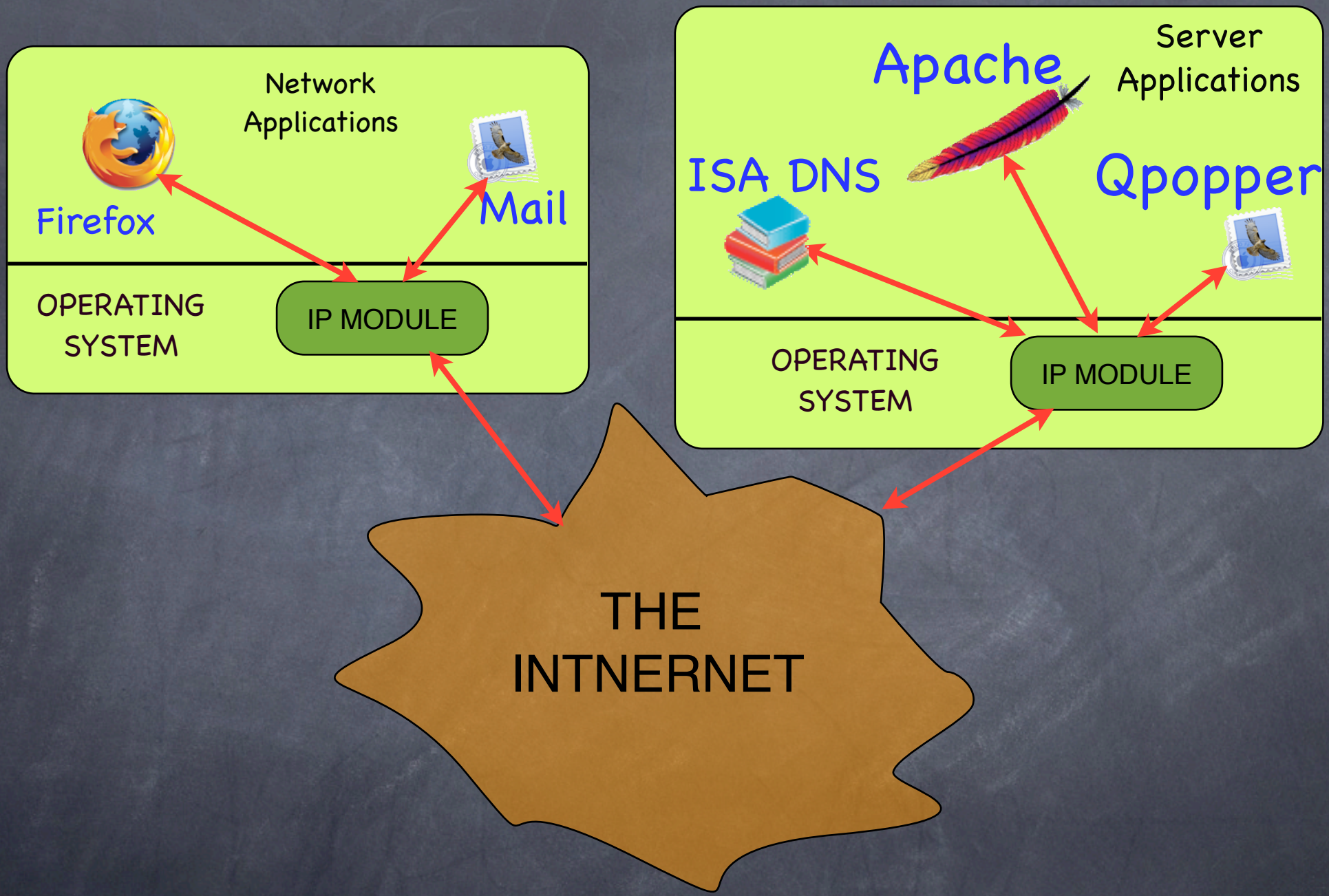
Announcements

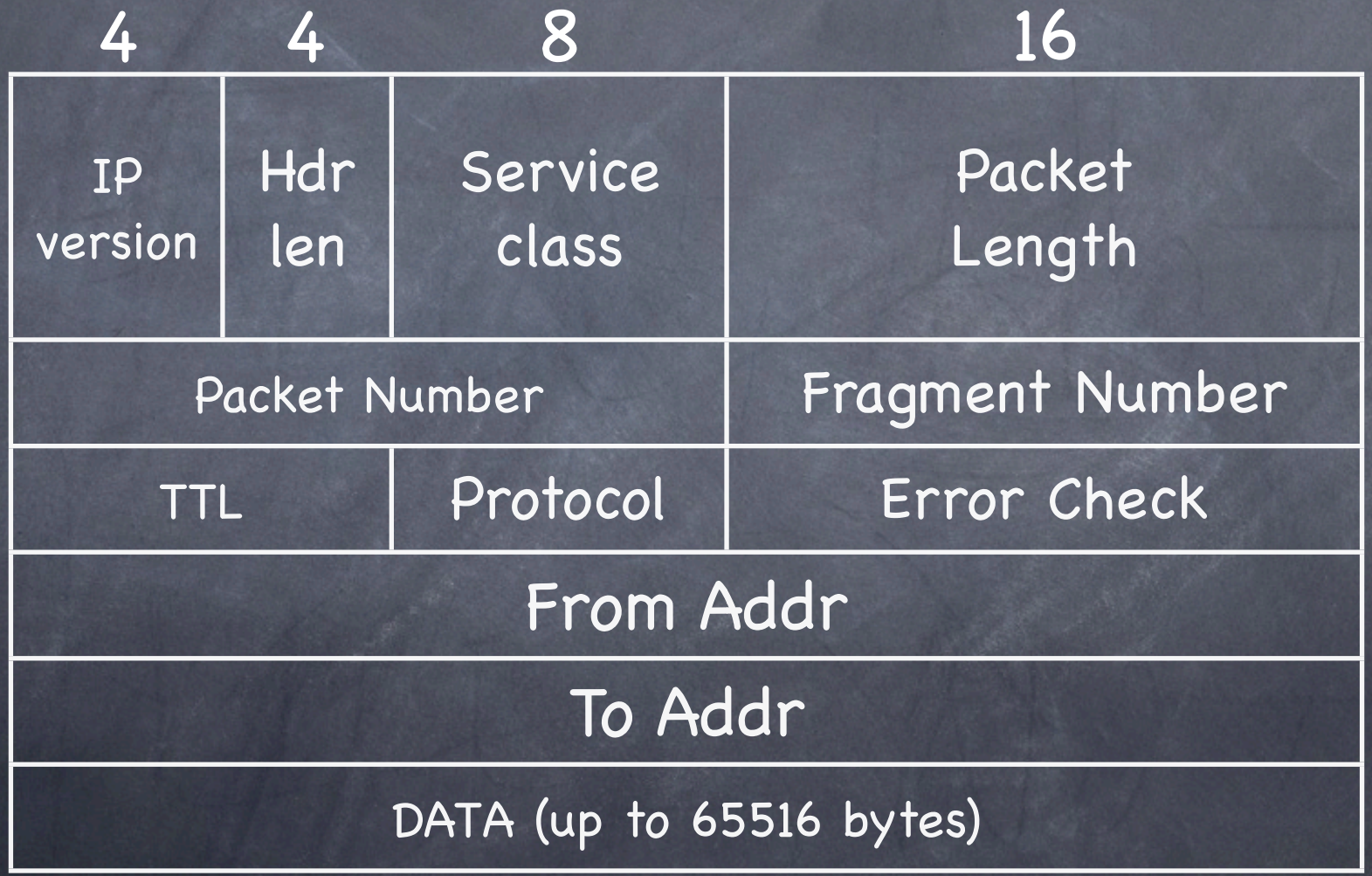
- Final project implementation plans due today
- All three lab periods will be open to all students for final project work
- Homework on Dijkstra's algorithm due Wednesday

