

**worksetID (1 byte):** An 8-bit workset ID defined within a workset group.

**data1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**reserved (4 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

2.3.4.7 NetMeeting Object Manager More Data

An Object Manager instance sends an OMNET\_MORE\_DATA packet on the workset group channel to continue transmission of a workset object. This packet is immediately followed by a data packet containing a full or partial workset object.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
Sender																messageType															
dataLength																															
data (variable)																															
...																															

**Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**messageType (2 bytes):** MUST be set to 0x0046.

**dataLength (4 bytes):** The total byte length of the following data packet.

**data (variable):** Data packet containing a full or partial workset object, as specified in section [2.3.4.25](#) and subsections.

#### 2.3.4.8 NetMeeting Object Manager Object Add

An Object Manager helper instance sends an OMNET\_OBJECT\_ADD message to a late joiner instance on its single node channel. For each object in each workset in a workset group, an OMNET\_OBJECT\_ADD message adds an object at a relative position in a workset list, as specified by **position** and by the Object Manager sequence stamp that is contained in **seqStamp\_genNumber** and **seqStamp\_userID**.

Depending on the enumerated value of **position**, (FIRST or LAST), the Object Manager searches (forward / backward) from the (start / end) of the workset until finding an object that does not have a (FIRST / LAST) position, or that has a (lower / higher) sequence stamp. The Object Manager inserts the object to be added (before / after) the found object.

For more information about operations sequencing via sequence stamps, see [NetMeeting Object Manager Sequence Stamps](#).

Each OMNET\_OBJECT\_ADD message is followed by a data packet that contains a full or partial workset object.



0	1	2	3	4	5	6	7	8	9	0 <sup>1</sup>	1	2	3	4	5	6	7	8	9	0 <sup>2</sup>	1	2	3	4	5	6	7	8	9	0 <sup>3</sup>	1								
Sender																messageType																							
wsGroupID										worksetID										position										flags									
seqStamp_genNumber																																							
seqStamp_userID																seqStamp_pad1																							
ObjectID_sequence																																							
ObjectID_creator																ObjectID_pad1																							
totalSize																																							
updateSize																																							
dataLength																																							
data (variable)																																							
...																																							

**Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**messageType (2 bytes):** MUST be set to 0x0032.

**wsGroupID (1 byte):** The workset group ID (unique to the domain). This value is generated internally by the [NetMeeting Object Manager](#). It consists of a value from 0 to 63 that is checked for uniqueness among other NetMeeting nodes that are present on the network.

**worksetID (1 byte):** An 8-bit workset ID that is defined in a workset group.

**position (1 byte):** An enumerated relative position in the workset that is defined as FIRST or LAST.

Value	Meaning
0x02	FIRST
0x01	LAST

**flags (1 byte):** Reserved. MUST be set to 0 and ignored upon receipt.

**seqStamp\_genNumber (4 bytes):** The current workset generation number of the operation sequence stamp as of the issue time.

**seqStamp\_userID (2 bytes):** The MCS user ID of the issuing Object Manager instance.

**seqStamp\_pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**ObjectID\_sequence (4 bytes):** An unsigned 32-bit integer sequence number.

**ObjectID\_creator (2 bytes):** An unsigned 16-bit integer MCS userid of the Object Manager instance that created the Object ID.

**ObjectID\_pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**totalSize (4 bytes):** The total byte length of the transferred data.

**updateSize (4 bytes):** The total byte length of the update data transferred.

**dataLength (4 bytes):** The total byte length of the following data packet.

**data (variable):** A data packet that contains a full or partial workset object, as specified in section [2.3.4.25](#) and its subsections.

### 2.3.4.9 NetMeeting Object Manager Object Catchup

The OMNET\_OBJECT\_CATCHUP message is part of the late-joiner message set. In response to an [OMNET\\_WSGROUP\\_SEND\\_REQ](#) message from a late joiner instance, an Object Manager helper instance sends an OMNET\_OBJECT\_CATCHUP message to a late joiner instance on its single node channel for each object in each workset within its workset group.

The OMNET\_OBJECT\_CATCHUP message contains the [OMNET\\_OBJECT\\_ADD](#) message format and specifies extra fields for the position-, replace-, and update- stamps. Except for deleted workset objects, the OMNET\_OBJECT\_CATCHUP message is followed by a data packet that contains a workset object.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1								
Sender																messageType																							
wsGroupID										worksetID										position										flags									
seqStamp_genNumber																																							
seqStamp_userID																seqStamp_pad1																							
ObjectID_sequence																																							
ObjectID_creator																ObjectID_pad1																							

totalSize	
updateSize	
positionStamp_genNumber	
positionStamp_userID	positionStamp_pad1
replaceStamp_genNumber	
replaceStamp_userID	replaceStamp_pad1
updateStamp_genNumber	
updateStamp_userID	updateStamp_pad1
dataLength	
data (variable)	
...	

**Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**messageType (2 bytes):** MUST be set to 0x0033.

**wsGroupID (1 byte):** The workset group ID (unique to the domain). This value is generated internally by the NetMeeting Object Manager. It consists of a value from 0 to 63 that is checked for uniqueness among other NetMeeting nodes present on the network.

**worksetID (1 byte):** An 8-bit workset ID that is defined in a workset group.

**position (1 byte):** An enumerated relative position in the workset that is defined as FIRST or LAST.

Value	Meaning
0x02	FIRST
0x01	LAST

**flags (1 byte):** Reserved. MUST be set to 0 and ignored upon receipt.

**seqStamp\_genNumber (4 bytes):** The current workset generation number of the operation sequence stamp as of the issue time.

**seqStamp\_userID (2 bytes):** The MCS user ID of the issuing Object Manager instance.

**seqStamp\_pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**ObjectID\_sequence (4 bytes):** An unsigned 32-bit integer sequence number.

**ObjectID\_creator (2 bytes):** An unsigned 16-bit integer MCS userid of the Object Manager instance that created the Object ID.

**ObjectID\_pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**totalSize (4 bytes):** The total byte length of the transferred data.

**updateSize (4 bytes):** The total byte length of the update transferred data.

**positionStamp\_genNumber (4 bytes):** The workset generation number of the operation position stamp.

**positionStamp\_userID (2 bytes):** The MCS user ID of the position stamp.

**positionStamp\_pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**replaceStamp\_genNumber (4 bytes):** The workset generation number of the operation replacement stamp.

**replaceStamp\_userID (2 bytes):** The MCS user ID of the operation replacement stamp.

**replaceStamp\_pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**updateStamp\_genNumber (4 bytes):** The workset generation number of the operation update stamp.

**updateStamp\_userID (2 bytes):** The MCS user ID of the operation update stamp.

**updateStamp\_pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**dataLength (4 bytes):** The total byte length of the following data packet.

**data (variable):** Data packet containing a full or partial workset object, as specified in section [2.3.4.25](#) and subsections.

#### 2.3.4.10 NetMeeting Object Manager Object Delete

An Object Manager instance broadcasts an OMNET\_OBJECT\_DELETE message on the workset group channel to delete a specified object from a workset group. The object is uniquely identified by a network user ID and a four-byte unsigned integer sequence number. Refer to fields **ObjectID\_creator** and **ObjectID\_sequence**.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1								
Sender																messageType																							
wsGroupID										worksetID										position										flags									
seqStamp_genNumber																																							
seqStamp_userID																seqStamp_pad1																							
ObjectID_sequence																																							
ObjectID_creator																ObjectID_pad1																							

**Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**messageType (2 bytes):** MUST be set to 0x0036.

**wsGroupID (1 byte):** The workset group ID (unique to the domain). This value is generated internally by the NetMeeting Object Manager. It consists of a value from 0 to 63 that is checked for uniqueness among other NetMeeting nodes that are present on the network.

**worksetID (1 byte):** An 8-bit workset ID that is defined in a workset group.

**position (1 byte):** Reserved. MUST be set to 0 and ignored upon receipt.

**flags (1 byte):** Reserved. MUST be set to 0 and ignored upon receipt.

**seqStamp\_genNumber (4 bytes):** The current workset generation number of the operation sequence stamp as of the issue time.

**seqStamp\_userID (2 bytes):** The MCS user ID of the issuing Object Manager instance.

**seqStamp\_pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**ObjectID\_sequence (4 bytes):** An unsigned 32-bit integer sequence number.

**ObjectID\_creator (2 bytes):** An unsigned 16-bit integer MCS userid of the Object Manager instance that created the Object ID.

**ObjectID\_pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

#### 2.3.4.11 NetMeeting Object Manager Object Move

An Object Manager instance broadcasts an OMNET\_OBJECT\_MOVE message on the workset group channel to move an object to a relative position in a workset list, as specified by **position** and by the Object Manager sequence stamp that is formed from the ordered values of **seqStamp\_genNumber**. Depending on the enumerated value of **position**, (FIRST or LAST), the Object Manager searches (forward / backward) from the (start / end) of the workset until it finds an

object that is not (FIRST / LAST), or that has a (lower / higher) position stamp. The Object Manager inserts the object to be moved (before / after) the found object. For more information about relative stamp order, refer to [OMNET\\_OBJECT\\_ADD](#).

0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1								
Sender																messageType																							
wsGroupID										worksetID										position										flags									
seqStamp_genNumber																																							
seqStamp_userID																seqStamp_pad1																							
ObjectID_sequence																																							
ObjectID_creator																ObjectID_pad1																							

**Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**messageType (2 bytes):** MUST be set to 0x0037.

**wsGroupID (1 byte):** The workset group ID (unique to the domain). This value is generated internally by the [NetMeeting Object Manager](#). It consists of a value from 0 to 63 that is checked for uniqueness among other NetMeeting nodes present on the network.

**worksetID (1 byte):** An 8-bit workset ID that is defined in a workset group.

**position (1 byte):** An enumerated relative position in the workset that is defined as FIRST or LAST.

Value	Meaning
0x02	FIRST
0x01	LAST

**flags (1 byte):** Reserved. MUST be set to 0 and ignored upon receipt.

**seqStamp\_genNumber (4 bytes):** The current workset generation number of the operation sequence stamp as of the issue time.

