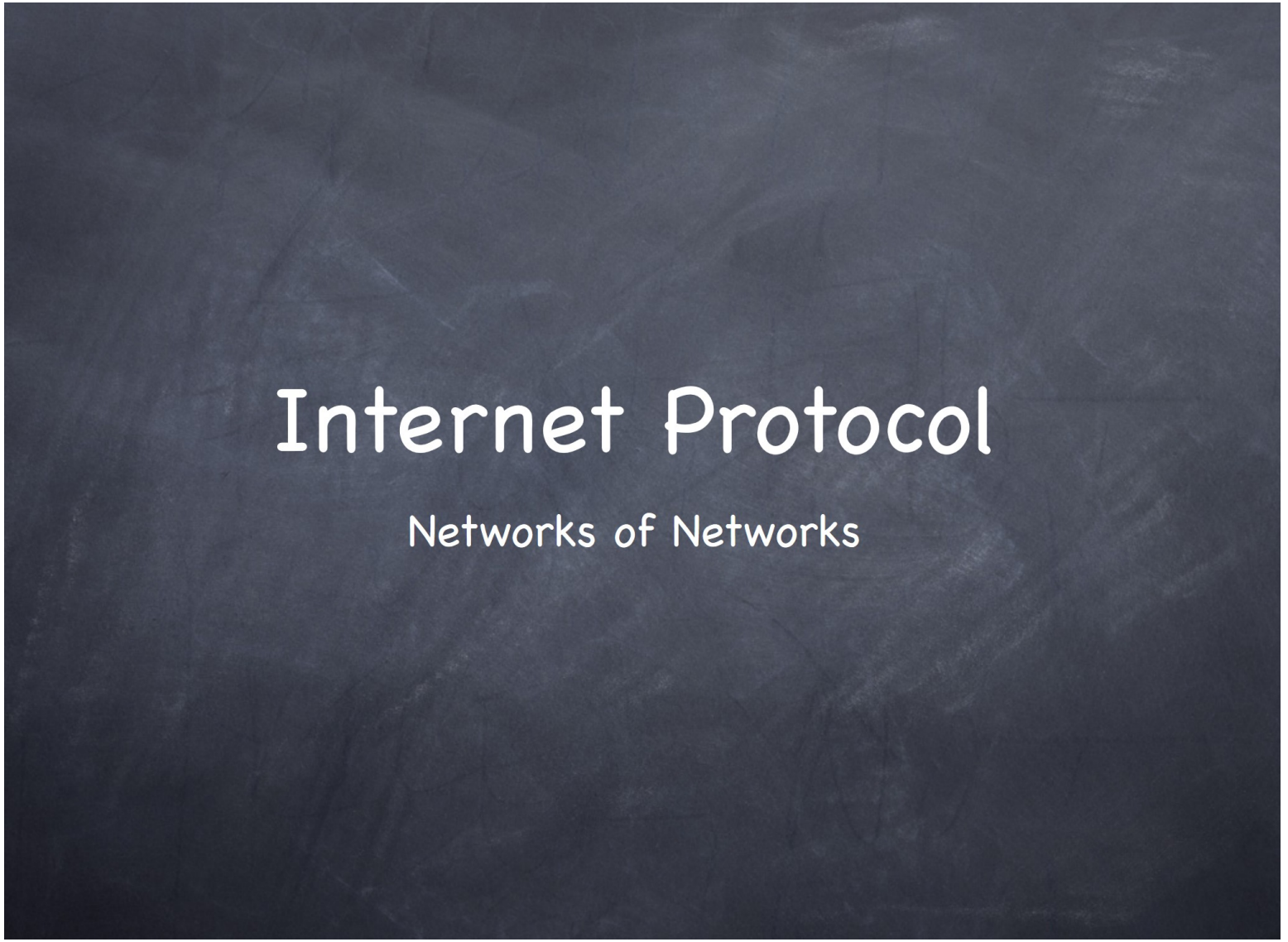
IT 609
Network and System Administration