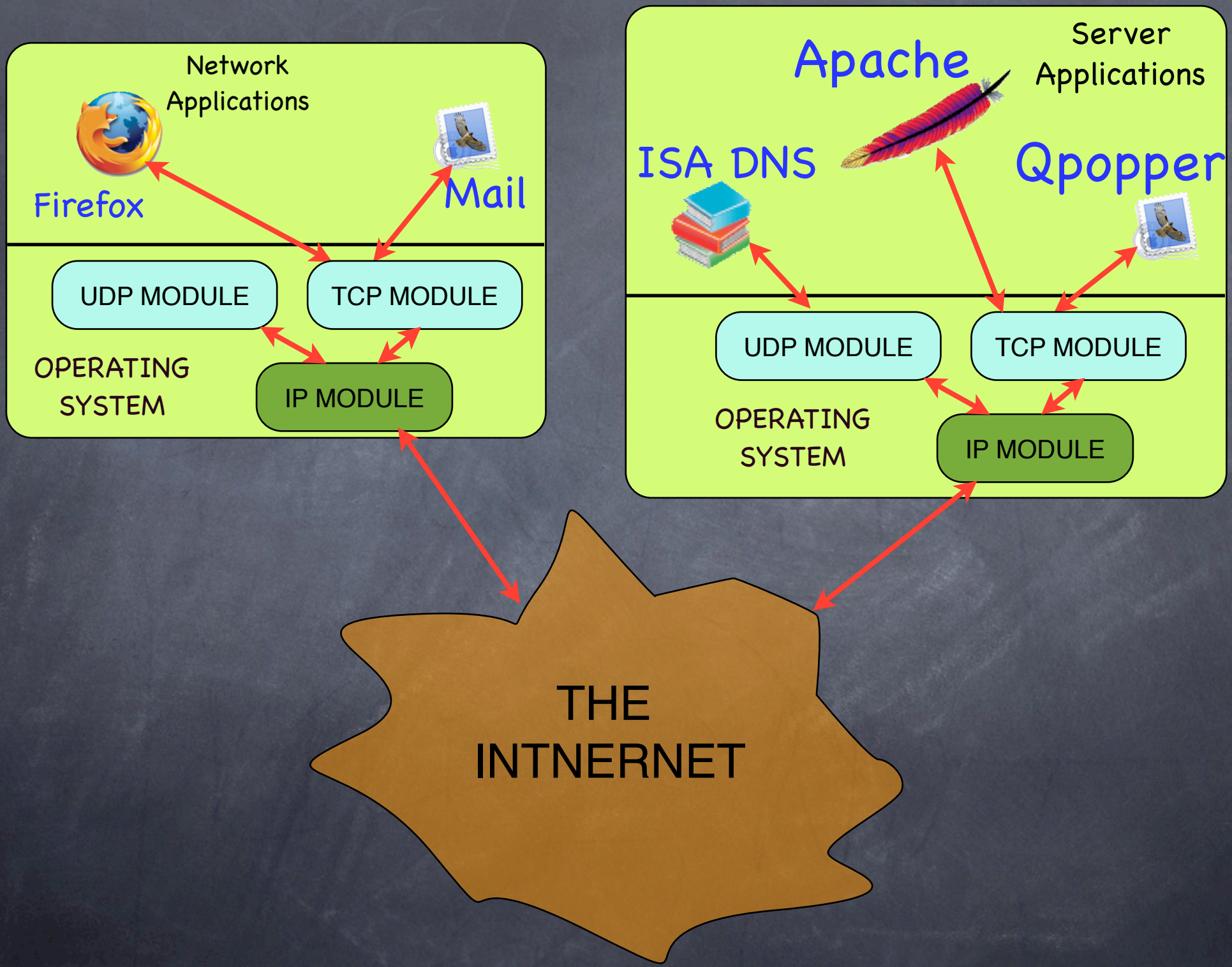
Today's Outline

- Transport layer protocols
- Ports
- UDP
- TCP
- Acknowledgements and Retransmission


Network
Applications
Firefox
Mail
OPERATING
SYSTEM
IP MODULE
Server
Applications
Apache
ISA DNS
Qpopper
OPERATING
SYSTEM
IP MODULE
THE
INTNERNET

IP Datagram Format




Network Applications
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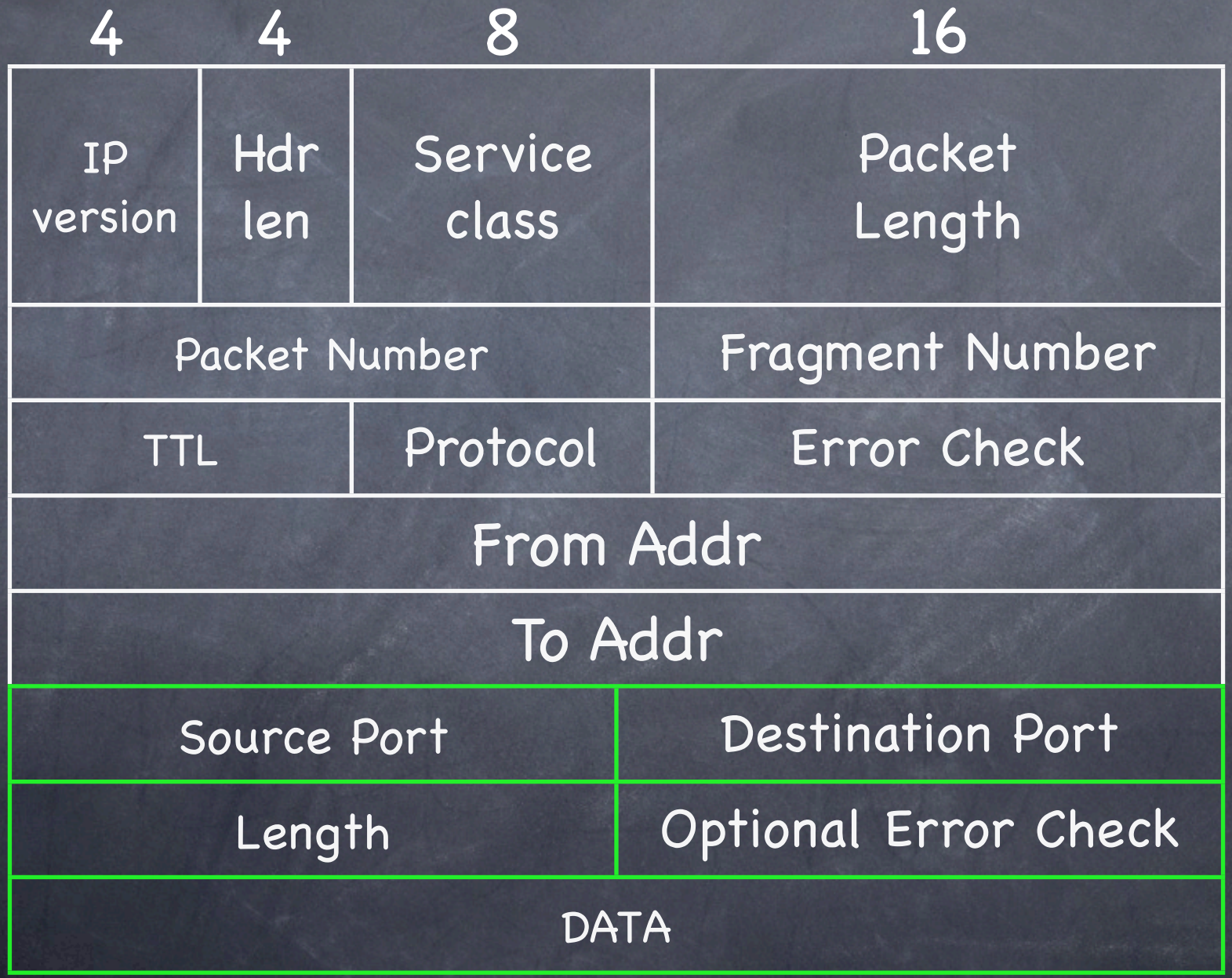
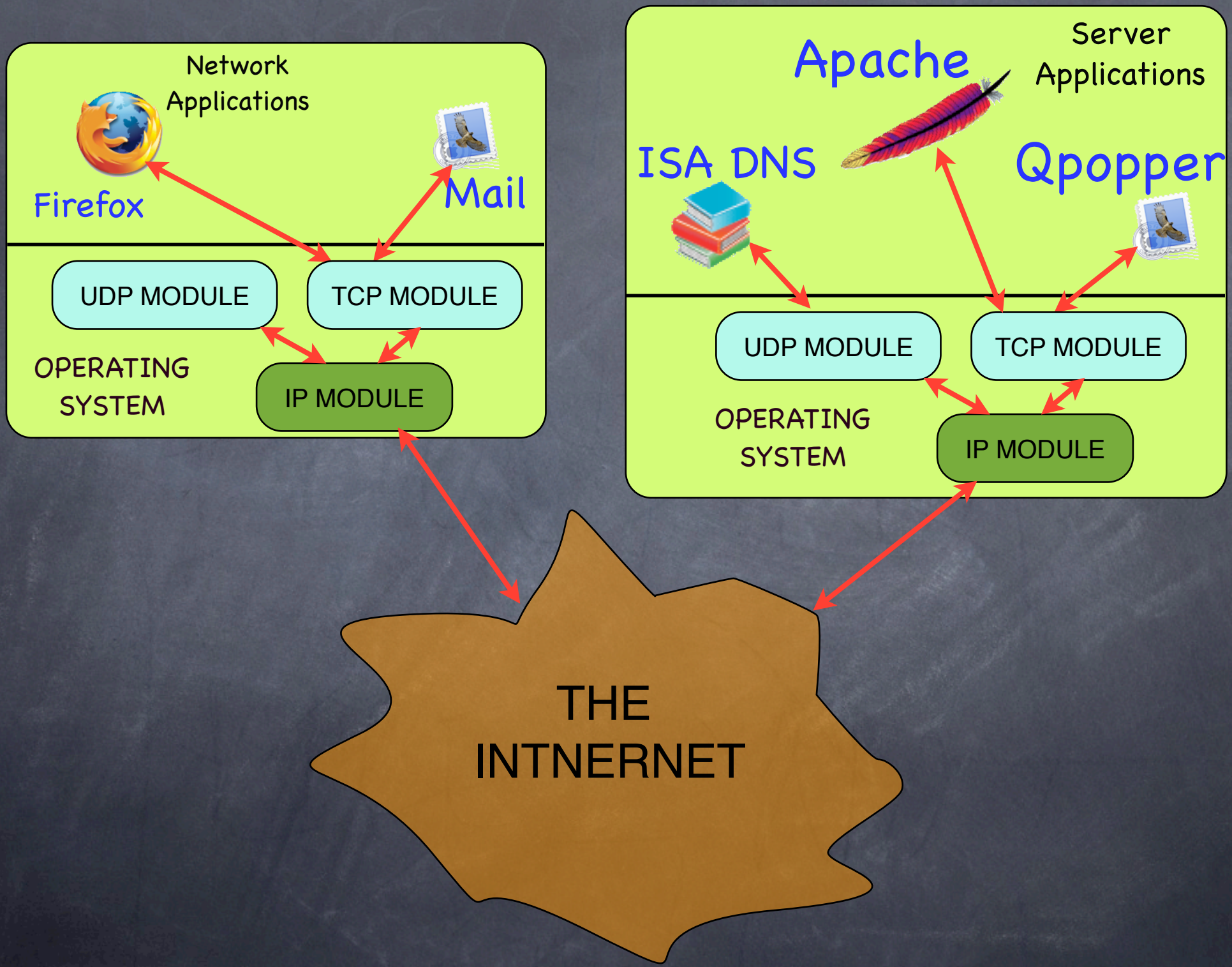
THE INTNERNET

UDP Packet Format

UDP packet inside IP packet

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THE INTNERNET

Top 4 reasons IP packets get lost: . . .