**seqStamp\_userID (2 bytes):** The MCS user ID of the issuing Object Manager instance.

**seqStamp\_pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

- ObjectID\_sequence (4 bytes):** An unsigned 32-bit integer sequence number.
- ObjectID\_creator (2 bytes):** An unsigned 16-bit integer MCS userid of the Object Manager instance that created the Object ID.
- ObjectID\_pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

### 2.3.4.12 NetMeeting Object Manager Object Replace

An Object Manager instance broadcasts an OMNET\_OBJECT\_REPLACE message on the workset group channel to replace an object in a workset list with new object data that is sent in an attached data packet. The replacement sequence stamp is sent in the **seqStamp\_genNumber** and **seqStamp\_userID** fields.

For more information about operations sequencing via sequence stamps, refer to [NetMeeting Object Manager Sequence Stamps](#).

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1								
Sender																messageType																							
wsGroupID										worksetID										position										flags									
seqStamp_genNumber																																							
seqStamp_userID																seqStamp_pad1																							
ObjectID_sequence																																							
ObjectID_creator																ObjectID_pad1																							
totalSize																																							
dataLength																																							
data (variable)																																							
...																																							

- Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.
- messageType (2 bytes):** MUST be set to 0x0034.

**wsGroupID (1 byte):** The workset group ID (unique to the domain). This value is generated internally by the [NetMeeting Object Manager](#). It consists of a value from 0 to 63 that is checked for uniqueness among other NetMeeting nodes that are present on the network.

**worksetID (1 byte):** An 8-bit workset ID that is defined in a workset group.

**position (1 byte):** Reserved. MUST be set to 0 and ignored upon receipt.

**flags (1 byte):** Reserved. MUST be set to 0 and ignored upon receipt.

**seqStamp\_genNumber (4 bytes):** The current workset generation number of the operation sequence stamp as of the issue time.

**seqStamp\_userID (2 bytes):** The MCS user ID of the issuing Object Manager instance.

**seqStamp\_pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**ObjectID\_sequence (4 bytes):** An unsigned 32-bit integer sequence number.

**ObjectID\_creator (2 bytes):** An unsigned 16-bit integer MCS userid of the Object Manager instance that created the Object ID.

**ObjectID\_pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**totalSize (4 bytes):** The total byte length of the transferred data.

**dataLength (4 bytes):** The total byte length of the following data packet.

**data (variable):** The data packet that contains a full or partial workset object, as specified in section [2.3.4.25](#) and subsections.

#### 2.3.4.13 NetMeeting Object Manager Object Update

An Object Manager instance broadcasts an OMNET\_OBJECT\_UPDATE message on the workset group channel to update an object in a workset list with the new object data that is sent in an attached data packet.



0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1								
Sender																messageType																							
wsGroupID										worksetID										position										flags									
seqStamp_genNumber																																							
seqStamp_userID																seqStamp_pad1																							
ObjectID_sequence																																							
ObjectID_creator																ObjectID_pad1																							
totalSize																																							
dataLength																																							
data (variable)																																							
...																																							

**Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**messageType (2 bytes):** MUST be set to 0x0035.

**wsGroupID (1 byte):** The workset group ID (unique to the domain). This value is generated internally by the [NetMeeting Object Manager](#). It consists of a value from 0 to 63 that is checked for uniqueness among other NetMeeting nodes present on the network.

**worksetID (1 byte):** An 8-bit workset ID that is defined in a workset group.

**position (1 byte):** Reserved. MUST be set to 0 and ignored upon receipt.

**flags (1 byte):** Reserved. MUST be set to 0 and ignored upon receipt.

**seqStamp\_genNumber (4 bytes):** The current workset generation number of the operation sequence stamp as of the issue time.

**seqStamp\_userID (2 bytes):** The MCS user ID of the issuing Object Manager instance.

**seqStamp\_pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**ObjectID\_sequence (4 bytes):** An unsigned 32-bit integer sequence number.

**ObjectID\_creator (2 bytes):** An unsigned 16-bit integer MCS user ID of the Object Manager instance that created the Object ID.

**ObjectID\_pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**totalSize (4 bytes):** The total byte length of the transferred data.

**dataLength (4 bytes):** The total byte length of the following data packet.

**data (variable):** The data packet that contains a full or partial workset object, as specified in section [2.3.4.25](#) and its subsections.

#### 2.3.4.14 NetMeeting Object Manager Unlock

An Object Manager instance broadcasts an OMNET\_UNLOCK packet on the well-known ObManControl channel to unlock a workset/object.

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
Sender																messageType															
wsGroupID								worksetID								data1															
reserved																															

**Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**messageType (2 bytes):** MUST be set to 0x0018.

**wsGroupID (1 byte):** The workset group ID (unique to the domain). This value is generated internally by the [NetMeeting Object Manager](#). It consists of a value from 0 to 63 that is checked for uniqueness among other NetMeeting nodes present on the network.

**worksetID (1 byte):** An 8-bit workset ID defined within a workset group.

**data1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**reserved (4 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

#### 2.3.4.15 NetMeeting Object Manager Welcome

An Object Manager instance broadcasts an OMNET\_WELCOME packet on the well-known ObManControl channel after: (1) attaching to a domain that contains an outgoing call or (2) receiving an [OMNET\\_HELLO](#) message.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
Sender																messageType															
capsLen																															
compressionCaps																															

**Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**messageType (2 bytes):** MUST be set to 0x000B.

**capsLen (4 bytes):** MUST be set to 0x00000004.

**compressionCaps (4 bytes):** The bitwise OR of OM\_CAPS\_ bits. The only two bit values allowed are:

Name	Value
OM_CAPS_PKW_COMPRESSION	0x00000002
OM_CAPS_NO_COMPRESSION	0x00000004

#### 2.3.4.16 NetMeeting Object Manager Workset Catchup

The OMNET\_WORKSET\_CATCHUP message is part of the Object Manager late joiner message set. In response to an [OMNET\\_WSGROUP\\_SEND\\_REQ](#) message from a late joiner instance, an Object Manager helper instance sends an OMNET\_WORKSET\_CATCHUP message for each workset in a workset group.

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									
Sender																messageType																								
wsGroupID										worksetID										position										flags										
seqStamp_genNumber																																								
seqStamp_userID																seqStamp_pad1																								
ObjectID_sequence																																								
ObjectID_creator																ObjectID_pad1																								

**Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**messageType (2 bytes):** MUST be set to 0x0030.

**wsGroupID (1 byte):** The workset group ID (unique to the domain). This value is generated internally by the [NetMeeting Object Manager](#). It consists of a value from 0 to 63 that is checked for uniqueness among other NetMeeting nodes that are present on the network.

**worksetID (1 byte):** An 8-bit workset ID that is defined in a workset group.

**position (1 byte):** The low byte of a NET\_PRIORITY value.

**flags (1 byte):** The high byte of a NET\_PRIORITY value.

**seqStamp\_genNumber (4 bytes):** The current workset generation number of the operation sequence stamp as of the issue time.

**seqStamp\_userID (2 bytes):** The MCS user ID of the issuing NetMeeting Object Manager instance.

**seqStamp\_pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**ObjectID\_sequence (4 bytes):** An unsigned 32-bit integer sequence number. For [OMNET\\_WORKSET\\_NEW](#) / OMNET\_WORKSET\_CATCHUP messages, the first byte contains a BOOL flag that designates whether the workset is persistent.

**ObjectID\_creator (2 bytes):** An unsigned 16-bit integer MCS user ID of the Object Manager instance that created the Object ID.

**ObjectID\_pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

### 2.3.4.17 NetMeeting Object Manager Workset Clear

An Object Manager instance broadcasts an OMNET\_WORKSET\_CLEAR message on the workset group channel to delete all workset objects that have addition stamps lower than the clear stamp

that is specified by **clearStamp\_genNumber** and **clearStamp\_userID**. For more information about relative stamp order, refer to [OMNET\\_OBJECT\\_ADD](#).

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				
Sender																messageType																			
wsGroupID									worksetID									position									flags								
clearStamp_genNumber																																			
clearStamp_userID																clearStamp_pad1																			

**Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**messageType (2 bytes):** MUST be set to 0x0028.

**wsGroupID (1 byte):** The workset group ID (unique to the domain). This value is generated internally by the [NetMeeting Object Manager](#). It consists of a value from 0 to 63 that is checked for uniqueness among other NetMeeting nodes that are present on the network.

**worksetID (1 byte):** An 8-bit workset ID that is defined in a workset group.

**position (1 byte):** Reserved. MUST be set to 0 and ignored upon receipt.

**flags (1 byte):** Reserved. MUST be set to 0 and ignored upon receipt.

**clearStamp\_genNumber (4 bytes):** The current workset generation number of the operation sequence stamp as of the issue time.

**clearStamp\_userID (2 bytes):** The MCS user ID of the issuing Object Manager instance.

**clearStamp\_pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

#### 2.3.4.18 NetMeeting Object Manager Workset New

The OMNET\_WORKSET\_NEW message is used to enumerate each workset in a workset group. For each workset in its workset group, an Object Manager helper instance sends an OMNET\_WORKSET\_NEW message to a late joiner instance on its single node channel.

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									
Sender																messageType																								
wsGroupID										worksetID										position										flags										
seqStamp_genNumber																																								
seqStamp_userID																seqStamp_pad1																								
ObjectID_sequence																																								
ObjectID_creator																ObjectID_pad1																								

**Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**messageType (2 bytes):** MUST be set to 0x0029.

**wsGroupID (1 byte):** The workset group ID (unique to the domain). This value is generated internally by the [NetMeeting Object Manager](#). It consists of a value from 0 to 63 that is checked for uniqueness among other NetMeeting nodes that are present on the network.

**worksetID (1 byte):** An 8-bit workset ID that is defined in a workset group.

**position (1 byte):** The low byte of a NET\_PRIORITY value.

**flags (1 byte):** The high byte of a NET\_PRIORITY value.

**seqStamp\_genNumber (4 bytes):** The current workset generation number of the operation sequence stamp as of the issue time.