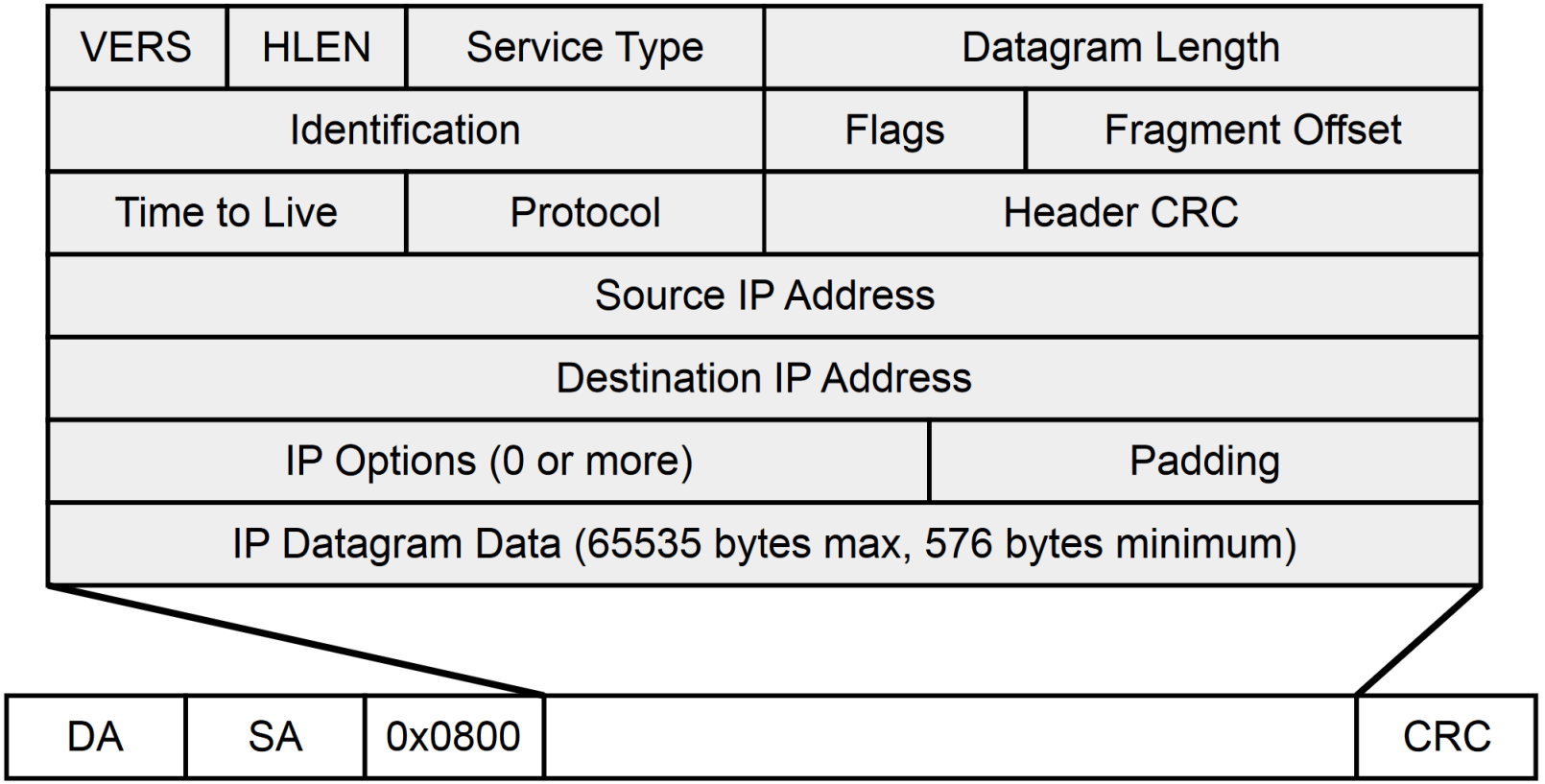
IP Basics

Tuesday October 14, 2021

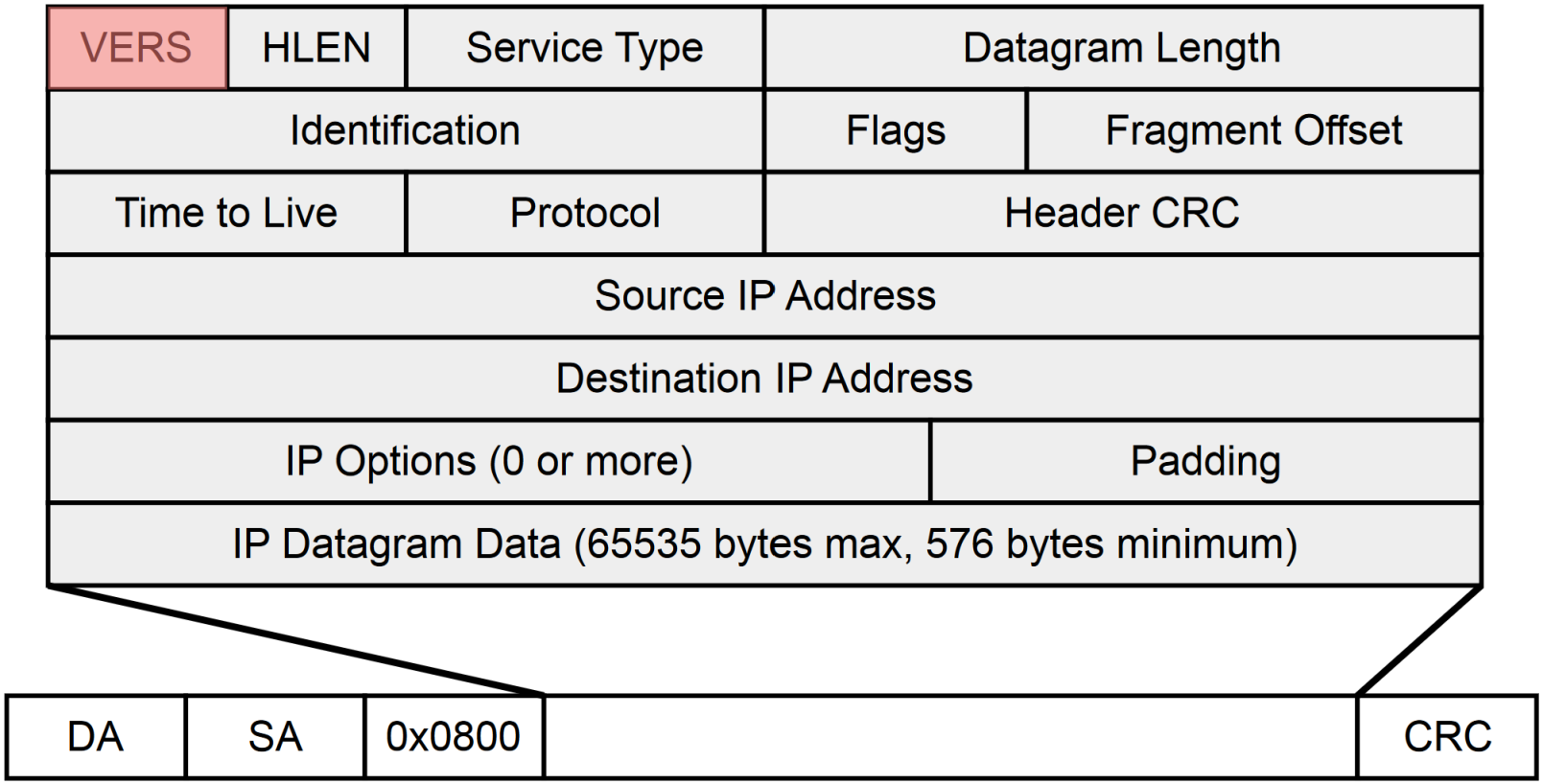
IP Basics



