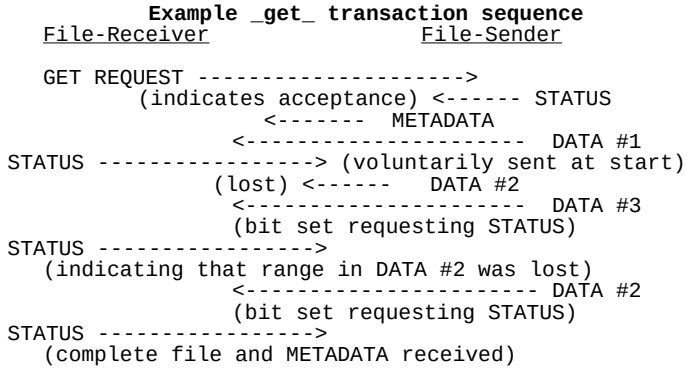
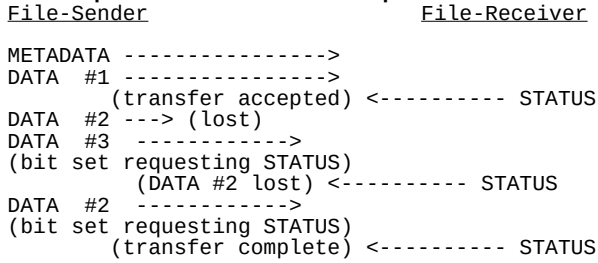
Example _get_ transaction sequence



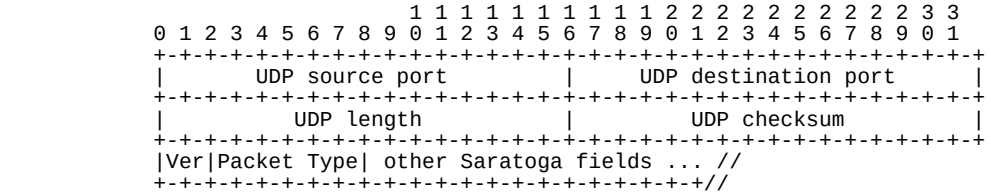
Example PUT transaction sequence



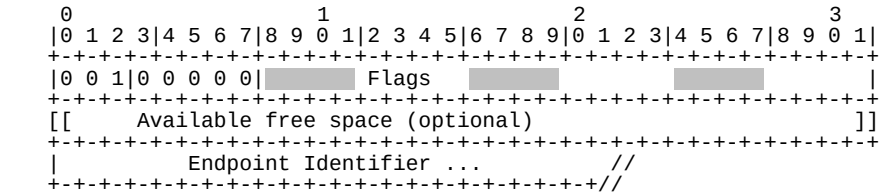
TRANSACTIONS:

#	Type	Use
0	BEACON	Beacon packet indicating peer status
1	REQUEST	Commands peer to start a transfer
2	METADATA	Carries file transfer metadata
3	DATA	Carries octets of file data
4	STATUS	Signals list of unreceived data to sender and errors between sender and receiver

SARATOGA UDP HEADER:



BEACON PACKET TYPE 0:



Flags:

Bit 8	Bit 9	Supported Field Sizes	Maximum File Size	Flags
0	0	16 bits	2^16 - 1 octets.	0x000000
0	1	16 or 32 bits	2^32 - 1 octets.	0x400000
1	0	16, 32, or 64 bits	2^64 - 1 octets.	0x800000
1	1	16, 32, 64, or 128 bits	2^128 - 1 octets.	0xC00000

Bit	Value	Meaning	
10	0	not able to pass bundles to a local bundle agent; handles files.	
10	1	can pass marked bundles to a local bundle agent.	0x200000

Bit	Value	Meaning	
11	0	not capable of supporting streaming.	
11	1	capable of supporting streaming.	0x100000

Bit 12	Bit 13	Capability and willingness to send files	
0	0	cannot send files at all.	0x000000
0	1	invalid.	0x040000
1	0	capable of sending, but not willing right now.	0x080000
1	1	capable of and willing to send files.	0x0C0000