**seqStamp\_userID (2 bytes):** The MCS user ID of the issuing Object Manager instance.

**seqStamp\_pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**ObjectID\_sequence (4 bytes):** An unsigned 32-bit integer sequence number. For the OMNET\_WORKSET\_NEW / [OMNET\\_WORKSET\\_CATCHUP](#) messages, the first byte contains a BOOL flag that designates whether the workset is persistent.

**ObjectID\_creator (2 bytes):** An unsigned 16-bit integer MCS user ID of the Object Manager instance that created the Object ID.

**ObjectID\_pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

### 2.3.4.19 NetMeeting Object Manager WSGROUP Info

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
length																															
idStamp																															
channelID																creator															
wsGroupID								pad1								pad2															
functionProfile																															
...																															
...																															
...																															
wsGroupName																															
...																															
...																															
...																															
...																															
...																															
...																															
...																															

**length (4 bytes):** The byte length of this data packet, exclusive of the byte length of this field.

**idStamp (4 bytes):** An unsigned 32-bit integer initialized to the equivalent of the character literal 'OMWI'.

**channelID (2 bytes):** An unsigned 16-bit integer containing the workset group MCS channel number.

- creator (2 bytes):** An unsigned 16-bit integer MCS userid of the Object Manager instance which created the workset group.
- wsGroupID (1 byte):** The workset group ID (unique to the domain).
- pad1 (1 byte):** For alignment.
- pad2 (2 bytes):** For alignment.
- functionProfile (16 bytes):** A NULL-terminated function profile name, of at most 16 characters, including the NULL. This field MUST contain only ASCII characters between 0x2C and 0x5B. This range includes all uppercase characters, all digits, and certain punctuation marks.
- wsGroupName (32 bytes):** A client-supplied NULL-terminated workset group name, of at most 32 characters, including the NULL. This field MUST contain only ASCII characters between 0x2C and 0x5B. This range includes all uppercase characters, all digits and certain punctuation marks.

2.3.4.20 NetMeeting Object Manager WSGROUP\_REG\_REC

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
length																															
idStamp																															
userID																status															

- length (4 bytes):** The byte length of this data packet, exclusive of the byte length of this field.
- idStamp (4 bytes):** An unsigned 32-bit integer initialized via the DC\_MAKE\_ID\_STAMP macro.
- userID (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.
- status (2 bytes):** An unsigned 16-bit integer state field set to either 1 = CATCHING\_UP or 2 = READY\_TO\_SEND.

2.3.4.21 NetMeeting Object Manager WSGROUP Send Complete

An Object Manager helper instance sends an OMNET\_WSGROUP\_SEND\_COMPLETE message to notify an Object Manager late joiner instance that it has received a complete copy of the workset group contents.



0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1				
Sender																messageType																			
wsGroupID										pad1										correlator															
Object ID sequence																																			
Object ID creator																Object ID pad1																			
maxObjIDSeqUsed																																			

**Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**messageType (2 bytes):** MUST be set to 0x0020.

**wsGroupID (1 byte):** The workset group ID (unique to the domain). This value is generated internally by the [NetMeeting Object Manager](#). It consists of a value from 0 to 63 that is checked for uniqueness among other NetMeeting nodes present on the network.

**pad1 (1 byte):** Reserved. MUST be set to 0 and ignored upon receipt.

**correlator (2 bytes):** A monotonically increasing 2-byte sequence number starting at zero.

**Object ID sequence (4 bytes):** An unsigned 32-bit integer sequence number.

**Object ID creator (2 bytes):** An unsigned 16-bit integer MCS userid of the Object Manager instance which created the Object ID.

**Object ID pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**maxObjIDSeqUsed (4 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

#### 2.3.4.22 NetMeeting Object Manager WSGROUP Send Deny

An Object Manager helper instance sends an OMNET\_WSGROUP\_SEND DENY message as a negative response to an [OMNET\\_WSGROUP\\_SEND\\_REQ](#) message from an Object Manager late joiner instance. After receiving this message, the late joiner instance selects a different helper instance to enumerate the workset group contents.

0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1				
Sender																messageType																			
wsGroupID										pad1										correlator															
Object ID sequence																																			
Object ID creator																Object ID pad1																			
maxObjIDSeqUsed																																			

**Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**messageType (2 bytes):** MUST be set to 0x0021.

**wsGroupID (1 byte):** The workset group ID (unique to the domain). This value is generated internally by the NetMeeting Object Manager. It consists of a value from 0 to 63 that is checked for uniqueness among other NetMeeting nodes present on the network.

**pad1 (1 byte):** Reserved. MUST be set to 0 and ignored upon receipt.

**correlator (2 bytes):** A monotonically-increasing, 2-byte sequence number starting at zero.

**Object ID sequence (4 bytes):** An unsigned 32-bit integer sequence number.

**Object ID creator (2 bytes):** An unsigned 16-bit integer MCS user ID of the Object Manager instance that created the Object ID.

**Object ID pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**maxObjIDSeqUsed (4 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

#### 2.3.4.23 NetMeeting Object Manager WSGROUP Send Midway

An Object Manager helper instance sends an OMNET\_WSGROUP\_SEND\_MIDWAY message to advise an Object Manager late joiner instance that its list of worksets currently in use is complete. A helper instance sends this message after sending one or more [OMNET\\_WORKSET\\_CATCHUP](#) messages to inform the late joiner instance of the workset group contents.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1				
Sender																messageType																			
wsGroupID										pad1										correlator															
Object ID sequence																																			
Object ID creator																Object ID pad1																			
maxObjIDSeqUsed																																			

**Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**messageType (2 bytes):** MUST be set to 0x001F.

**wsGroupID (1 byte):** The workset group ID (unique to the domain). This value is generated internally by the [NetMeeting Object Manager](#). It consists of a value from 0 to 63 that is checked for uniqueness among other NetMeeting nodes present on the network.

**pad1 (1 byte):** Reserved. MUST be set to 0 and ignored upon receipt.

**correlator (2 bytes):** A monotonically increasing 2-byte sequence number starting at zero.

**Object ID sequence (4 bytes):** An unsigned 32-bit integer sequence number.

**Object ID creator (2 bytes):** An unsigned 16-bit integer MCS user ID of the Object Manager instance that created the Object ID.

**Object ID pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**maxObjIDSeqUsed (4 bytes):** An unsigned 32-bit integer representing the maximum Object ID sequence number previously used by the late joiner user ID in the workset group. This value prevents the re-use of object IDs.

#### 2.3.4.24 NetMeeting Object Manager WSGROUP Send Request

A late-joiner Object Manager instance requests a copy of the workset group contents by sending an OMNET\_WSGROUP\_SEND\_REQ packet at high priority on the user ID channel of an Object Manager helper instance.

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				
Sender																messageType																			
wsGroupID										pad1										correlator															
Object ID sequence																																			
Object ID creator																Object ID pad1																			
maxObjIDSeqUsed																																			

**Sender (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**messageType (2 bytes):** MUST be set to 0x001E.

**wsGroupID (1 byte):** The workset group ID (unique to the domain). This value is generated internally by the [NetMeeting Object Manager](#). It consists of a value from 0 to 63 that is checked for uniqueness among other NetMeeting nodes present on the network.

**pad1 (1 byte):** Reserved. MUST be set to 0 and ignored upon receipt.

**correlator (2 bytes):** An unsigned 16-bit integer catchup correlator.

**Object ID sequence (4 bytes):** An unsigned 32-bit integer sequence number.

**Object ID creator (2 bytes):** An unsigned 16-bit integer MCS user ID of the Object Manager instance that created the Object ID.

**Object ID pad1 (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

**maxObjIDSeqUsed (4 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

## 2.3.4.25 Object Manager Data Packet Structures

### 2.3.4.25.1 WB\_GRAPHIC

WB\_GRAPHIC contains the header that is used on all graphic objects, such as lines, rectangles, ellipses, and freehand drawings, that are used when representing a whiteboard object.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
Length																															
Type																Dataoffset															
rectBounds																															
...																															
Color																								Locked							
penWidth																penStyle															
Rect																															
...																															
lockPersonID																															
...																															
rasterOp																smoothed								Tooltype							
LoadedFromFile																loadingClientID															
reserved1																															
reserved2																															

**Length (4 bytes):** The total length of the structure plus the length of the variable data that follows this structure.

**Type (2 bytes):** The following values indicate the type of compression that is used for the type field.

Value	Meaning
TYPE_GRAPHIC_FREEHAND 0x0003	A freehand drawing.
TYPE_GRAPHIC_LINE 0x0004	A line drawing.

Value	Meaning
TYPE_GRAPHIC_RECTANGLE 0x0005	A rectangle drawing.
TYPE_GRAPHIC_FILLED_RECTANGLE 0x0006	A filled rectangle drawing.
TYPE_GRAPHIC_ELLIPSE 0x0007	An ellipse drawing.
TYPE_GRAPHIC_FILLED_ELLIPSE 0x0008	A filled ellipse drawing.
TYPE_GRAPHIC_GRAPHIC_TEXT 0x0009	A line text string.
TYPE_GRAPHIC_GRAPHIC_DIB 0x000A	A device-independent bitmap.

**Dataoffset (2 bytes):** The size, in bytes, of this structure.

**rectBounds (8 bytes):** A [TSHR\\_RECT16](#) structure that specifies the left, upper, right, and lower edges of the drawings bounding rectangle.

**Color (3 bytes):** A value MAY be present that represents the pen color value that is specified by a [TSHR\\_COLOR](#) structure.

**Locked (1 byte):** A value that indicates if a node that is editing the drawing could be 0 (for not editing) or 1 (for editing).

Value	Meaning
0x00	A node is not editing the drawing.
0x01	A node is editing the drawing.

**penWidth (2 bytes):** A value that indicates the width, in pixels, of the pen.

**penStyle (2 bytes):** One of the following pen style values MAY be present.

Value	Meaning
PS_SOLID 0x0000	The pen is solid.
PS_DASH 0x0001	The pen is dashed.
PS_DOT 0x0002	The pen is dotted.
PS_DASHDOT 0x0003	The pen has alternating dashes and dots.
PS_DASHDOTDOT 0x0004	The pen has alternating dashes and double dots.