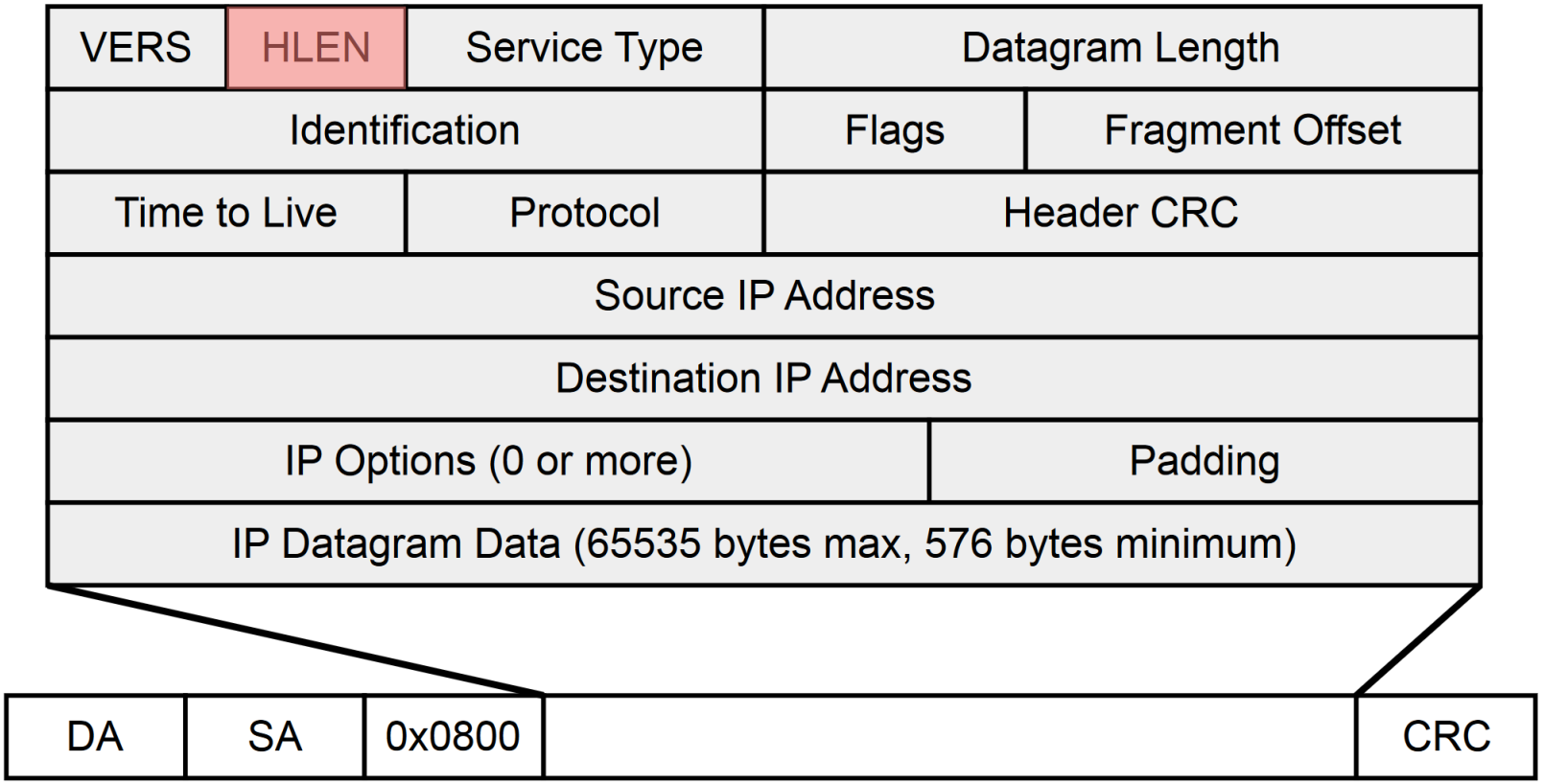
IP Packets


VERS
HLEN
Service Type
Datagram Length
Identification
Flags
Fragment Offset
Time to Live
Protocol
Header CRC
Source IP Address
Destination IP Address
IP Options (0 or more)
Padding
IP Datagram Data (65535 bytes max, 576 bytes minimum)
DA
SA
0x0800
CRC