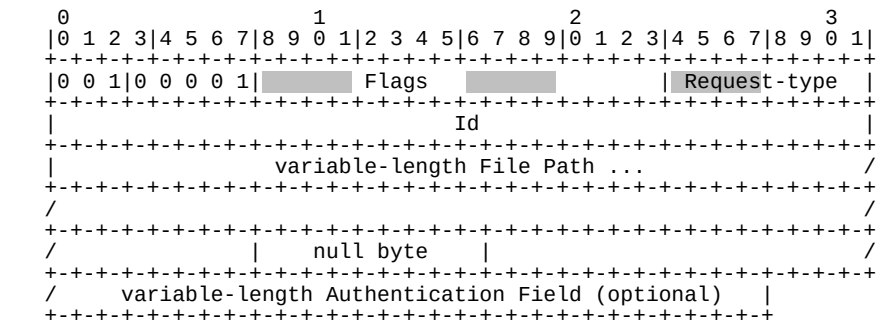
Bit 14	Bit 15	Capability and willingness to receive files	
0	0	cannot receive files at all.	0x000000
0	1	invalid.	0x010000
1	0	capable of receiving, but will reject METADATA.	0x020000
1	1	capable of and willing to receive files.	0x030000

Bit	Value	Meaning	
16	0	supports DATA transfers over UDP only.	
16	1	supports DATA transfers over both UDP and UDP-Lite.	0x008000

Bit	Value	Meaning	
17	0	available free space is not advertised in this BEACON.	
17	1	available free space is advertised in this BEACON.	0x004000

Bit 18	Bit 19	Size of free space field	
0	0	16 bits.	0x000000
0	1	32 bits.	0x001000
1	0	64 bits.	0x002000
1	1	128 bits.	0x003000

REQUEST PACKET TYPE 1: command to perform either a _get_, _getdir_, or _delete_ transaction.



Flags:

Bit 8	Bit 9	Supported Field Sizes	Maximum File Size	Flags
0	0	16 bits	2^16 - 1 octets.	0x000000
0	1	16 or 32 bits	2^32 - 1 octets.	0x400000
1	0	16, 32, or 64 bits	2^64 - 1 octets.	0x800000
1	1	16, 32, 64, or 128 bits	2^128 - 1 octets.	0xC00000

Bit	Value	Meaning
10	0	The requester cannot handle bundles locally.
10	1	The requester can handle bundles.
11	0	The requester cannot receive streams.
11	1	The requester is also able to receive streams.
16	0	The requester is able to receive DATA over UDP only.
16	1	The requester is also able to receive DATA over UDP-Lite.

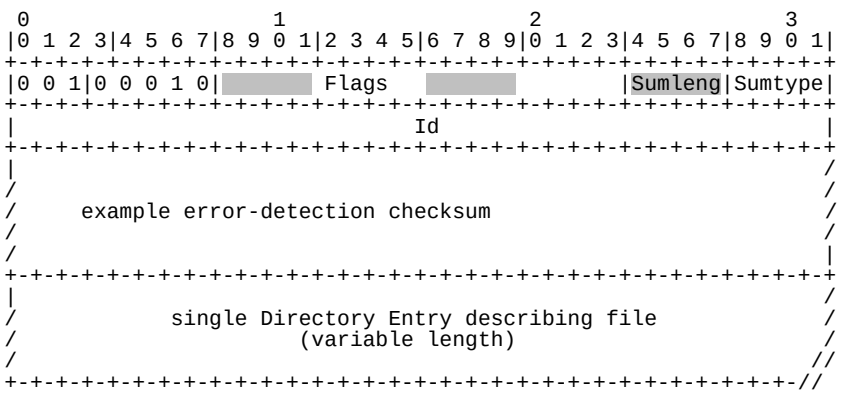
Transaction keys

Bit	Value	Key	Purpose
10	0	{bundles}	Not a bundle.
11	0	{streams}	Not a stream.
16	1	{UDPlite}	Receive DATA over UDP-Lite.

Request Type (bits 24-31)

Value		Command	Meaning
0	0000		No action is to be taken; similar to a BEACON.
1	0001	'get'	A _get_ transaction is requested. The File Path field holds the name of the file to be sent.
2	0010	'put'	A _put_ transaction is requested. The File Path field suggests the name of the file that will be delivered only after an OK STATUS is received from the file receiver.
3	0011	'take'	A _get_ transaction is requested and once received the original copy should be deleted. The File Path field holds the name of the file to be sent. (This get+delete is known as a 'take'.)
4	0100	'give'	A _put_ transaction is requested, and once sent successfully, the original copy will be deleted. The File Path field holds the name of the file to be sent.(This put+delete is known as a 'give'.)
5	0101	'delete'	A _delete_ transaction is requested, and the File Path field specifies the name of the file or directory to be deleted.
6	0110	'getdir'	A _getdir_ transaction is requested. The File Path field holds the name of the directory to be examined.