Value	Meaning
PS_NULL 0x0005	The pen is invisible.
PS_INSIDEFRAME 0x0006	The pen is solid. When this pen is used with a bounding rectangle, the dimensions of the figure are shrunk so that it fits entirely in the bounding rectangle, taking into account the width of the pen. This applies only to geometric pens.

**Rect (8 bytes):** A TSHR\_RECT16 structure that specifies the left, upper, right, and lower edges of the drawings that define the rectangle.

**lockPersonID (8 bytes):** The ID of the locking person. This field is maintained internally and should not be altered.

**rasterOp (2 bytes):** The raster operation that is used to draw the object.

Value	Meaning
R2_BLACK 0x0001	The pixel is always drawn as black.
R2_NOTMERGEPEN 0x0002	The pixel is the inverse of the R2_MERGEPEN color.
R2_MASKNOTPEN 0x0003	The pixel is a combination of the colors that are common to both the screen and the inverse of the pen.
R2_NOTCOPYPEN 0x0004	The pixel is the inverse of the pen color.
R2_MASKPENNOT 0x0005	The pixel is a combination of the colors that are common to both the pen and the inverse of the screen.
R2_NOT 0x0006	The pixel is the inverse of the screen color.
R2_XORPEN 0x0007	The pixel is a combination of the colors in the pen and in the screen, but not in both.
R2_NOTMASKPEN 0x0008	The pixel is the inverse of the R2_MASKPEN color.
R2_MASKPEN 0x0009	The pixel is a combination of the colors that are common to both the pen and the screen.
R2_NOTXORPEN 0x000A	The pixel is the inverse of the R2_XORPEN color.
R2_NOP 0x000B	The pixel SHOULD remain unchanged.
R2_MERGENOTPEN 0x000C	The pixel is a combination of the screen color and the inverse of the pen color.
R2_COPYPEN 0x000D	The pixel always has the color of the pen.

Value	Meaning
R2_MERGE PEN NOT 0x000E	The pixel is a combination of the pen color and the inverse of the screen color.
R2_MERGE PEN 0x000F	The pixel is a combination of the pen color and the screen color.
R2_WHITE 0x0010	The pixel is always drawn as white.

**smoothed (1 byte):** Flag field that MUST be set to 0 or 1, specifying if the drawing uses the curve smoothing algorithm.

Name	Value
No smoothing	0x00
Smoothing	0x01

**Tooltype (1 byte):** The type of tool that is used to create this drawing. It should be one of the values that are specified in section [2.3.4.25.1.1](#).

**LoadedFromfile (2 bytes):** The flag that indicates if this drawing was loaded from a file.

**loadingClientID (2 bytes):** The local identifier of the user, which is obtained from the Multipoint Communication Service (MCS) [\[T122\]](#) layer. For more information about the MCS user ID, see [\[T122\]](#) section 3 (Definitions) in the ITU-T Recommendation.

**reserved1 (4 bytes):** Reserved. MUST be set to zero and ignored upon receipt.

**reserved2 (4 bytes):** Reserved. MUST be set to zero and ignored upon receipt.

### 2.3.4.25.1.1 TOOLTYPE

The **TOOLTYPE** enumeration indicates the type of tool that is used to create a drawing.

```
typedef enum
{
    TOOLTYPE_SELECT = 0x00,
    TOOLTYPE_ERASER,
    TOOLTYPE_TEXT,
    TOOLTYPE_HIGHLIGHT,
    TOOLTYPE_PEN,
    TOOLTYPE_LINE,
    TOOLTYPE_BOX,
    TOOLTYPE_FILLEDBOX,
    TOOLTYPE_ELLIPSE,
    TOOLTYPE_FILLEDELIPSE
} TOOLTYPE;
```

### 2.3.4.25.2 WB\_GRAPHIC\_DIB

The WB\_GRAPHIC\_DIB packet consists of a header that is followed by a raw bitmap.



0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1
header																															
...																															
...																															
...																															
...																															
...																															
...																															
(header cont'd for 6 rows)																															
data (variable)																															
...																															

**header (56 bytes):** The basic information of the drawing. A [WB\\_GRAPHIC](#) structure.

**data (variable):** The raw data definition of a bitmap in memory.

### 2.3.4.25.3 WB\_GRAPHIC\_FREEHAND

The WB\_GRAPHIC\_FREEHAND packet contains [TSHR\\_POINT16](#) structures.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
header																															
...																															
...																															
...																															
...																															
...																															
...																															
(header cont'd for 6 rows)																															
pointCount																points (variable)															
...																															

**header (56 bytes):** The basic information about the drawing. A [WB\\_GRAPHIC](#) structure.

**pointCount (2 bytes):** The number of TSHR\_POINT16 structures contained in **points** and specified in units of points.

**points (variable):** An array of TSHR\_POINT16 structures.

#### 2.3.4.25.4 WB\_GRAPHIC\_TEXT

The WB\_GRAPHIC\_TEXT packet contains a string along with other data that is used to generate graphic text.

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
header																															
...																															

...		
...		
...		
...		
...		
...		
(header cont'd for 6 rows)		
charHeight		averageCharWidth
strokeWeight		italicunderline
strikeout	pitch	faceName
...		
...		
...		
...		
...		
...		
...		
...		codePage
stringCount		text (variable)
...		

**header (56 bytes):** The basic information of the drawing, which consists of a byte array of WB\_GRAPHIC structures.

**charHeight (2 bytes):** The maximum height of characters in the text string.

**averageCharWidth (2 bytes):** The average character width in the text string.

**strokeWeight (2 bytes):** One of the following values.

Value	Meaning
0x0000	The font weight is unspecified.
0x0064	Thin font.
0x00C8	Extra-light font.
0x012C	Light font.
0x0190	Normal font.
0x01F4	Medium font.
0x0258	Semi-bold font.
0x02BC	Bold font.
0x0320	Extra-bold font.
0x0384	Heavy font.

**italic (1 byte):** A flag value that indicates whether the font is normal (0x00) or italic (0x01).

Name	Value
Normal	0x00
Italic	0x01

**underline (1 byte):** A flag value that indicates whether the font is normal (0x00) or underline (0x01).

Name	Value
Normal	0x00
Underline	0x01

**strikeout (1 byte):** A flag value that indicates whether the font is normal (0x00) or strikeout (0x01).

Name	Value
Normal	0x00
Strikeout	0x01

**pitch (1 byte):** One of the following values.

Value	Meaning
Default 0x00	Default font pitch.
Fixed 0x01	Fixed font pitch.
Variable 0x02	Variable font pitch.

**faceName (32 bytes):** A 32-byte ASCII array that specifies the null-terminated face name of the font. There can be 31 characters maximum. The string **MUST** be null-terminated.

**codePage (2 bytes):** Either the codepage of the font or one of the following codepages.

Value	Meaning
WIN_ANSI 0x0000	The codepage is Windows ANSI.
OEM_FONT 0x00FF	The codepage is for an OEM font.
Unknown 0xFFFF	The codepage is unknown.

**stringCount (2 bytes):** The number of lines of text in text.

**text (variable):** Null-terminated text strings.

#### 2.3.4.25.5 WB\_PAGE\_ORDER

The WB\_PAGE\_ORDER packet contains data that is used to build the Page Control Object that is kept in the Page Control Workset.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
objectType																generationLo															
generationHi																countPages															
pages																															
...																															
...																															
...																															
...																															
...																															
...																															
...																															
(pages cont'd for 54 rows)																															
...																															

- objectType (2 bytes):** The object type. MUST be set to 0x0002.
- generationLo (2 bytes):** The generation number of the object (low 16-bits).
- generationHi (2 bytes):** The generation number of the object (high 16-bits).
- countPages (2 bytes):** The number of active pages.
- pages (250 bytes):** The byte array of worksets (in page order).

### 2.3.4.25.6 WB\_LOCK

The WB\_LOCK packet contains the type and owner who is currently locking the whiteboard contents.

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
objectType																lockType															
seqStamp_userID																pad															

**objectType (2 bytes):** MUST be set to 0x0002.

**lockType (2 bytes):** MUST be set to one of the following values:

Value	Meaning
0x0000	No objects are locked.
0x0001	The entire whiteboard workspace is locked.
0x0002	The objects in the current page are locked.

**seqStamp\_userID (2 bytes):** The MCS user ID of the issuing Object Manager instance.

**pad (2 bytes):** Reserved. MUST be set to 0 and ignored upon receipt.

#### 2.3.4.25.7 WB\_SYNC

The WB\_SYNC packet contains synchronization data.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
length																															
dataOffset																currentPage								pad							
visibleRect																															
...																															
zoomed																															

**length (4 bytes):** The total byte length of this packet.

**dataOffset (2 bytes):** The offset to data from start.

**currentPage (1 byte):** The current page identifier.

**pad (1 byte):** Reserved. MUST be set to zero and ignored upon receipt.

**visibleRect (8 bytes):** A [TSHR\\_RECT16](#) structure that defines the area that is visible in the node's window.

**zoomed (2 bytes):** The zoom synchronization participants.

**2.3.4.25.8 WB\_PERSON**

The WB\_PERSON packet contains the person object data.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
person																															
...																															
...																															
...																															
...																															
...																															
...																															
(person cont'd for 4 rows)																															
colorID																synced								currentPage							
visibleRect																															
...																															
pointerActive								cmgPersonID																							
...								reserved1																							
...								reserved2																							
...																															

**person (48 bytes):** The name of the node. MUST be present as an array of UCHAR.

**colorID (2 bytes):** The offset to data from start.



**synced (1 byte):** 0x00 if not synchronized, 0x01 if synchronized.

Name	Value
Not synchronized	0x00
Synchronized	0x01

**currentPage (1 byte):** The current page identifier.

**visibleRect (8 bytes):** A [TSHR\\_RECT16](#) structure that specifies the left, upper, right, and lower edges of the region, in order.