4: Cosmic Rays

3: Electrical Interference

2: Back Hoes

http://www.scourstop.com/images/photos/full/backhoe.jpg

MAIL MYSTERY SOLVED

NEW YORK (1010 WINS) -- A letter carrier charged with torching first-class mail that he had stashed in a basement for years has been released on $25,000 bail, the U.S. attorney's office said Thursday.

Gregory Mewborn, assigned to the Vanderveer post office in the Flatbush section of Brooklyn for eight years, was arraigned before a federal magistrate on Wednesday night, said Robert Nardoza, a spokesman for the U.S. attorney.

A federal complaint charged that Mewborn ``unlawfully secreted, destroyed, detained and delayed" letters and other mail entrusted to him.

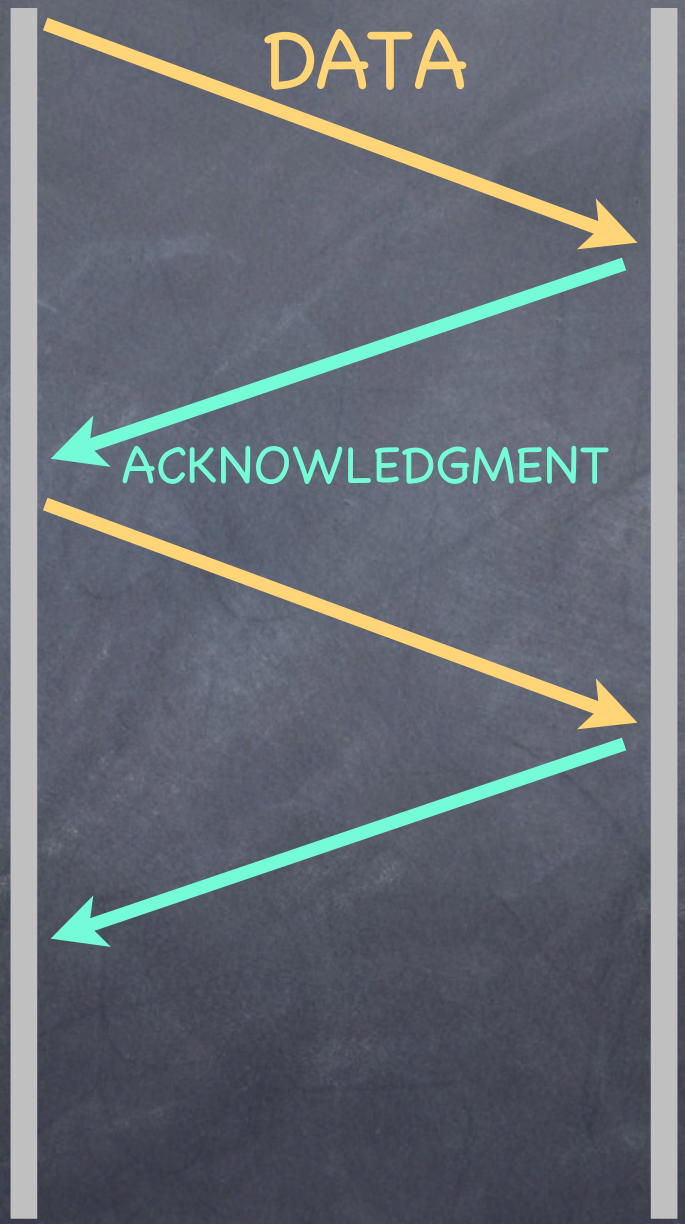
Firefighters got a call about smoke at a boarded building in Flatbush on Wednesday morning. They found 10 bags of undelivered mail, some of it burned, and a lighter fluid container near the basement furnace. The mail dated as far back as 2002.

http://www.1010wins.com/pages/32068.php?contentType=4&contentId=136945

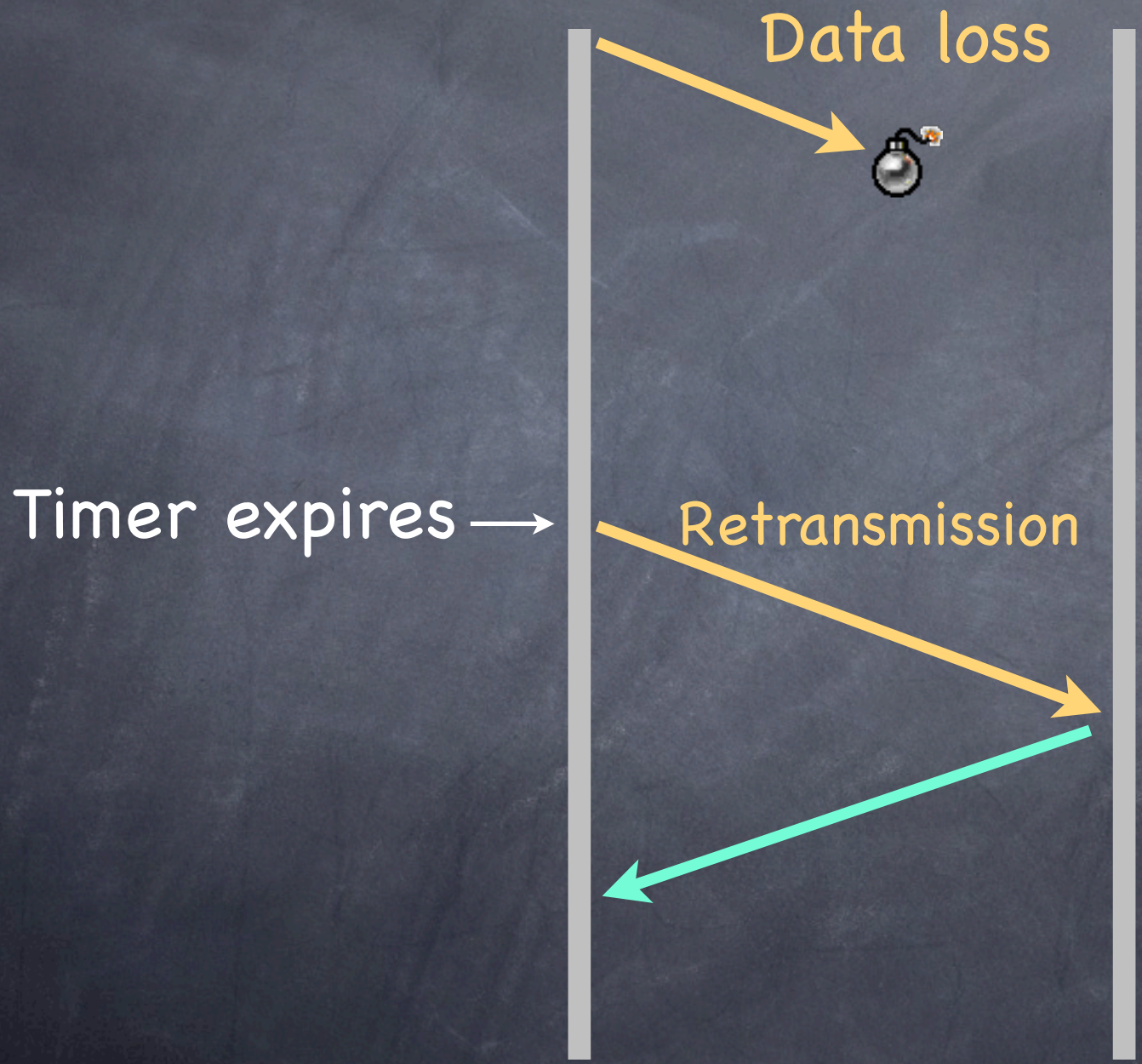
http://directmag.com/news/marketing_chicago_letter_carrier/