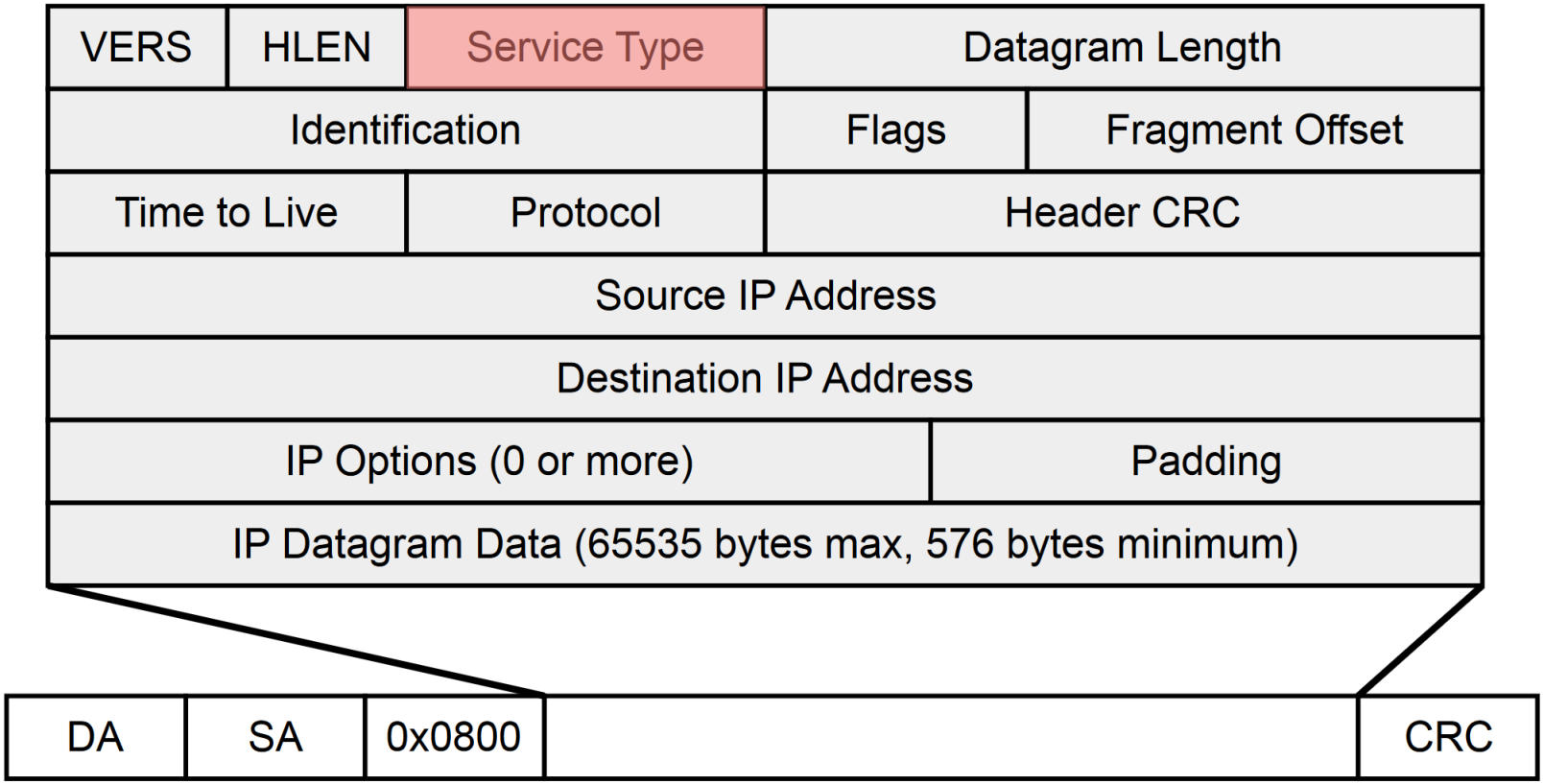
IP Packets


VERS
HLEN
Service Type
Datagram Length
Identification
Flags
Fragment Offset
Time to Live
Protocol
Header CRC
Source IP Address
Destination IP Address
IP Options (0 or more)
Padding
IP Datagram Data (65535 bytes max, 576 bytes minimum)
DA
SA
0x0800
CRC