**pointerActive (1 byte):** 0x00 if the pointer is inactive; 0x01 if the pointer is active.

Name	Value
Inactive	0x00
Active	0x01

**cmgPersonID (4 bytes):** The **GCC** user ID.

**reserved1 (4 bytes):** Reserved. MUST be set to zero and ignored on receipt.

**reserved2 (4 bytes):** Reserved. MUST be set to zero and ignored on receipt.

### 2.3.5 Voice Communication Protocol

Peer nodes engage in voice communication through the [H.245 Protocol: Microsoft Extensions](#), as specified in [MS-H245].

### 2.3.6 Whiteboard Protocol Extensions

Microsoft NetMeeting Protocol peers engage in whiteboard data-sharing by exchanging International Telecommunications Union (ITU) T.126 data, as specified in [\[T126\]](#), except for the following extensions.

The Microsoft NetMeeting Protocol adds support to T.126 for the exchange of bitmaps and textual data.

The bitmap data is transferred in T.126 BitmapCreate and BitmapCreateContinue packets. The **nonStandardParameter** field of each is used, with **nonStandardIdentifier** set to the **Octet String** "B500534C4269746D617032340" and **data** set to a **BITMAPINFOHEADER** structure, as defined in [\[T126\]](#).

Up to 2000 bytes of bitmap data can be transferred per message, in the **bitmapData** field of BitmapCreate or BitmapCreateContinue.

Textual data is transferred in a T.126 **nonStandardPDU** message. The **nonStandardIdentifier** field of **nonStandardParameter** contains the **Octet String** "B500534C54657874320", and the **data** field contains an [MSTextPDU](#) structure.

#### 2.3.6.1 MSTextPDU

The **MSTextPDU** structure provides associated information for text data.

```
typedef struct {
    TEXTPDU_HEADER header;
    TEXTPDU_ATTRIB attrib;
} MStextPDU;
```

**header:** A [TEXTPDU\\_HEADER](#) that describes what to do with the text.

**attrib:** A [TEXTPDU\\_ATTRIB](#) that defines the attributes of the text.

One or more **attributesFlag** values in the **TEXTPDU\_ATTRIB** field can be set that correspond to the **textPenColor**, **textFillColor**, **textViewState**, **textZOrder**, **textAnchorPoint**, **textFont**, **numberOfLines**, or **textString** fields. A field only contains valid data if its attribute flag is set.

If the **nonStandardPdu** field in **TEXTPDU\_HEADER** is set to **textDeletePDU\_chosen** (31), the **attrib** field in **MStextPDU** is not present.

### 2.3.6.2 TEXTPDU\_ATTRIB

The **TEXTPDU\_ATTRIB** structure defines the attributes of an [MStextPDU](#) structure.

```
typedef struct {
    DWORD attributesFlag;
    COLORREF textPenColor;
    COLORREF textFillColor;
    UINT textViewState;
    UINT textZOrder;
    POINT textAnchorPoint;
    LOGFONT textFont;
    UINT numberOfLines;
    VARIABLE_STRING textString;
} TEXTPDU_ATTRIB;
```

**attributesFlag:** The bitmap of flags that describe the changes of an edit operation.

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
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	X	N	A	Z	V	F	P

Where the bits are defined as:

Value	Description
X ChangedText	The text has changed.
N ChangedFont	The font has changed.
A	The position of the text has changed.

Value	Description
ChangedAnchorPoint	
Z ChangedZOrder	The Z-order has changed.
V ChangedViewState	The view state has changed.
F ChangedFillColor	The fill color has changed.
P ChangedPenColor	The pen color has changed.

The bits that are marked 0 MUST be zero.

**textPenColor:** A **COLORREF** structure that describes the color of the text.

**textFillColor:** Reserved. MUST be set to 0 and ignored.

**textViewState:** If set to 0x0000, the text is not selected. Otherwise, the text is selected.

**textZOrder:** The Z-order value of the text.

**textAnchorPoint:** A **POINT** structure that describes the position of the text.

**textFont:** A **LOGFONT** structure that describes the text font.

**numberOfLines:** The number of lines that are spanned by the text.

**textString:** A [VARIABLE STRING](#) structure that contains the text to change.

One or more **attributesFlag** values in the **TEXT\_PDU\_ATTRIB** field can be set that correspond to the **textPenColor**, **textFillColor**, **textViewState**, **textZOrder**, **textAnchorPoint**, **textFont**, **numberOfLines**, or **textString** fields. A field only contains valid data if its attribute flag is set.

### 2.3.6.3 TEXT\_PDU\_HEADER

The **TEXT\_PDU\_HEADER** structure describes what SHOULD be done with the text in an [MSTextPDU](#) structure.

```
typedef struct {
    UINT nonStandardPdu;
    UINT textHandle;
    UINT workspaceHandle;
} TEXT_PDU_HEADER;
```

**nonStandardPdu:** MUST be one of the following values.

Value	Meaning
textCreatePDU_chosen	The text SHOULD be added.

Value	Meaning
0x1E (decimal: 30)	
textDeletePDU_chosen 0x1F (decimal: 31)	The text SHOULD be deleted.
textEditPDU_chosen 0x20 (decimal: 32)	The text SHOULD be changed.

**textHandle:** The device context of the text.

**workspaceHandle:** The device context of the window on which the text is drawn.

If the **nonStandardPdu** field in **TEXT\_PDU\_HEADER** is set to **textDeletePDU\_chosen** (31), the **attrib** field in **MSTextPDU** is not present.

#### 2.3.6.4 VARIABLE\_STRING

The **VARIABLE\_STRING** structure contains a string.

```
typedef struct {
    VARIABLE_STRING_HEADER header;
    CHAR string[];
} VARIABLE_STRING;
```

**header:** A [VARIABLE\\_STRING\\_HEADER](#) that describes the **VARIABLE\_STRING** structure.

**string:** An array of ASCII characters.

#### 2.3.6.5 VARIABLE\_STRING\_HEADER

The **VARIABLE\_STRING\_HEADER** structure describes a [VARIABLE\\_STRING](#) structure.

```
typedef struct {
    ULONG len;
    TSHR_POINT16 start;
} VARIABLE_STRING_HEADER;
```

**len:** The length, in bytes, of the [VARIABLE\\_STRING](#) structure, including this **VARIABLE\_STRING\_HEADER** structure.

**start:** A [TSHR\\_POINT16](#) structure that describes the column (in the X field) and the line (in the Y variable) at which the string SHOULD be placed.

## 3 Protocol Details

The following sections specify details of the Microsoft NetMeeting Protocol, including abstract data models and message processing rules.

### 3.1 Peer-to-Peer Protocol Details

#### 3.1.1 Abstract Data Model

There are no changes in the Microsoft NetMeeting Protocol from the abstract data model that is defined in [\[T120\]](#).

#### 3.1.2 Timers

No timers are specified in the [\[T120\]](#) protocol. Microsoft NetMeeting Protocol implementations MAY use a connection time-out mechanism. [<16>](#)

#### 3.1.3 Initialization

There are no changes in initialization procedure from those that are defined in [\[T120\]](#).

#### 3.1.4 Higher-Layer Triggered Events

There are no trigger events in the Microsoft NetMeeting Protocol.

#### 3.1.5 Message Processing Events and Sequencing Rules

##### 3.1.5.1 S20 Protocol MCS Channel

Share v2.0 (S20) is the protocol that is used by Microsoft NetMeeting. It is functionally similar to T.120 but is an earlier legacy protocol.

The S20 protocol MCS channel provides session management for application-sharing between nodes in a share session. The S20 protocol provides the session establishment for application-sharing, and Multipoint Communication Service (MCS) provides the broadcast transport for the S20 protocol.

The S20 protocol functions on the **distributed model**: one node (the creator node) creates the share session and other nodes join the share session. Each node builds its own **share roster** and keeps the roster locally. Each roster is built from received [S20 RESPOND](#) packets. After a node joins the share session, it can also share its local application with the other nodes in the share session.

The S20 protocol is used on each node in a session share to learn all the names and capabilities of nodes that participate in the share session. Nodes that request application-sharing send control and data packets via the S20 protocol. The S20 protocol sends the received control and data packets to MCS. The S20 protocol also retrieves application-sharing control and data packets from MCS, and forwards application and control data packets from MCS.

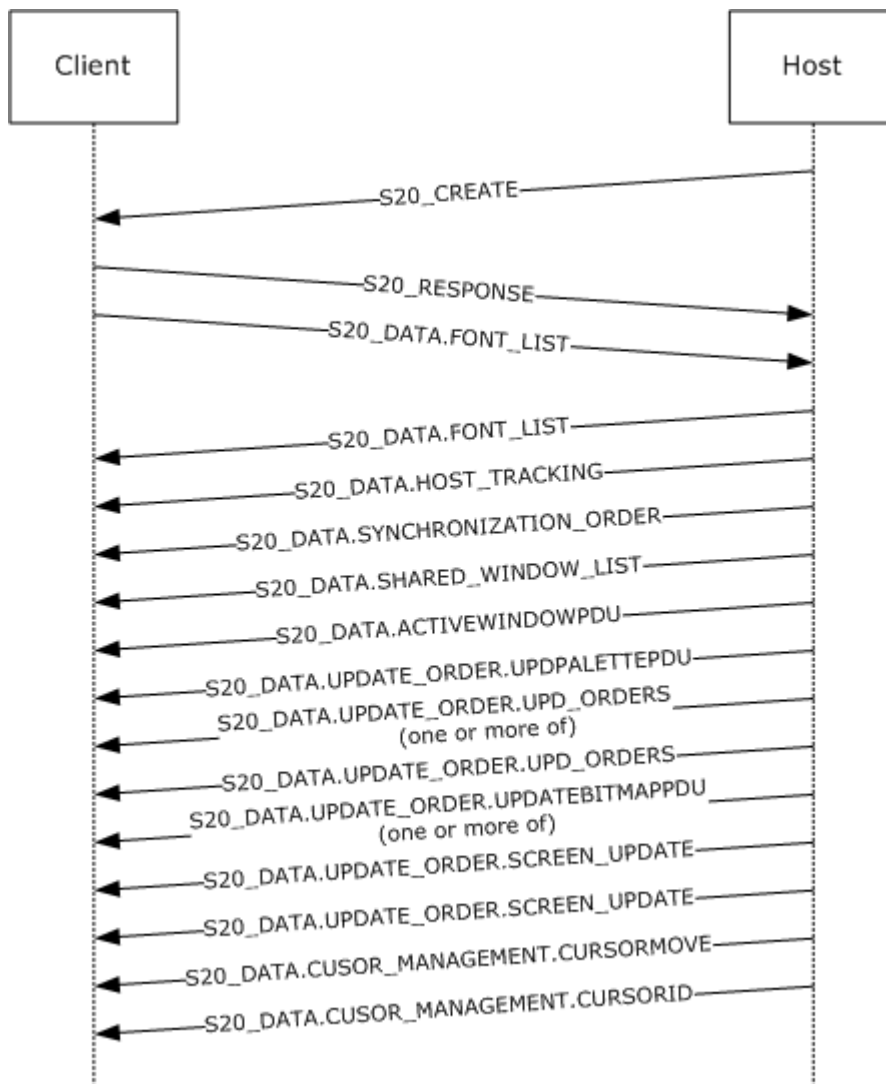
For interoperability, the S20 protocol MCS channel is designed to allow rudimentary communication with legacy application-sharing clients. The preferred procedure for establishing a new T.128 application-sharing session is to use the advancements that are available through T.124 generic conference control (GCC) services, rather than the legacy S20 protocol.