http://www.cbc.ca/canada/manitoba/story/2006/05/16/mb-mail-20060516.html

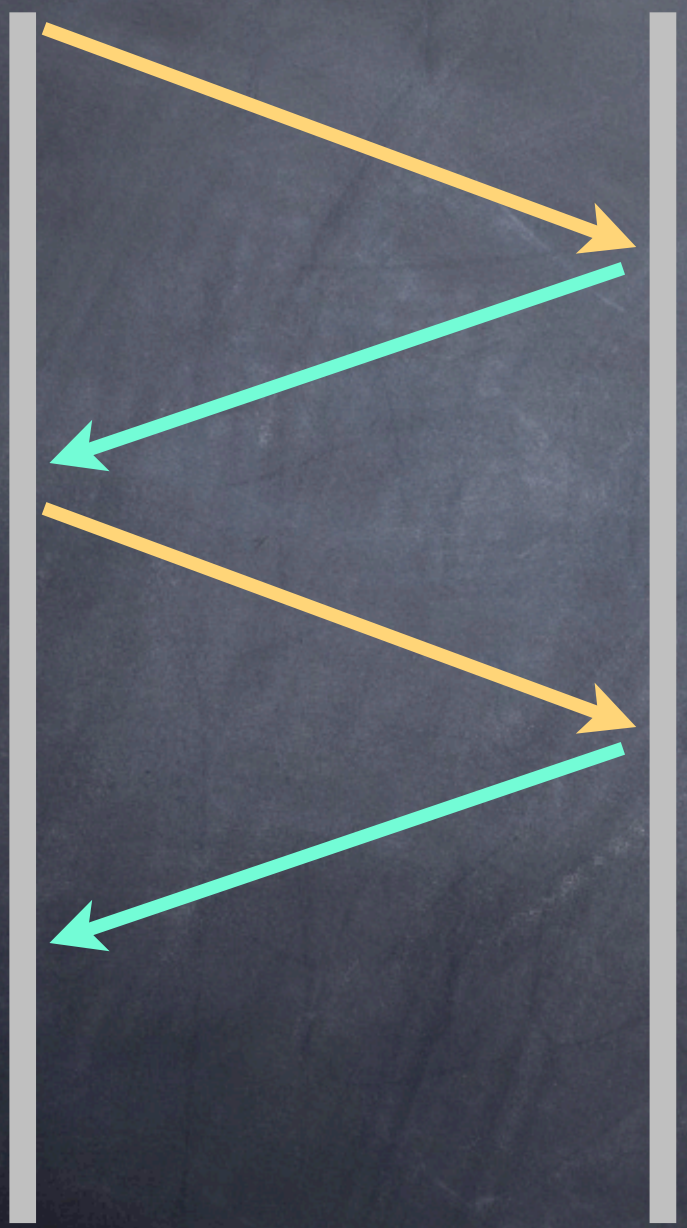
NORMAL TCP DATA TRANSMISSION



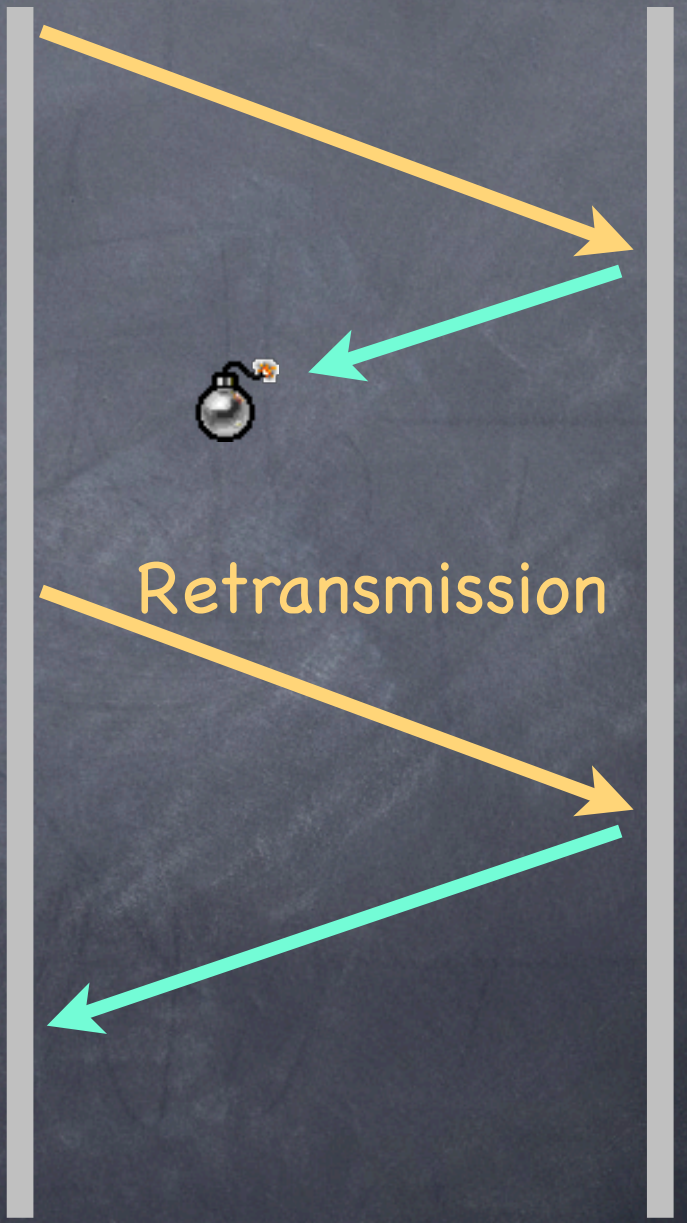
DATA LOSS



ACKNOWLEDGMENT LOSS + PACKET DUPLICATION



VS.