METADATA PACKET TYPE 2: command to either acknowledge a _get_, or _getdir_ REQUEST, or to initiate a _put_ transaction.



Bits 8 & 9, set the transfer descriptor size in the METADATA packet.

Bit 8	Bit 9	xfer desc Field Sizes	Maximum File Size	Flags
0	0	16 bits	2^16 - 1 octets.	0x000000
0	1	16 or 32 bits	2^32 - 1 octets.	0x400000
1	0	16, 32, or 64 bits	2^64 - 1 octets.	0x800000
1	1	16, 32, 64, or 128 bits	2^128 - 1 octets.	0xC00000

Bit 10	Bit 11	Type of transfer
0	0	a file is being sent.
0	1	the file being sent should be interpreted as a directory record.
1	0	a bundle is being sent.
1	1	an indefinite-length stream is being sent.

Only For Streams!

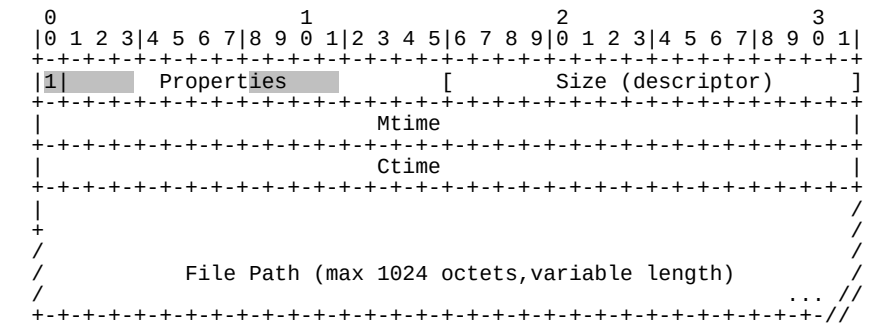
Bit	Value	Meaning
12	0	This transfer is in progress.
12	1	This transfer is no longer in progress, and has been terminated.

Bit 13	Use
0	This file's content MUST be delivered reliably without errors using UDP.
1	This file's content MAY be delivered unreliably, without errors, or partly unreliably, where errors are tolerated, using UDP-Lite.

Sumlength bits 24-27	Use
0	No checksum is provided.
1	32-bit field, e.g. CRC32.
4	128-bit field e.g. MD5.
5	160-bit field e.g. SHA-1.

Sumtype bits 28-31	Use
0	No checksum is provided.
1	32-bit CRC32 checksum, suitable for small files.
2	128-bit MD5 checksum, suitable for larger files
3	160-bit SHA-1 checksum, suitable for larger files but slower to process than MD5.

Directory Entry Format



field	description
Properties	if set, bit 7 of this field indicates that the entry corresponds to a directory. Bit 6, if set, indicates that the file is "special". A special file may not be directly transferable as it corresponds to a symbolic link, a named pipe, a device node, or some other "special" filesystem object. A file-sender may simply choose not to include these types of files in the results of a _getdir_ request. Bits 8 and 9 are flags that indicate the width of the following descriptor field that gives file size. Bit 10 indicates that the file is to be handled by Saratoga as a bundle, and passed to a bundle agent.
Size	the size of each file or directory in octets. This is a descriptor, varying as needed in each entry for the size of the file. For convenience in the figure, it is shown here as a 16-bit descriptor for a small file.
Mtime	a timestamp showing when the file or directory was modified.
Ctime	a timestamp of the last status change for this file or directory.
File Path	contains the file's name relative within the requested path of the _getdir_ a transaction, maximum of 1024-octet UTF-8 string, that is null-terminated to to indicate the beginning of the next directory entry in _getdir_ results