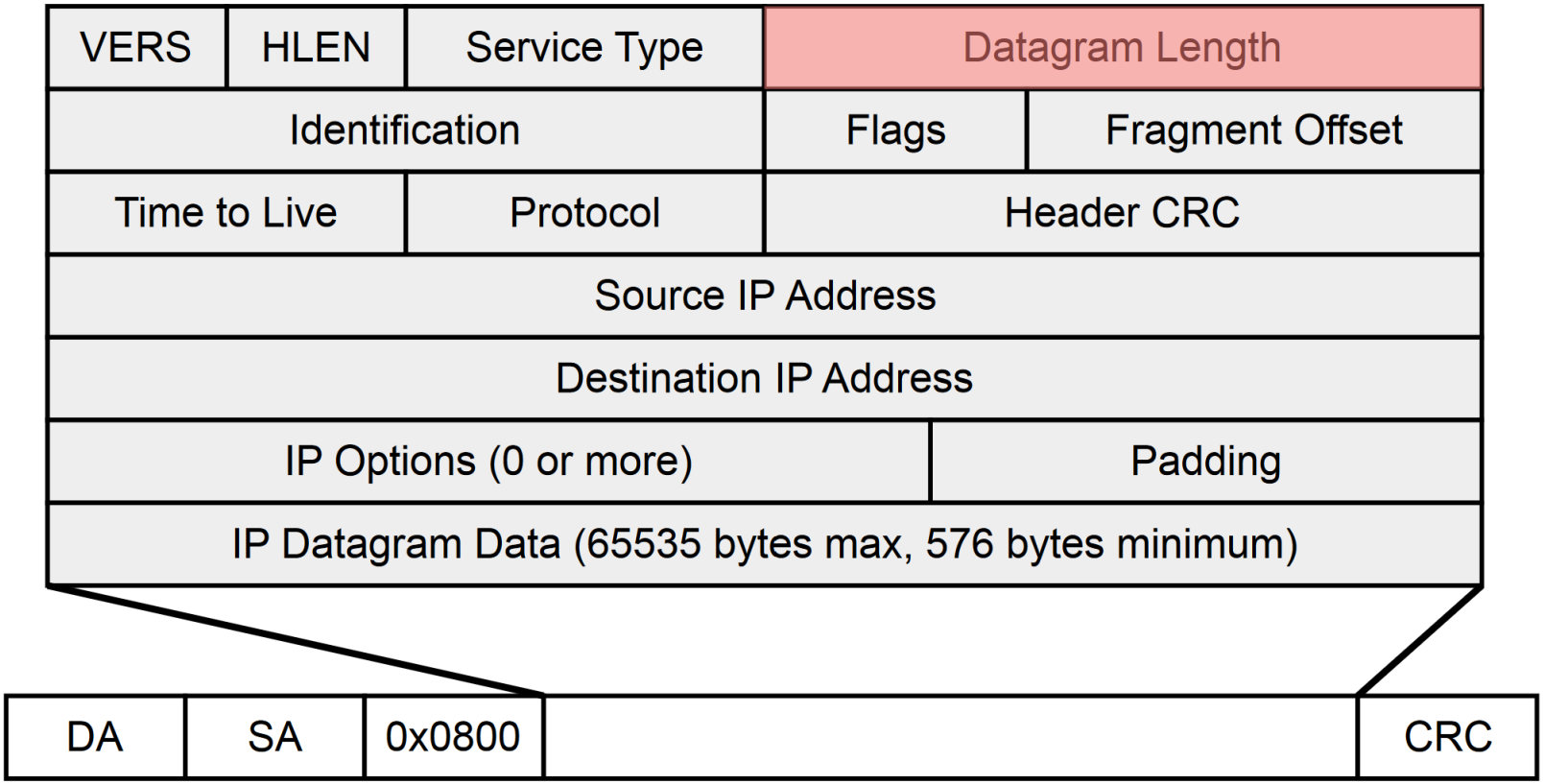
IP Packets


VERS
HLEN
Service Type
Datagram Length
Identification
Flags
Fragment Offset
Time to Live
Protocol
Header CRC
Source IP Address
Destination IP Address
IP Options (0 or more)
Padding
IP Datagram Data (65535 bytes max, 576 bytes minimum)
DA
SA
0x0800
CRC