The following table lists the S20 protocol session establishment control packets.

Packet name	Packet type	Description of packet function
<a href="#">S20_CREATE</a>	Control packet	Creates a new application-sharing session.
<a href="#">S20_JOIN</a>	Control packet	Joins an existing share session.
<a href="#">S20_RESPOND</a>	Control packet	Responds to S20_CREATE, S20_JOIN, or S20_RESPOND.
<a href="#">S20_DELETE</a>	Control packet	Removes a node from a share session.
<a href="#">S20_LEAVE</a>	Control packet	Used by a node to leave a share session.
<a href="#">S20_END</a>	Control packet	Used by a share creator node to end a share session.
<a href="#">S20_DATA</a>	Data packet	Used by any node as a general transport packet (part of the S20 data packet payload).
<a href="#">S20_COLLISION</a>	Control packet	Used to inform another node that is attempting to create a share that it is already created.

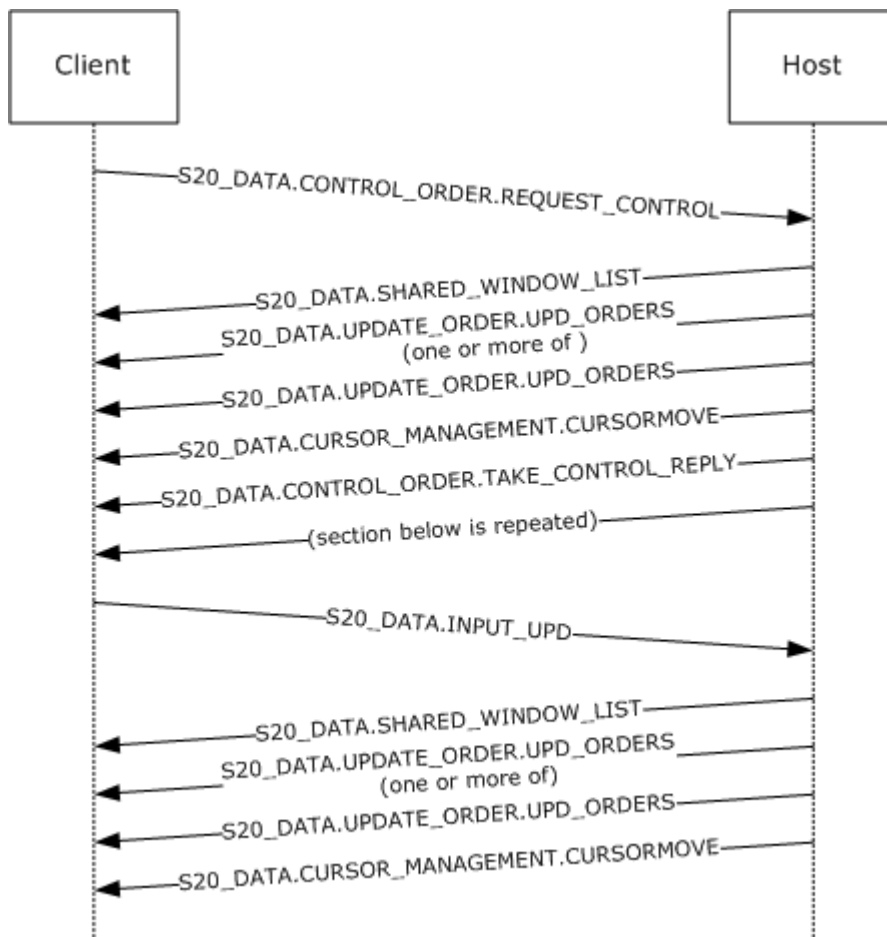
#### 3.1.5.1.1 Sequencing

A typical sequence for a client that joins a session is as follows:



**Figure 2: Sequencing as a client joins a session**

A typical sequence for a client that takes control of a session is as follows:



**Figure 3: Sequencing as a client takes control of a session**

The following table shows the detailed descriptions of the layer packet.

Packet name	Description
<a href="#">S20_CREATE</a>	Creates a new application-sharing session.
<a href="#">S20_JOIN</a>	Joins an existing application-sharing session.
<a href="#">S20_RESPOND</a>	Responds to an S20_CREATE or S20_JOIN message.
<a href="#">S20_DELETE</a>	Removes a client from an application-sharing session.
<a href="#">S20_LEAVE</a>	Ends the participation of the sending client in an application-sharing session.
<a href="#">S20_END</a>	Ends an application-sharing session.
<a href="#">S20_COLLISION</a>	Indicates that a share already exists with the referenced correlator.
<a href="#">S20_DATA</a>	Sends data to an application-sharing session.



### 3.1.5.1.2 Interaction between S20 Protocol and MCS

Interactions between the MCS and S20 protocol for starting a share session can be summarized as follows:

- S20 attaches itself through the MCS\_ATTACH\_USER function to the MCS session and waits for the MCS\_ATTACH\_CONFIRM event.
- When the S20 protocol node receives the MCS\_ATTACH\_CONFIRM event, it joins its local channel and the S20 protocol node broadcast channel through the MCS\_CHANNEL\_JOIN function.
- After the S20 protocol node receives both MCS\_CHANNEL\_JOIN\_CONFIRM events, one for its local channel and the other for the S20 protocol broadcast channel, it starts the S20 protocol state machine.

Interactions between MCS and the S20 protocol for leaving (ending) a share session can be summarized as follows:

- The S20 protocol node leaves (in the case of a non-creator node) or ends (in the case of the creator node) the share session.
- The S20 protocol node leaves its local channel and the S20 protocol broadcast channel through MCS\_CHANNEL\_LEAVE.
- The S20 protocol node detaches itself through MCS\_DETACH\_USER from the MCS session.

Multipoint Communication Service (MCS) provides the broadcast transport services for the Share v2.0 (S20) protocol.

### 3.1.5.1.3 MCS Broadcast Transport Service Functions for S20 Protocol

Nodes use the following MCS functions for the broadcast transport service for the S20 protocol.

**Note** A "node" in S20 protocol usage is a "user" in MCS. Also, the "MCS Top Provider" is the creator node of an MCS session. The MCS session-creator node can be different from an S20 share-creator node. The MCS session-creator node creates the MCS session. The S20 share-creator node creates the application-sharing session.

Function	Description
MCS_ATTACH_USER	Attaches the node to the MCS session. The S20 protocol node MUST use this function to attach the node to the session before it can create a share session.
MCS_DETACH_USER	Detaches the node from the MCS session. The S20 protocol node MUST use this function to detach itself from the session. This SHOULD happen after a node leaves or ends an application-sharing session.
MCS_SEND_DATA	Sends data to another node or all the nodes in the MCS session. The S20 protocol node uses this function to send all S20 protocol control and data packets.
MCS_CHANNEL_JOIN	Joins a channel in the MCS session. In MCS, every node (user) is associated with a channel automatically. In order for this node to receive data, the node MUST join its local channel. A node in the S20 protocol needs to join its local channel and the S20 protocol node broadcast channel before it can send any S20 protocol control and data packets.
MCS_CHANNEL_LEAVE	Leaves a channel in the MCS session. A node in the S20 protocol needs to leave its local channel and the S20 protocol node broadcast channel after leaving or ending

Function	Description
LEAVE	the application-sharing session.

### 3.1.5.1.3.1 MCS Broadcast Transport Service Events for the S20 Protocol

According to network activities (such as incoming data, new user attach, user detach, and time-out), MCS sends the following events (notifications) to the S20 protocol nodes:

Event (notification)	Description
MCS_ATTACH_CONFIRM	A node receives an MCS_ATTACH_CONFIRM event after it successfully attaches itself to the MCS session. The S20 protocol node <b>MUST</b> attach itself to the MCS session and wait for this confirmation before it can join its local and S20 protocol broadcast channels.
MCS_DETACH_INDICATION	<p>A node can be detached voluntarily or involuntarily. A node can detach itself voluntarily from the session by using MCS_DETACH_USER. A node can be detached involuntarily from the session if the MCS top provider deletes this node or its parent node, or if the TCP connection to this node or its parent node times out or shuts down unexpectedly. In general, this MCS_DETACH_INDICATION event means one of the following three possibilities:</p> <ul style="list-style-type: none"> <li>▪ This node has been forced out. This is the case when the user ID in the event is equal to this node's user ID.</li> <li>▪ A remote node has detached. This is the case when the event has a single user ID that is not equal to this node's user ID.</li> <li>▪ A set of remote nodes has been detached. This is the case when the event contains a set of user IDs and none of them is equal to this node's user ID.</li> </ul>
MCS_CHANNEL_JOIN_CONFIRM	<p>A node receives this MCS_CHANNEL_JOIN_CONFIRM event after it successfully joins a channel. The S20 protocol receives two such events:</p> <ul style="list-style-type: none"> <li>▪ Joining its local channel.</li> </ul> <p><b>Note</b> Joining the local channel is required by MCS. Every node is required to join its local channel in order to receive data that is sent to this node.</p> <ul style="list-style-type: none"> <li>▪ Joining the S20 protocol broadcast channel.</li> </ul>
MCS_CHANNEL_LEAVE_INDICATION	A node receives this MCS_CHANNEL_LEAVE_INDICATION event when it voluntarily leaves this channel through the MCS_CHANNEL_LEAVE function, or it is forced to leave this channel. In the S20 protocol, a node can be forced to leave the S20 protocol broadcast channel by the application-sharing creator; in which case, this node <b>SHOULD</b> detach itself from MCS and terminate the share session locally.