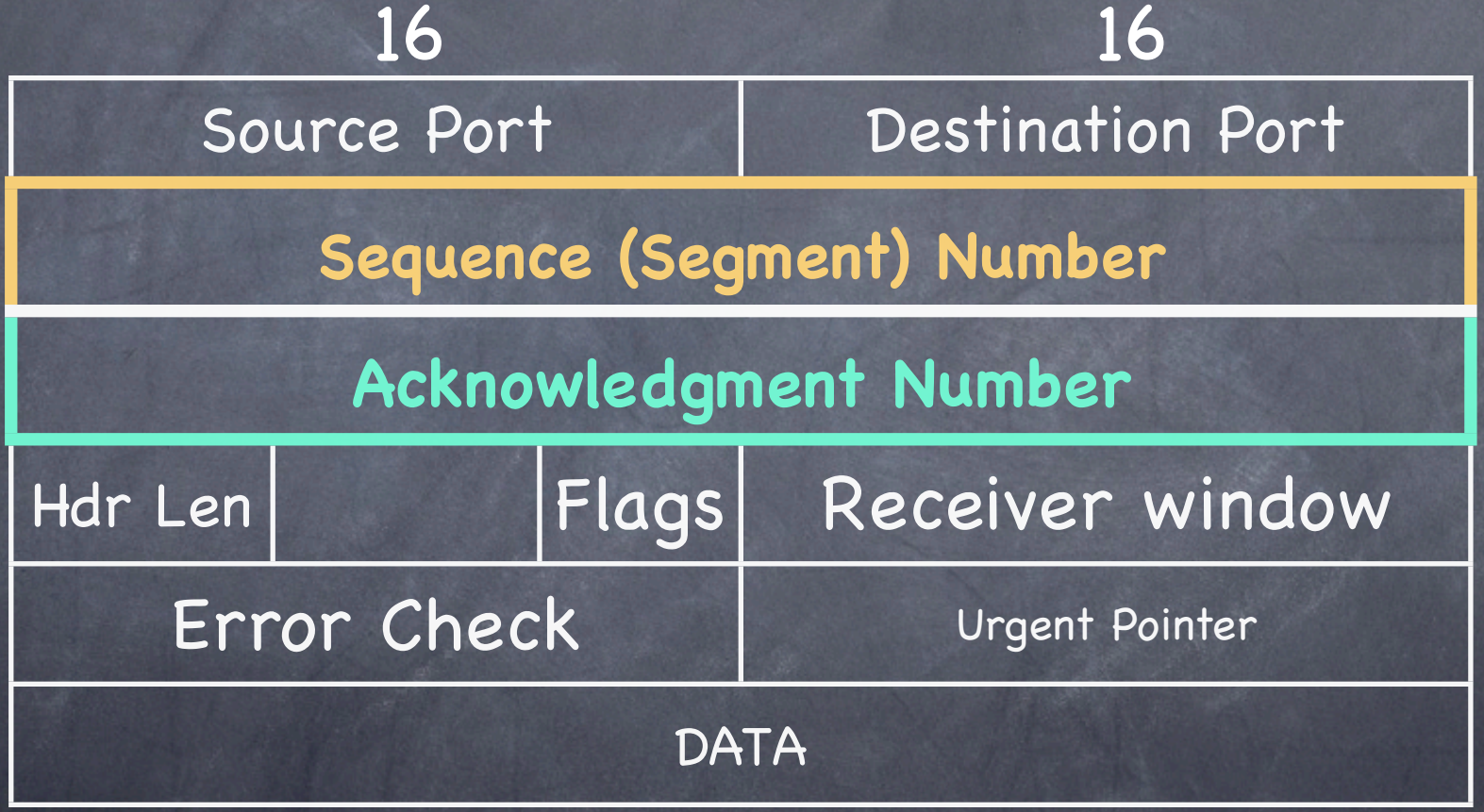


Sequence and Acknowledgment Numbers

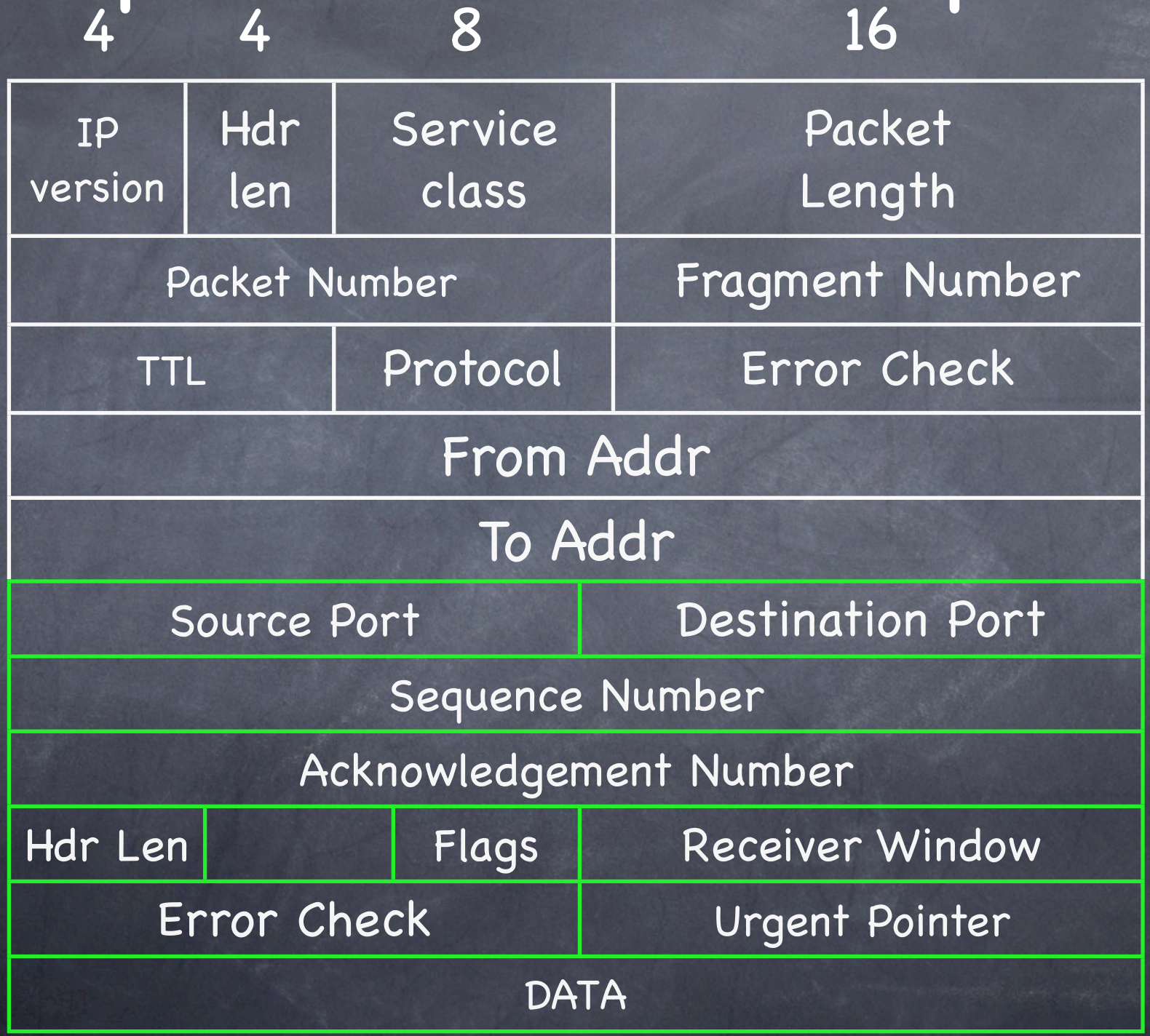
Loss Case

No Loss Case

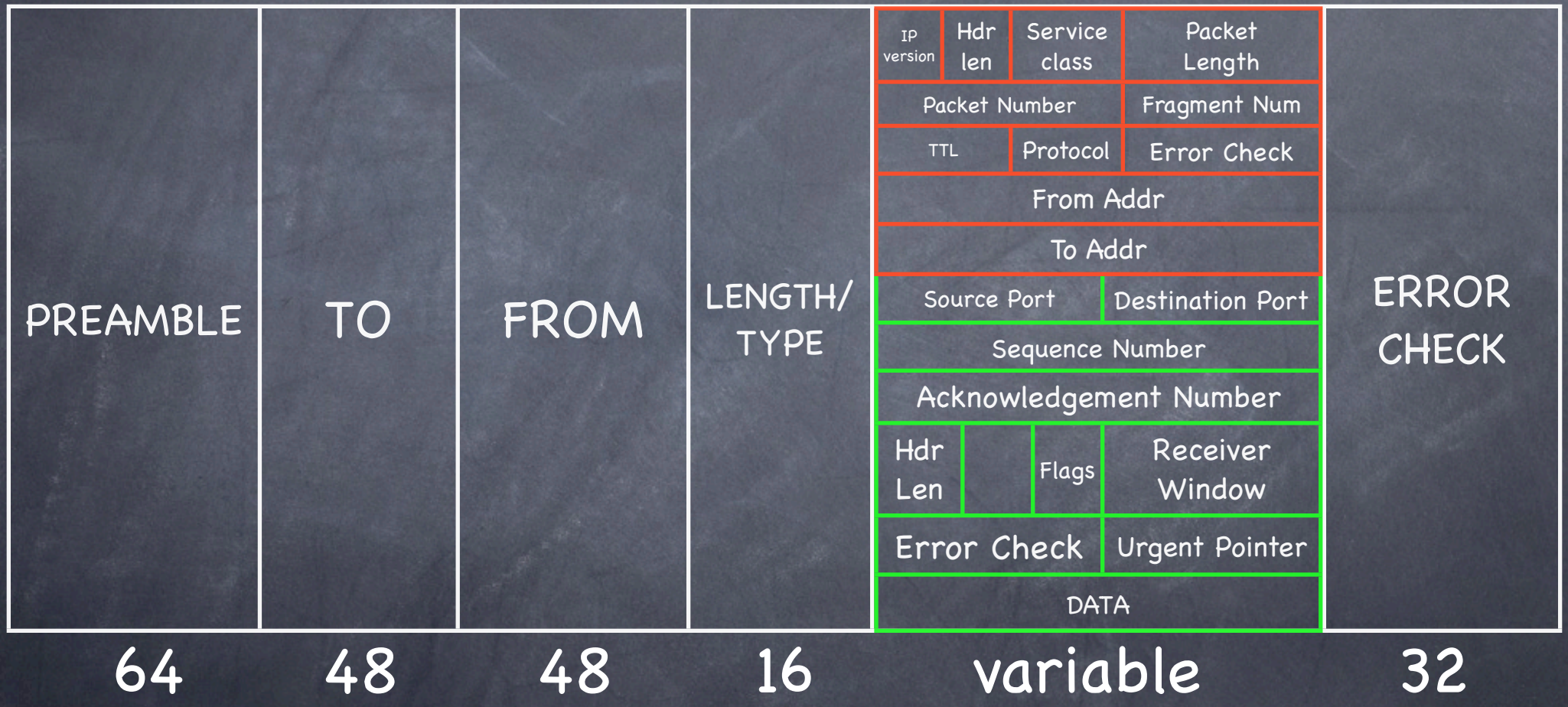
TCP Segment Format