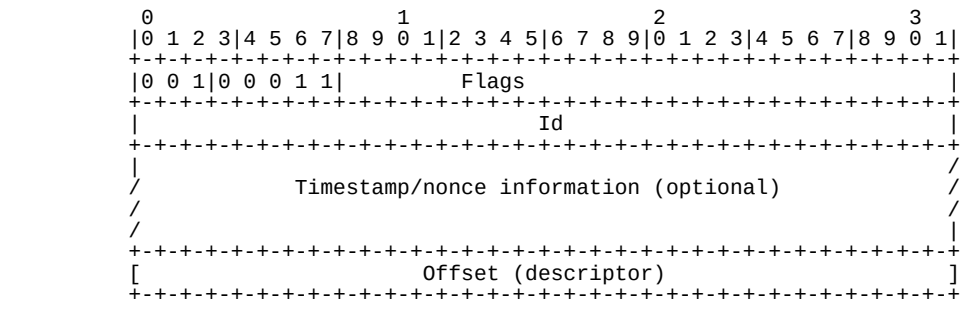
Bit 6	Bit 7	Properties conveyed
0	0	normal file.
0	1	normal directory.
1	0	special file.
1	1	special directory.

Bit 8	Bit 9	Properties conveyed
0	0	File size is indicated in a 16-bit descriptor.
0	1	File size is indicated in a 32-bit descriptor.
1	0	File size is indicated in a 64-bit descriptor.
1	1	File size is indicated in a 128-bit descriptor.

Bit 10	Properties conveyed
0	File really is a file.
1	File is to be treated as a bundle.

Bit 13	Use
0	This file's content MUST be delivered reliably without errors using UDP.
1	This file's content MAY be delivered unreliably, or partly unreliably, where errors are tolerated, using UDP-Lite.

DATA PACKET TYPE 3: The data transfer response to a _get_, _put_, or _getdir_ request.



Flags:

Bit 8	Bit 9	Supported Field Sizes	Maximum File Size	Flags
0	0	16 bits	2^16 - 1 octets.	0x000000
0	1	16 or 32 bits	2^32 - 1 octets.	0x400000
1	0	16, 32, or 64 bits	2^64 - 1 octets.	0x800000
1	1	16, 32, 64, or 128 bits	2^128 - 1 octets.	0xC00000

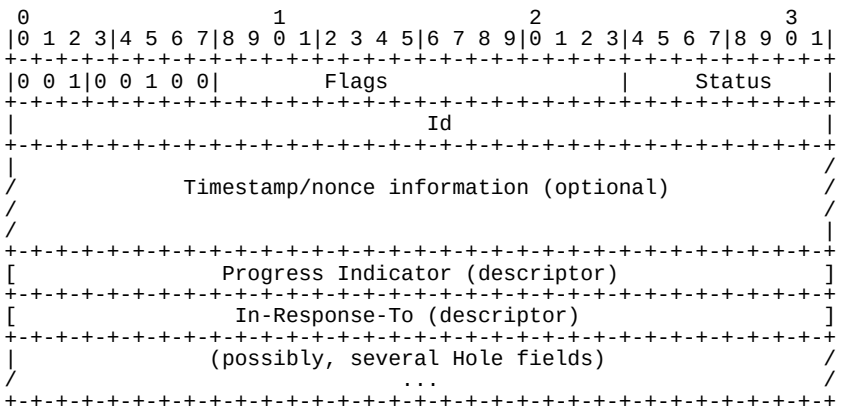
Bit 10	Bit 11	Type of transfer
0	0	a file is being sent.
0	1	the file being sent should be interpreted as a directory record.
1	0	a bundle is being sent.
1	1	an indefinite-length stream is being sent.

Bit	Value	Meaning
12	0	This packet does not include an optional timestamp/nonce field.
12	1	This packet includes an optional timestamp/nonce field.

Bit	Value	Meaning
15	0	No response is requested.
15	1	A HOLESTOFILL packet is requested.

Bit	Value	Meaning
16	0	Normal use.
16	1	The EOD End of Data flag is set.