Event (notification)	Description
MCS_SEND_INDICATION	A node receives an S20 protocol packet from another node in the session. It can be any one of the S20 protocol packets. The S20 protocol packet is in the payload of the MCS data packet.

### 3.1.5.1.3.1.1 MCS Handling of Network Transmission, Time-outs, and Retransmissions

All the network transmission time-outs and retransmissions are specified within MCS. If a time-out causes the TCP connection to shut down, a user-detach indication with the lost nodes' user IDs MUST be broadcast by MCS. The S20 protocol on live nodes SHOULD receive this user-detach indication and remove the lost nodes from the live nodes' share rosters. For the lost nodes themselves, their local MCS providers MUST send a user-detach indication locally to the S20 protocol node. Then the S20 protocol node in the lost nodes MUST terminate the share session locally.

The interaction between MCS and the S20 protocol for a node that leaves normally or abnormally (for example, due to TCP time-out) can be summarized in the following steps. For the S20 protocol, it cannot tell whether a node leaves normally or abnormally. All S20 protocol nodes receive a MCS\_DETACH\_INDICATION event from MCS.

- After receiving a user-detach MCS\_DETACH\_INDICATION event that has a set of user IDs, the S20 protocol node MUST check to see if the set contains the nodes's user ID.
- If the node's user ID is in the set, this node is forced out, and the S20 protocol MUST terminate the share session locally.
- If the node's user ID is not in the set, the S20 protocol removes the node (with matching user ID in the set) from the share roster locally. The MCS session MUST remove the node with matching user ID.

A node can be deleted by the MCS top provider. This happens when a node receives a user-detach MCS\_DETACH\_INDICATION event. In this case, the S20 protocol node MUST destroy the share locally. A node can also be forced out by the share creator. This happens when a node receives an MCS\_CHANNEL\_LEAVE\_INDICATION event, but this node did not leave the channel voluntarily through the MCS\_CHANNEL\_LEAVE function. In this case, the S20 protocol node MUST destroy the share locally and detach itself through the MCS\_DETACH\_USER function from the MCS session.

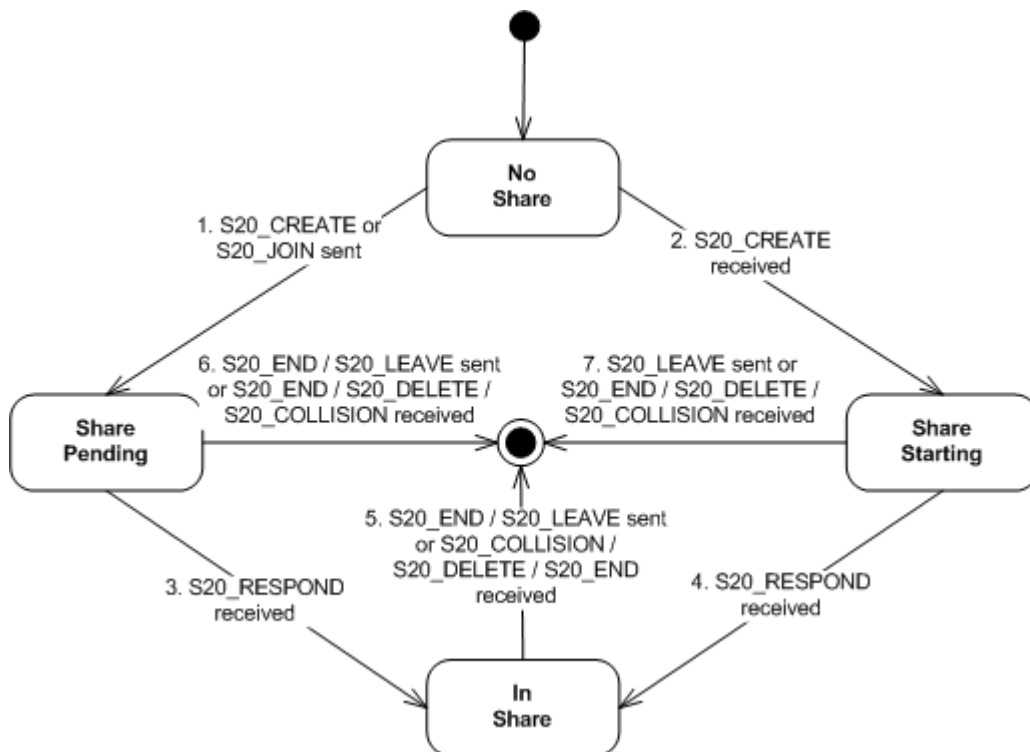
### 3.1.5.2 State Machine Control State Transitions

The state machine for the S20 protocol has seven transitions between the four control states. The following table and diagram illustrate these seven transitions.

Control state transition	Description
1	The session creator node sends an <a href="#">S20_CREATE</a> packet, or a new node sends an <a href="#">S20_JOIN</a> packet.
2	A node receives an S20_CREATE packet from the creator node.
3	A node receives an <a href="#">S20_RESPOND</a> packet from another node.
4	A node receives an S20_RESPOND packet from another node.
5	The creator node sends an <a href="#">S20_END</a> packet or receives an <a href="#">S20_COLLISION</a> packet. This

Control state transition	Description
	transition also occurs when a non-creator node sends an <a href="#">S20_LEAVE</a> packet or receives either an S20_END packet, an <a href="#">S20_DELETE</a> packet, or an S20_COLLISION packet.
6	The creator node sends an S20_END packet or receives an S20_COLLISION packet. This transition also occurs when a non-creator node sends an S20_LEAVE packet or receives either an S20_END packet, an S20_DELETE packet, or an S20_COLLISION packet.
7	A node sends an S20_LEAVE packet or receives either an S20_END packet, S20_DELETE packet, or an S20_COLLISION packet.

The following diagram illustrates the control flow of these seven transitions. Note that any requests sent out of order (for example, S20\_JOIN while in the Share State) are ignored and discarded.



**Figure 4: S20 protocol control state transitions**

### 3.1.5.3 NetMeeting Object Manager Late Joiner Protocol

The NetMeeting Object Manager implements the late joiner protocol to bring a late-joining instance up to date with the current contents of the workset group. When a NetMeeting client registers with a workset group that exists in a domain, the client is treated as a late joiner for the workset group.

The late joiner instance sends a message to the domain to announce its arrival, and receives one or more replies from the current domain instances. Next, the late joiner instance selects one of the replying instances as its helper. The helper instance polls the other domain instances, assembles a current copy of the workset, and sends it to the late joiner.

The late joiner Object Manager instance:

1. Locks the Object Manager Workset group, ensuring that all other Object Manager instances in the domain keep their local workset group copies.
2. Examines the Object Manager Workset group and determines the workset group MCS channel ID and the MCS user ID of an instance from which to request a workset group copy.
3. Requests to join the workset group channel by broadcasting the [OMNET\\_HELLO](#) message and waiting for replies.
4. Waits for one or more current instances to respond with an [OMNET\\_WELCOME](#) message.
5. Selects one of the responding instances as its helper, and sends a high priority [OMNET\\_WSGROUP\\_SEND\\_REQ](#) message to the helper on its user ID channel.
6. Unlocks the Object Manager workset group by broadcasting an [OMNET\\_UNLOCK](#) message at low priority on the Object Manager control channel.

The helper Object Manager instance:

1. Receives the OMNET\_WSGROUP\_SEND\_REQ message.
2. Marks its copy of the workset group as non-discardable.
3. Examines the workset and determines the MCS user IDs of the Object Manager instances which already have copies of the workset group.
4. For each workset in the workset group, sends one [OMNET\\_WORKSET\\_NEW](#) message to the late joiner on its single node channel.
5. For each object in each workset within the workset group, sends one [OMNET\\_OBJECT\\_ADD](#) message to the late joiner on its single node channel.
6. Sends an [OMNET\\_WSGROUP\\_SEND\\_COMPLETE](#) message to advise the late joiner that it has caught up with the state of the workset group as of the initial join time.

### 3.1.5.4 NetMeeting Object Manager Sequence Stamps

Operation Sequencing and Resequencing

The NetMeeting Object Manager protocol specifies one or more **sequence stamps**, which are used to re-order packets that arrive in varying orders at different nodes. Before being broadcast, each operation packet is assigned a sequence stamp that consists of an ordered pair of a **workset generation number** and a **node id**. After receiving an operation packet, an Object Manager instance compares the packet stamp to one or more stamps that are maintained locally. Depending on the comparison results, an Object Manager instance executes or ignores the requested operation.

#### Sequence Stamps

The **workset generation number** is an unsigned integer that begins at zero when the workset is created; increments whenever the Object Manager performs a local operation; and accepts the greater of the existing local value or of the workset generation number that is contained in the network operation sequence stamp whenever a network operation arrives.

The **node id** is the domain-unique integer user ID that is allocated by the MCS subsystem to the Object Manager instance.

## Sequence Stamp Types

Object Manager implements the following sequence stamps:

One **clear stamp** per workset, representing the last relative time that the workset was cleared; initialized to <0.ID>, where ID is the ID of the node that created the workset.