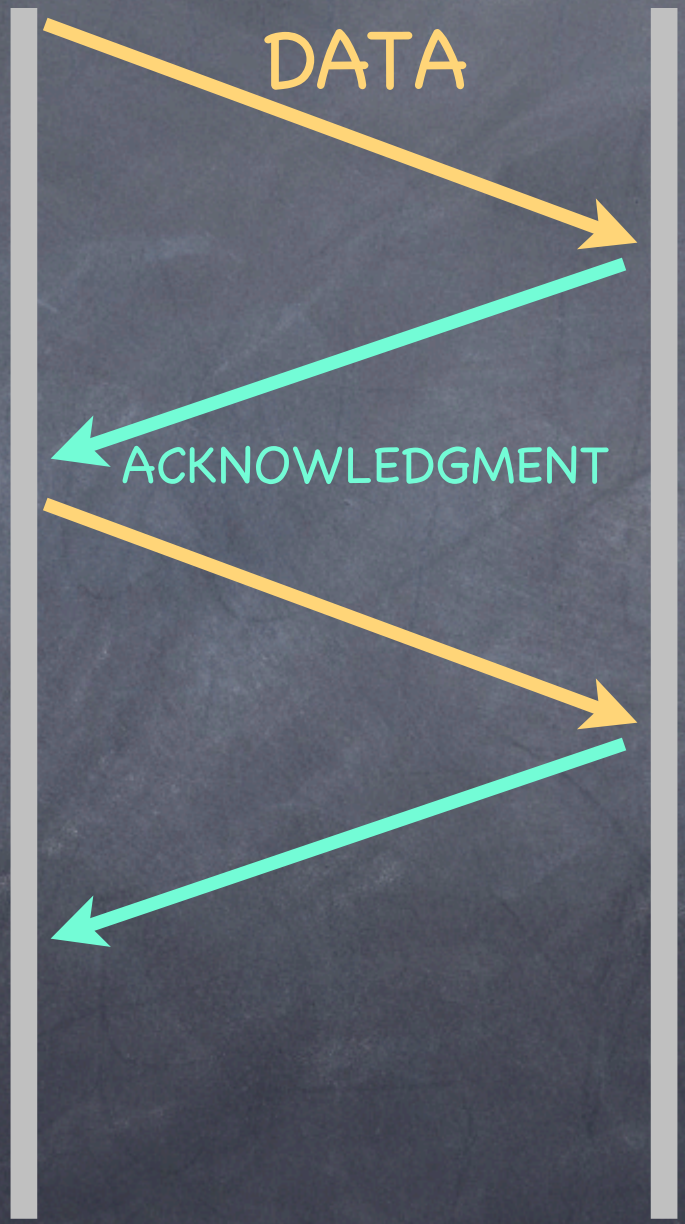
TCP packet inside IP packet



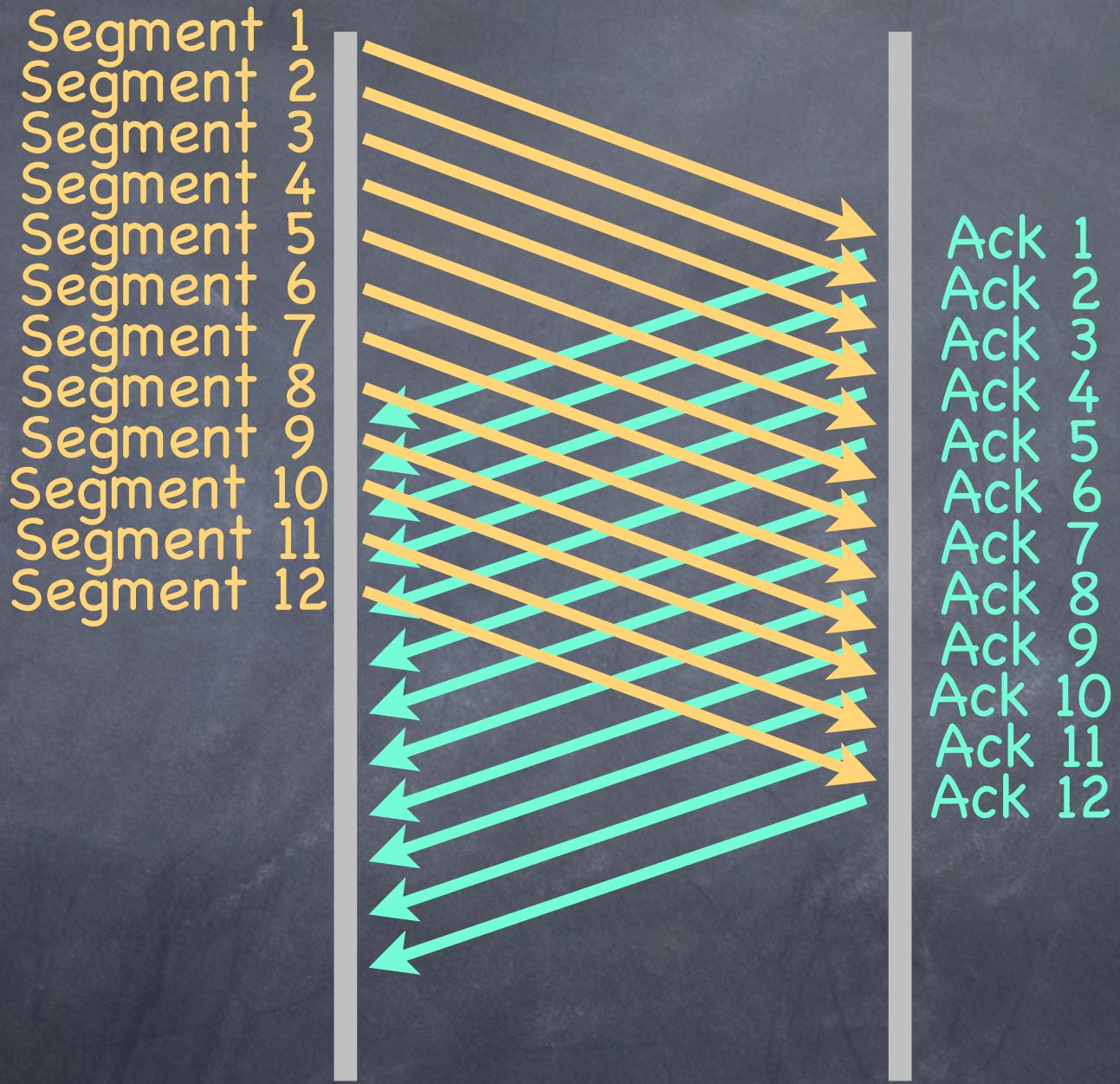
...inside Ethernet packet!



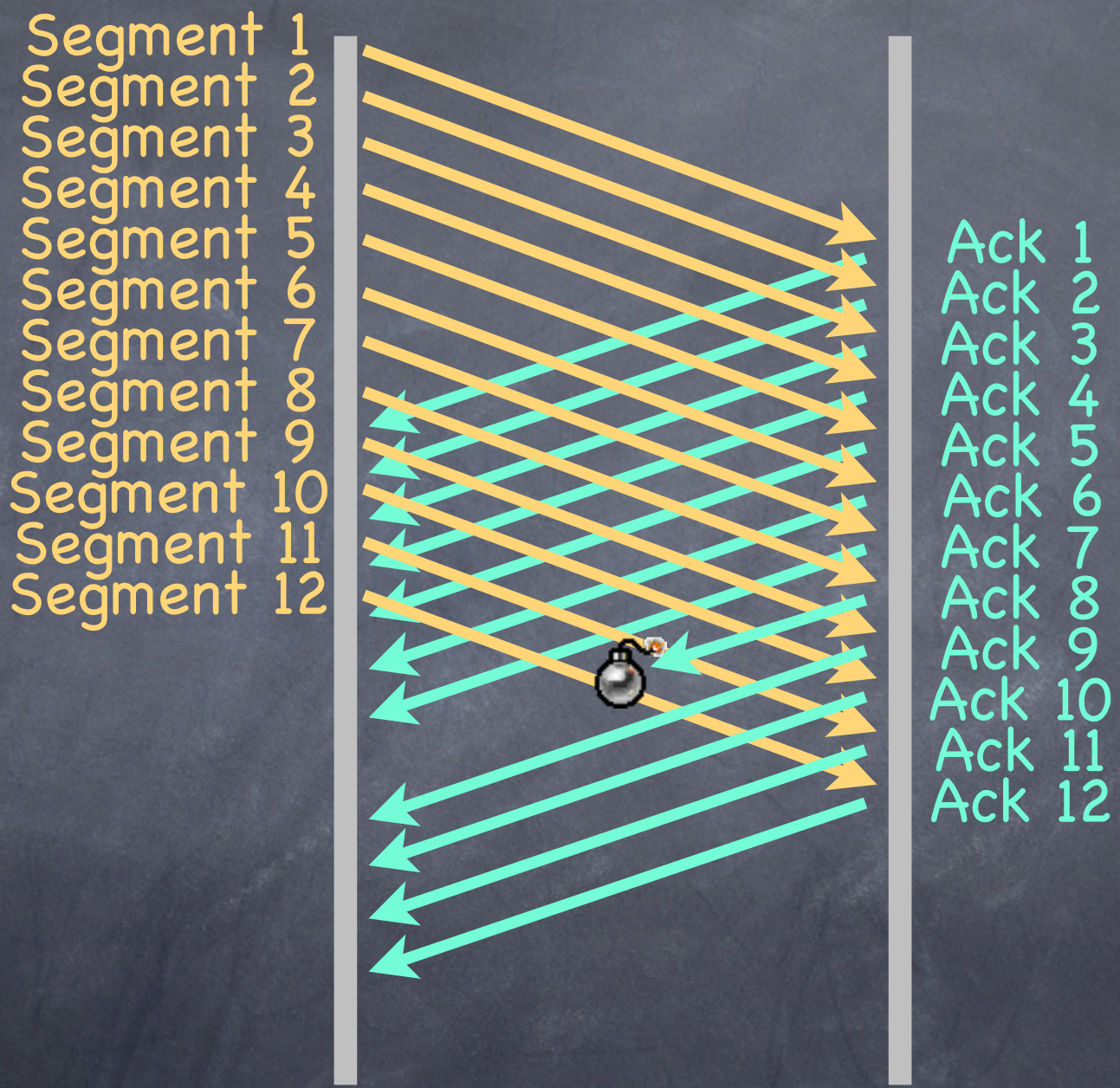
NORMAL TCP DATA TRANSMISSION?