STATUS PACKET TYPE 4:



Flags:

Bit 8	Bit 9	Set descriptor Sizes	Maximum File Size	Flags
0	0	16 bits	2^16 - 1 octets.	0x000000
0	1	16 or 32 bits	2^32 - 1 octets.	0x400000
1	0	16, 32, or 64 bits	2^64 - 1 octets.	0x800000
1	1	16, 32, 64, or 128 bits	2^128 - 1 octets.	0xC00000

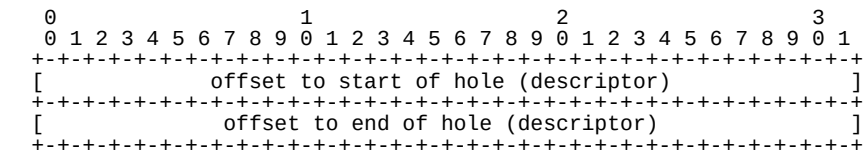
Bit	Value	Meaning
12	0	This packet does not include a timestamp field.
12	1	This packet includes an optional timestamp field.

Bit	Value	Meaning
13	0	file's METADATA has been received.
13	1	file's METADATA has not been received.

Bit	Value	Meaning
14	0	this packet contains the complete current set of holes at the file-receiver.
14	1	this packet contains incomplete hole-state; holes shown in this packet should supplement other incomplete hole-state known to the file-sender.

Bit	Value	Meaning
15	0	This STATUS was requested by the file-sender.
15	1	This STATUS is sent voluntarily.

Hole Definition Format



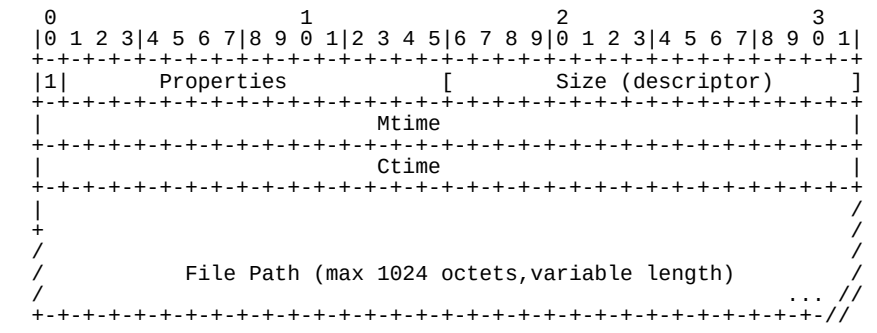
Error Code Status Value	End Action	Rcvd by*	Meaning
0x00	0	B	Success, No Errors.
0x01	1	R	Unspecified Error.
0x02	1	R	Unable to send file due to resource constraints.
0x03	1	S	Unable to receive file due to resource constraints.
0x04	1	R	File not found.
0x05	1	B	Access Denied.
0x06	1	B	Unknown Id field for transaction.
0x07	0	R	Did not delete file.
0x08	1	S	File length is longer than receiver can support.
0x09	1	S	File offset descriptors do not match expected use or file length.
0x0A	1	B	Unsupported Saratoga packet type received.
0x0B	1	R	Unsupported Request Type received.
0x0C	1	B	REQUEST is now terminated due to an internal timeout.
0x0D	1	S	DATA flag bits describing transfer have changed unexpectedly.
0x0E	1	S	Receiver is no longer interested in receiving this file.
0x0F	1	R	File is in use.
0x10	1	S	METADATA required before transfer can be accepted.
0x11	0	B	A STATUS error message has been received unexpectedly, so REQUEST is terminated.

* Rcvd by - indicates whether a Sender, Receiver or Both ('S', 'R' or 'B') will be the recipient of this status error.

Transaction completed packet:

1) Bit 14 set to '0', indicating complete list of holes.
2) Bit 15 set to '1', indicating voluntarily set packet.
3) 'In_Response_To' field set to last byte of file.
4) Hole pair list is empty.

Directory Entry Format



field	description
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Bit 6	Bit 7	Properties conveyed
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0	1	normal directory.
1	0	special file.
1	1	special directory.

Bit 8	Bit 9	Properties conveyed
0	0	File size is indicated in a 16-bit descriptor.
0	1	File size is indicated in a 32-bit descriptor.
1	0	File size is indicated in a 64-bit descriptor.
1	1	File size is indicated in a 128-bit descriptor.

Bit 10	Properties conveyed
0	File really is a file.
1	File is to be treated as a bundle.

Bit 13	Use
0	This file's content MUST be delivered reliably without errors using UDP.
1	This file's content MAY be delivered unreliably, or partly unreliably, where errors are tolerated, using UDP-Lite.