Four sequence stamps per object:

The **addition stamp**, representing the relative time that the object was added to the workset.

The **position stamp**, representing the relative time that the object was last moved within the workset.

The **update stamp**, representing the relative time that the object was last updated.

The **replace stamp**, representing the relative time that the object was last replaced.

The position-, update-, and replace- stamps are initialized with the addition stamp value.

## Sequence Stamp Relative Order

The relative order of sequence stamps is defined as follows, where **stamp\_X** = **workset\_generation\_number\_X.node\_id\_X**:

If **workset\_generation\_number\_1** < **workset\_generation\_number\_2**, then **stamp\_1** < ("is lower than") **stamp\_2**;

Else if **workset\_generation\_number\_1** = **workset\_generation\_number\_2**, then:

If **node\_id\_1** < **node\_id\_2**, then **stamp\_1** < **stamp\_2**;

Else **stamp\_2** < **stamp\_1**;

Else **stamp\_2** < **stamp\_1**.

### 3.1.6 Timer Events

None.

### 3.1.7 Other Local Events

None.

## 4 Protocol Examples

The following section describes several operations as used in common scenarios to illustrate the function of the Microsoft NetMeeting Protocol.

### 4.1 Sample Session Establishment Packet Flows

The following sections provide examples that illustrate control packet flow for S20 session establishment:

- Example one: Creating a new application-sharing session with multiple nodes in section [4.1.1](#).
- Example two: Joining an existing application-sharing session in section [4.1.2](#).
- Example three: Leaving an application-sharing session in section [4.1.3](#).
- Example four: Deleting a node from an application-sharing session in section [4.1.4](#).
- Example five: Ending an application-sharing session (node creator action) in section [4.1.5](#).

#### 4.1.1 Creating a New Application-Sharing Session with Multiple Nodes

This application-sharing session is between four nodes. One node (node A) shares an application and starts a new application-sharing session. Node B, node C, and node D are participants. The following list describes the steps that are involved:

1. Node A creates a share session. Node A becomes the owner of the session.
2. Node A broadcasts an [S20\\_CREATE](#) packet to node B, node C, and node D. Node A is listed as the owner.
3. Node B, node C, and node D each receive the S20\_CREATE packet and broadcast an S20\_RESPOND packet to all nodes in the session. The [S20\\_RESPOND](#) packet contains the name and capabilities of the responding node.
4. Each node receives the S20\_RESPOND packets from the other nodes and adds each sender node to its local share roster.
5. Each receiving node broadcasts another S20\_RESPOND packet to indicate to the other nodes that it received their responses.
6. If one of the participating nodes already has a node in its share roster, it does not respond to the S20\_RESPOND packet but updates its share roster with only the name and capabilities of the sender node.

#### 4.1.2 Joining an Existing Application-Sharing Session

This application-sharing session is between five nodes. Node E is new and wants to join the application-sharing session with node A, node B, node C, and node D. The following list describes the steps that are involved:

1. Node E broadcasts an [S20\\_JOIN](#) packet that contains its name and capabilities, to the other nodes in the session that node E wants to join.

2. Node A, node B, node C, and node D receive the S20\_JOIN packet that is sent by node E. They in turn, broadcast an [S20\\_RESPOND](#) packet that contains their name and capabilities to all other nodes.
3. Node E receives all the S20\_RESPOND packets from all the other nodes and adds each sender to its local share roster.
4. Node E broadcasts an S20\_RESPOND packet that includes its name and capabilities to all the other nodes.
5. If one of the participating nodes already has a node in its share roster, it does not respond to the S20\_RESPOND packet, but updates its share roster with only the name and capabilities of the sender node.

#### 4.1.3 Leaving an Application-Sharing Session

This application-sharing session is between five nodes. Node-E wants to leave the application-sharing session. The following list describes the steps that are involved:

1. Node E broadcasts an [S20\\_LEAVE](#) packet to node A, node B, node C, and node D.
2. Node A, node B, node C, and node D all receive the S20\_LEAVE packet that is sent by node E. They delete node E from their local share rosters.

#### 4.1.4 Deleting a Node from an Application-Sharing Session

This application-sharing session is between four nodes. Node A, the application-sharing session creator, wants to delete node D from the application-sharing session. The following list describes the steps that are involved:

1. Node A broadcasts an [S20\\_DELETE](#) packet that contains the name of node D to all other nodes.
2. Node B, node C, and node D receive the S20\_DELETE packet. Node B and node C delete node D from their local share rosters. Node D destroys its local share roster and leaves the application-sharing session.

#### 4.1.5 Ending an Application-Sharing Session

This application-sharing session is between three nodes. Node A, the application-sharing session creator, wants to end the application-sharing session. The following list describes the steps that are involved:

1. Node A broadcasts an [S20\\_END](#) packet to all other nodes.
2. Node B and node C receive the S20\_END packet. All nodes delete their local share roster and leave the application-sharing session.



## 5 Security

The following sections specify security considerations for implementers of the Microsoft NetMeeting Protocol.

### 5.1 Security Considerations for Implementers

MCS and GCC packets are encoded and decoded by using ASN.1.

Transport Layer Security (TLS) is negotiated by following T.123, as specified in [\[T123\]](#) Annex B. In a secure mode, X.244 payloads are encrypted by using TLS, as specified in [\[X224\]](#). Additional TLS can also be used. [<17>](#)

### 5.2 Index of Security Parameters

There are no security parameters in this protocol.

## 6 Appendix A: Windows Behavior

The information in this specification is applicable to any version of Windows that includes NetMeeting, as follows:

- Windows 98 Second Edition
- Windows Me
- Windows 2000 Workstation and Windows 2000 Server
- Windows XP
- Windows Server 2003

Exceptions, if any, are noted below. Unless otherwise specified, any statement of optional behavior in this specification prescribed using the terms SHOULD or SHOULD NOT implies Windows behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term MAY implies that Windows does not follow the prescription.

[<1> Section 1.3:](#) The Microsoft implementation of the Microsoft NetMeeting Protocol exists in the Windows NetMeeting feature. This implementation is backwards-compatible with the ITU T.120 protocols, as specified in [\[T120\]](#) and the S20 protocols.

[<2> Section 2.3.1.4.5.1:](#) The NetMeeting application obtains various information about fonts used between application sharing from the following Windows GDI data structures:

- **TEXTMETRIC:** The TEXTMETRIC structure contains basic information about a physical font. All sizes are specified in logical units; that is, they depend on the current mapping mode of the display context.
- **GetTextMetrics:** The GetTextMetrics function fills the specified buffer with the metrics for the currently selected font.

[<3> Section 2.3.1.4.5.1:](#) The NetMeeting application obtains various information about fonts used between application sharing from the following Windows GDI data structures:

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[<5> Section 2.3.1.4.5.1:](#) The NetMeeting application obtains various information about fonts used between application sharing from the following Windows GDI data structures:

- **TEXTMETRIC:** The TEXTMETRIC structure contains basic information about a physical font. All sizes are specified in logical units; that is, they depend on the current mapping mode of the display context.
- **GetTextMetrics:** The GetTextMetrics function fills the specified buffer with the metrics for the currently selected font.

[<6> Section 2.3.1.4.5.1:](#) The NetMeeting application obtains various information about fonts used between application sharing from the following Windows GDI data structures:

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- **GetTextMetrics:** The GetTextMetrics function fills the specified buffer with the metrics for the currently selected font.

[<11> Section 2.3.1.4.7.1.1:](#) WM\_KEYUP Notification: The WM\_KEYUP message is posted to the window that has the keyboard focus when a nonsystem key is released. A nonsystem key is a key that is pressed when the ALT key is not pressed, or a keyboard key that is pressed when a window has the keyboard focus.

WM\_SYSKEYUP Notification: The WM\_SYSKEYUP message is posted to the window that has the keyboard focus when the user releases a key that was pressed while the ALT key was held down. It also occurs when no window currently has the keyboard focus; in this case, the WM\_SYSKEYUP message is sent to the active window. The window that receives the message can distinguish between these two contexts by checking the context code in the lParam parameter.

[<12> Section 2.3.1.4.10.1.9:](#) The NetMeeting application obtains various information about fonts that are used between application sharing from the following Windows GDI data structures:

- **TEXTMETRIC:** The TEXTMETRIC structure contains basic information about a physical font. All sizes are specified in logical units; that is, they depend on the current mapping mode of the display context.
- **GetTextMetrics:** The GetTextMetrics function fills the specified buffer with the metrics for the currently selected font.

[<13> Section 2.3.1.4.10.1.9:](#) The NetMeeting application obtains various information about fonts that are used between application sharing from the following Windows GDI data structures:

- **TEXTMETRIC:** The TEXTMETRIC structure contains basic information about a physical font. All sizes are specified in logical units; that is, they depend on the current mapping mode of the display context.
- **GetTextMetrics:** The GetTextMetrics function fills the specified buffer with the metrics for the currently selected font.

[<14> Section 2.3.1.4.10.1.29:](#) The NetMeeting application obtains various information about fonts that are used between application sharing from the following Windows GDI data structures:

- **TEXTMETRIC:** The TEXTMETRIC structure contains basic information about a physical font. All sizes are specified in logical units; that is, they depend on the current mapping mode of the display context.
- **GetTextMetrics:** The GetTextMetrics function fills the specified buffer with the metrics for the currently selected font.

[<15> Section 2.3.1.4.10.1.29:](#) The NetMeeting application obtains various information about fonts that are used between application sharing from the following Windows GDI data structures:

- **TEXTMETRIC:** The TEXTMETRIC structure contains basic information about a physical font. All sizes are specified in logical units; that is, they depend on the current mapping mode of the display context.
- **GetTextMetrics:** The GetTextMetrics function fills the specified buffer with the metrics for the currently selected font.

[<16> Section 3.1.2:](#) The NetMeeting implementation has a time-out mechanism for connection establishment, which is to wait 20 seconds for a callee to respond. If no response is returned, the implementation MUST declare a time-out and notify the user.

[<17> Section 5.1:](#) The Microsoft implementation uses Transport Layer Security as specified in [\[T123\]](#).

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