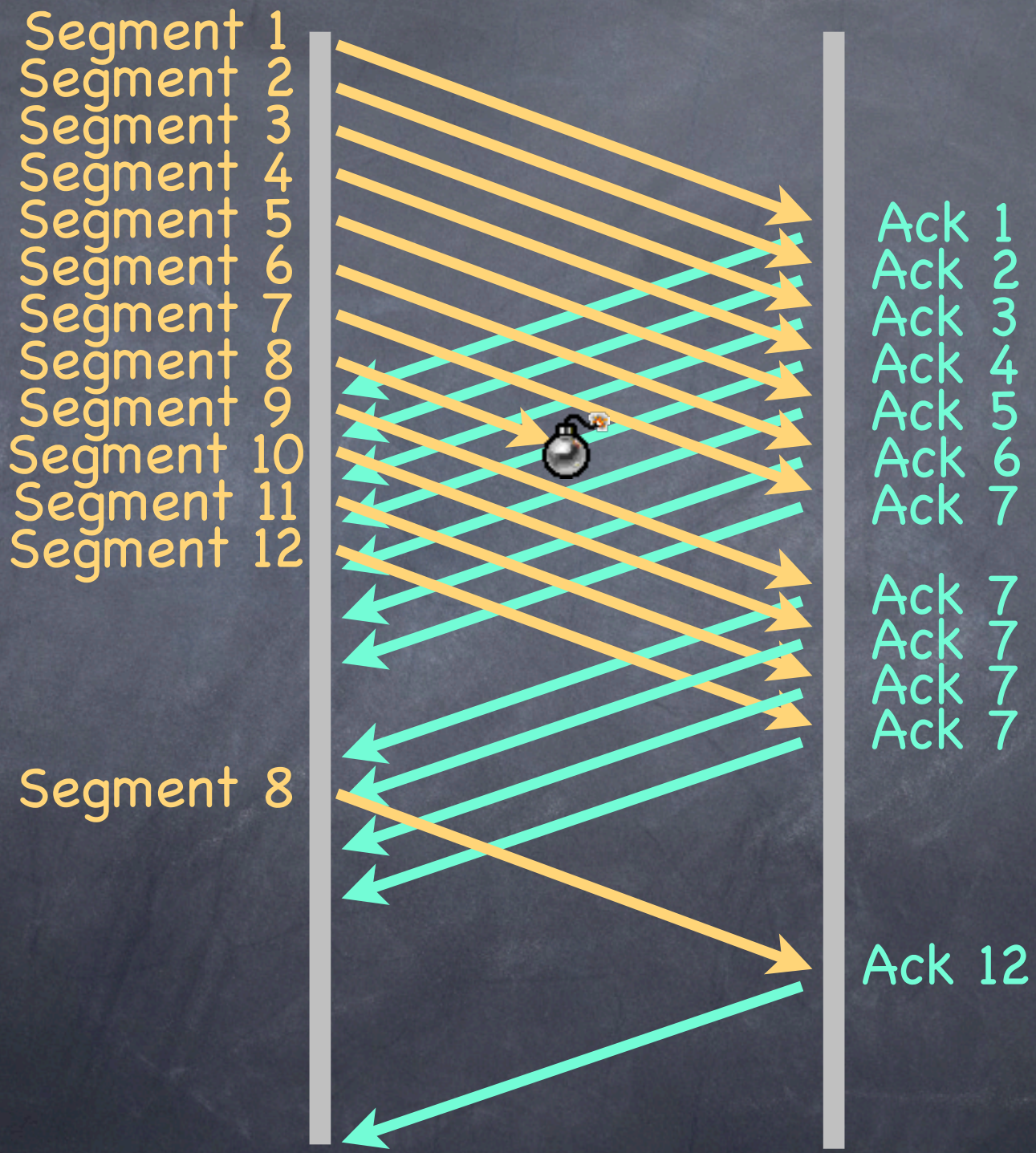
Maintaining Transmission Efficiency



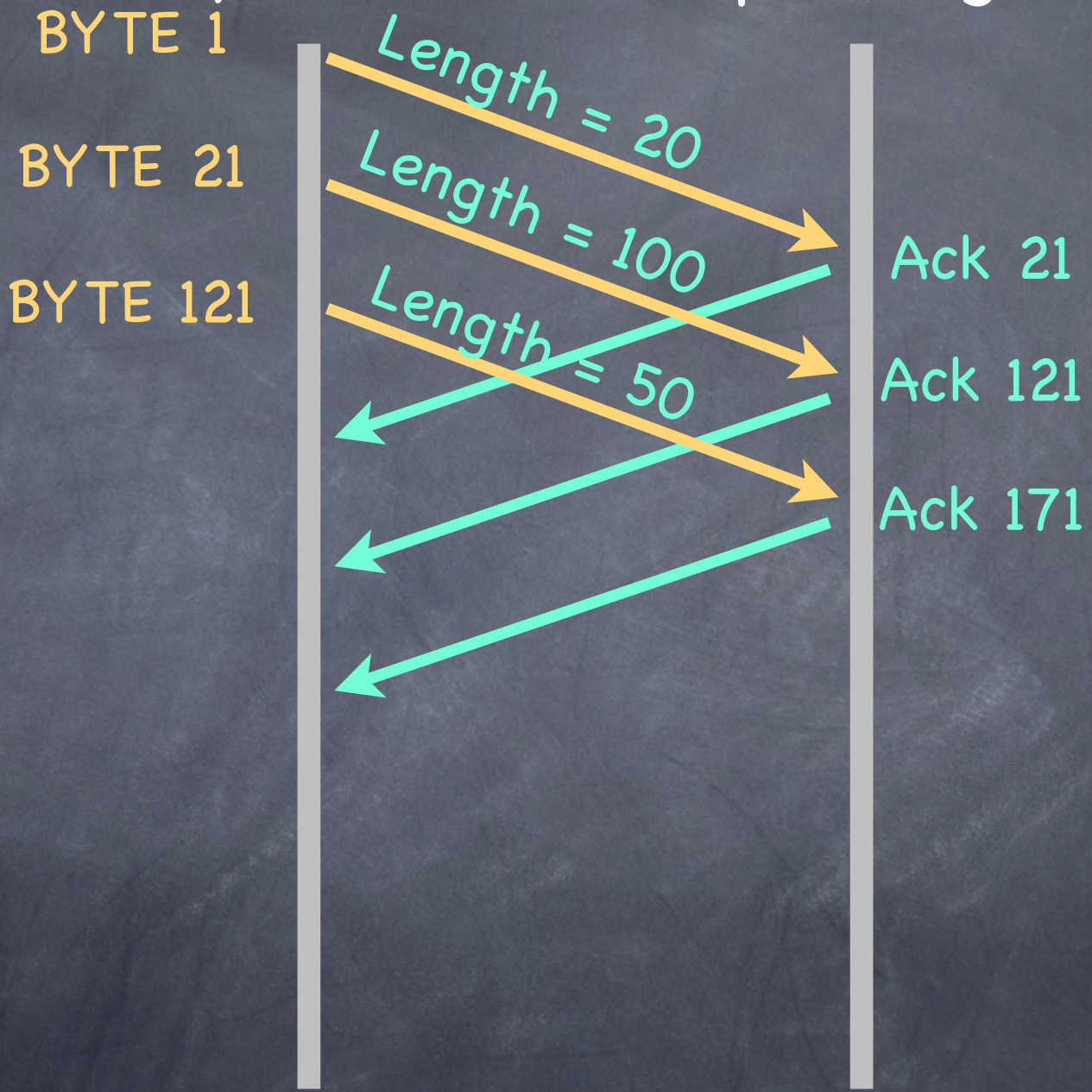
Cumulative Acknowledgments



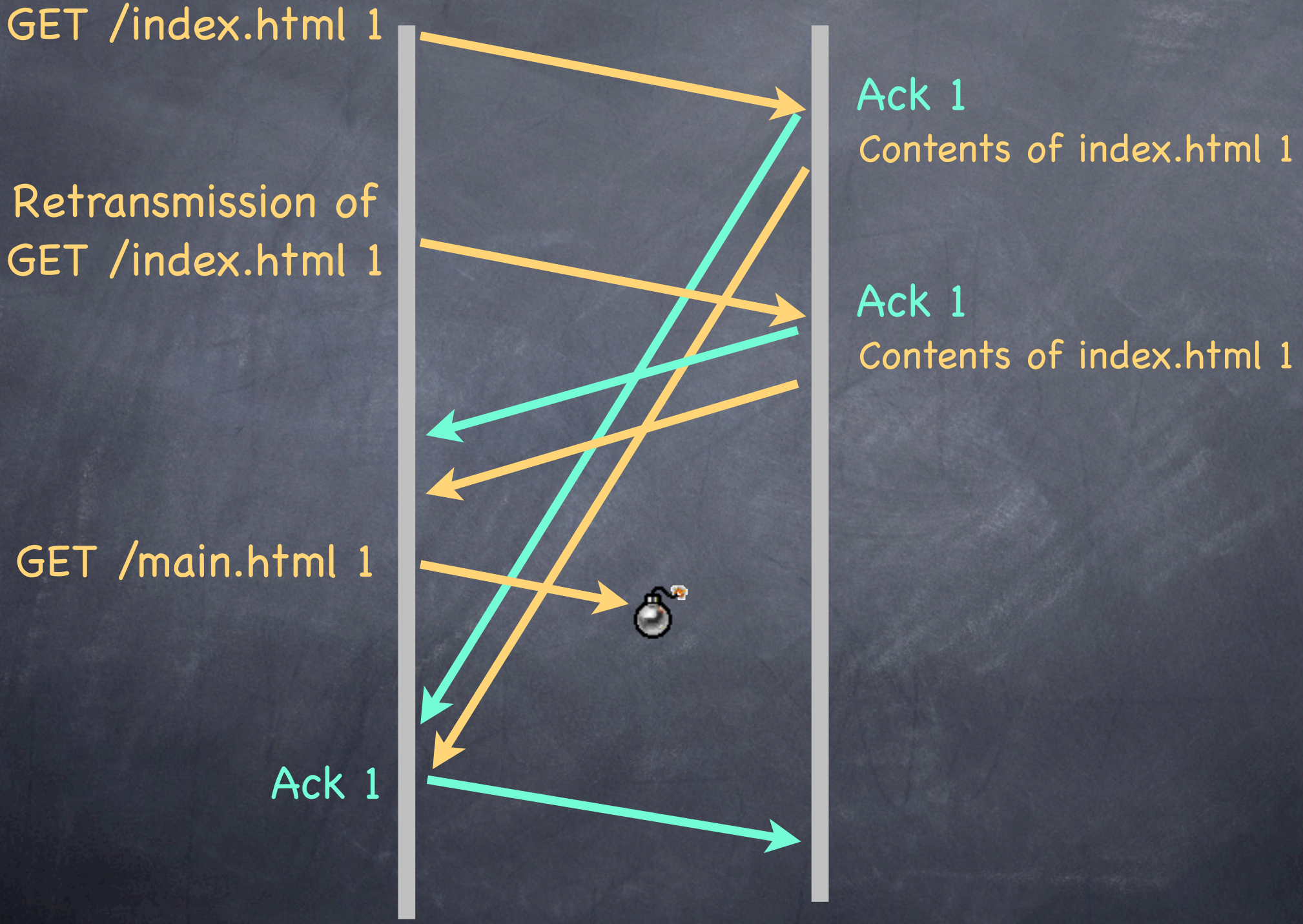
Cumulative Acknowledgments



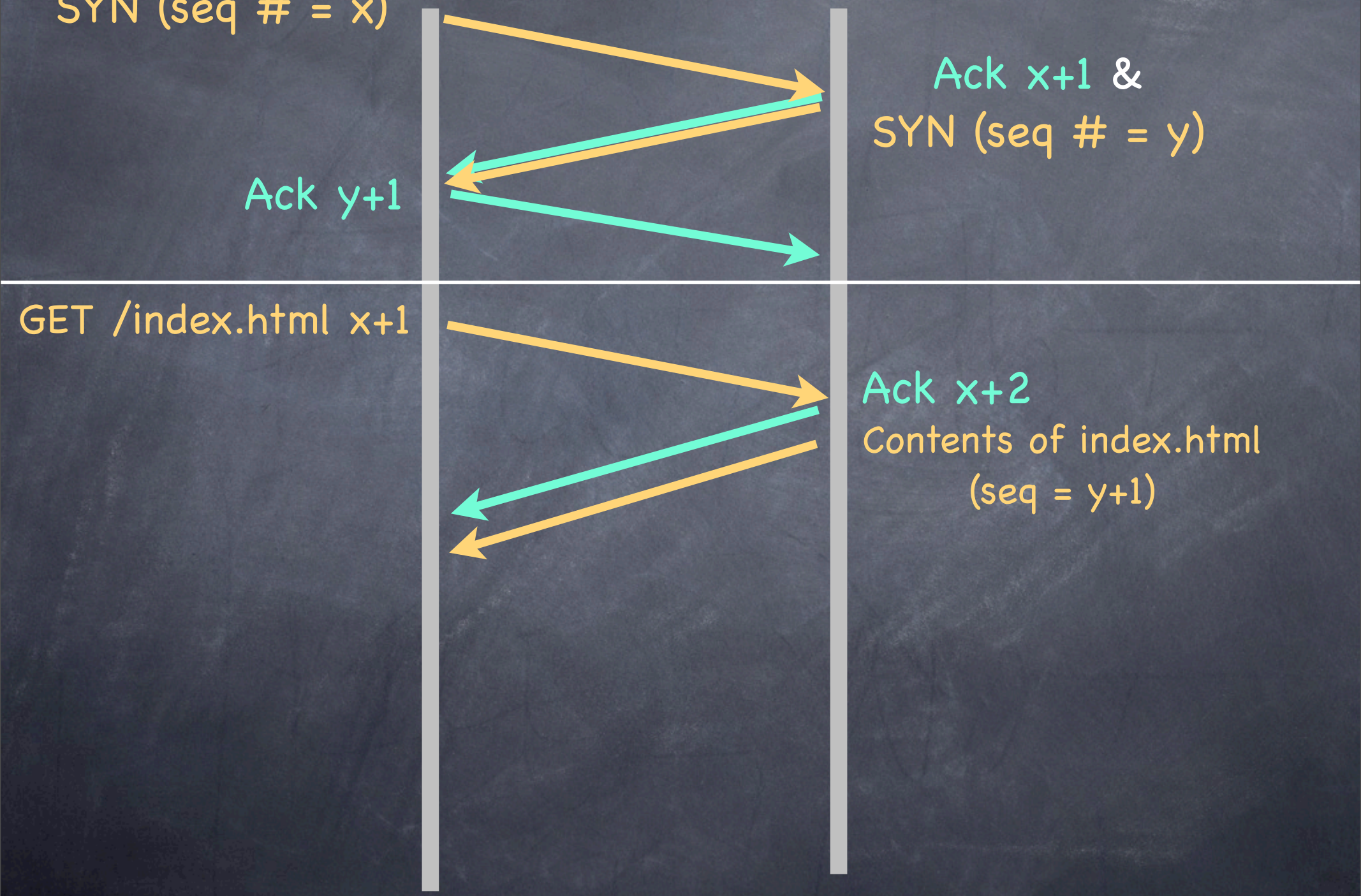
Byte Number Sequencing



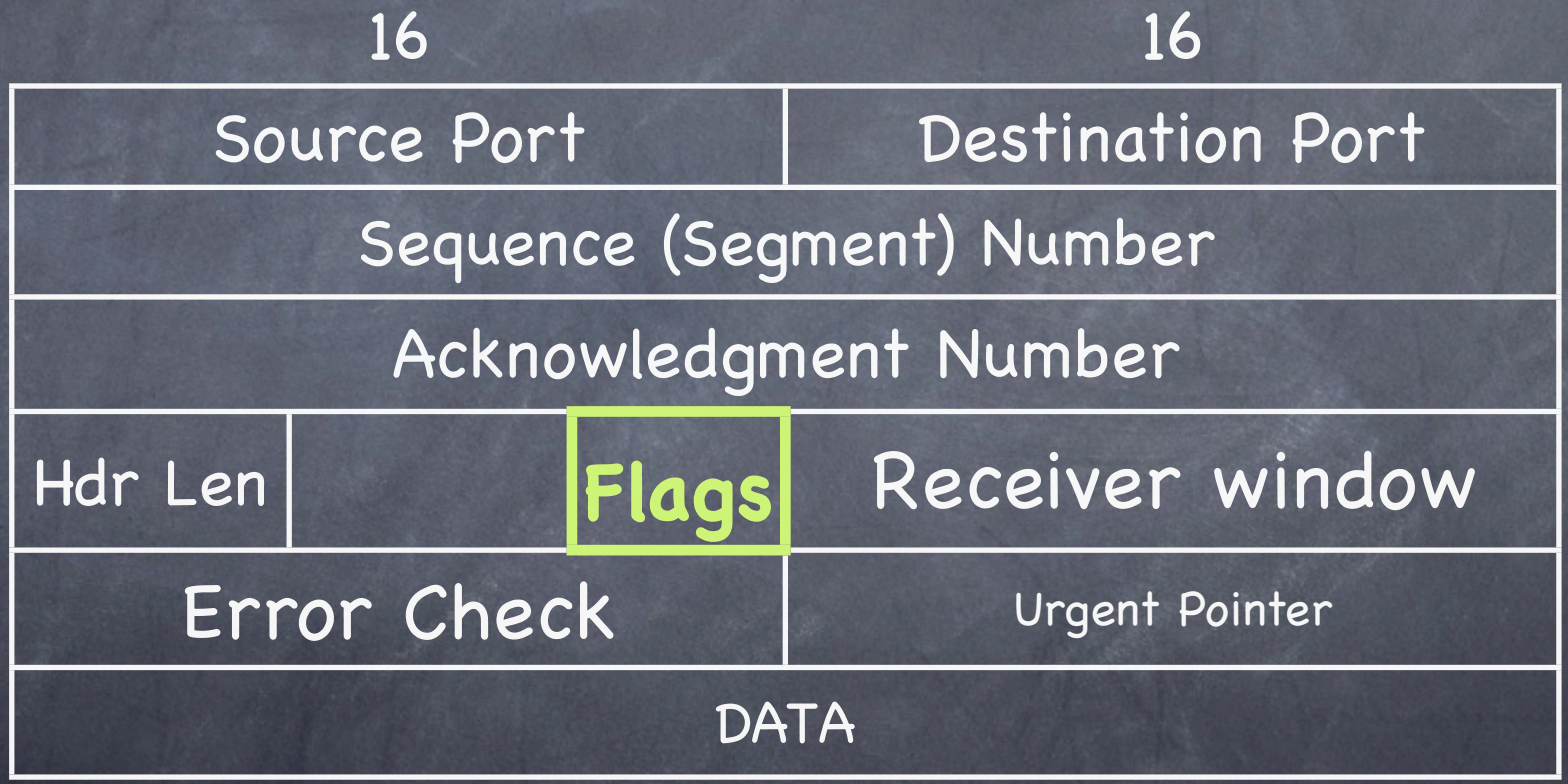
Slow Segments == Confused Conversations



The Connection Start 3-Way Handshake



TCP Segment Format



Flags

(nothing)	Here's some data
SYN	Connect
FIN	Disconnect
ACK	I got segment #___
RESET	I'm confused and want to hang up
URG	By the way, ...
PUSH	Send data now

Connection Termination