UDP File Transporter

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Outline

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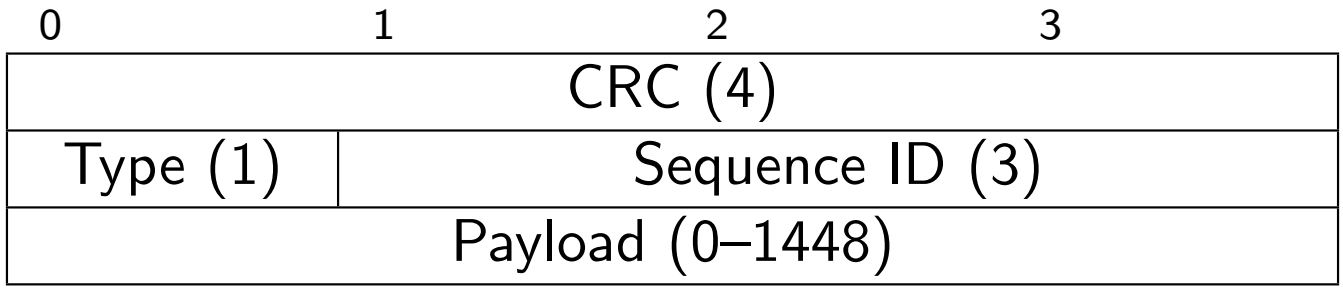
The Structure of the Datagram



CRC covers Type, Sequence ID, Payload

Type required operation and flags

Sequence ID identifies successive datagrams

Payload data required by operation

Mechanism for Downloading a File

- The client pulls data from the server.
- The client asks for each segment using one datagram.
- The server responds each datagram with required segment.

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Datagrams Used for Downloading a File

Client request for downloading a file

	Type	Payload	Flags
(a)	4	offset, filename	none

Server reply for downloading a file

	Type	Payload	Flags
(a)	4	contents	EOF (optional)
(b)	4	empty	Error

Mechanism for Uploading a File

- The client pushes data onto the server.
- The client places a segment into each datagram.
- The server acknowledges each datagram.

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Datagrams Used for Uploading a File

Client request for uploading a file

	Type	Payload	Flags
(a)	5	0 (32-bit), filename, contents	EOF (optional), Resume (optional)
(b)	5	upload id, offset, contents	EOF (optional)

Server reply for uploading a file

	Type	Payload	Flags
(a)	5	upload id, complete offset, capacity offset	none
(b)	5	empty	Error

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Timeout Calculation Using Round Trip Time Estimate

RTT and RTT deviation estimate:

$$\begin{aligned} \textit{RTT difference} &= \textit{actual RTT} - \textit{RTT estimate} \\ \textit{new RTT estimate} &= \textit{RTT estimate} + \tfrac{1}{8}\textit{RTT difference} \\ \textit{new RTT deviation} &= \tfrac{3}{4}\textit{RTT deviation} + \tfrac{1}{4}\left|\textit{RTT difference}\right| \end{aligned}$$

The timeout is then calculated to be:

$$\textit{Timeout} = \textit{RTT estimate} + 3\textit{RTT deviation}$$

How the Client Avoids Network Congestion

- The client is solely responsible for congestion avoidance.
- The window size is initially set to one datagram.
- Window grows when no datagrams are lost.
- Window size halved for every lost datagram.

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Summary

We have seen

- The datagram format.
- The protocol used for downloading and uploading files.
- The flow control mechanisms involved.