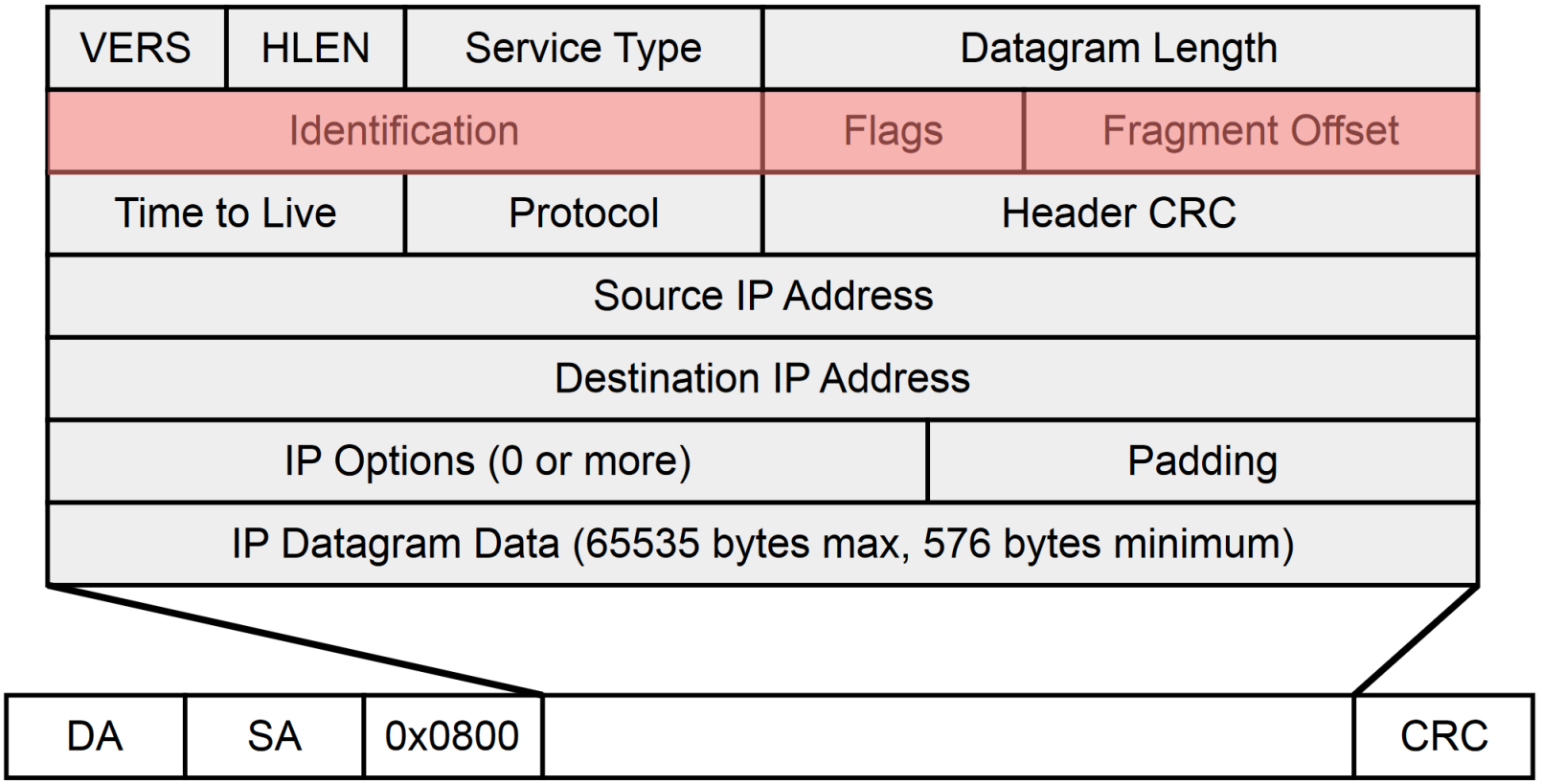
IP Packets


VERS
HLEN
Service Type
Datagram Length
Identification
Flags
Fragment Offset
Time to Live
Protocol
Header CRC
Source IP Address
Destination IP Address
IP Options (0 or more)
Padding
IP Datagram Data (65535 bytes max, 576 bytes minimum)
DA
SA
0x0800
CRC

IP Packets


VERS
HLEN
Service Type
Datagram Length
Identification
Flags
Fragment Offset
Time to Live
Protocol
Header CRC
Source IP Address
Destination IP Address
IP Options (0 or more)
Padding
IP Datagram Data (65535 bytes max, 576 bytes minimum)
DA
SA
0x0800
CRC

IP Packets


VERS
HLEN
Service Type
Datagram Length
Identification
Flags
Fragment Offset
Time to Live
Protocol
Header CRC
Source IP Address
Destination IP Address
IP Options (0 or more)
Padding
IP Datagram Data (65535 bytes max, 576 bytes minimum)
DA
SA
0x0800
CRC

IP Fragmentation

IP datagrams can be up to 65535 bytes

No guarantee that the Data Link layer can accommodate that much data in its frames

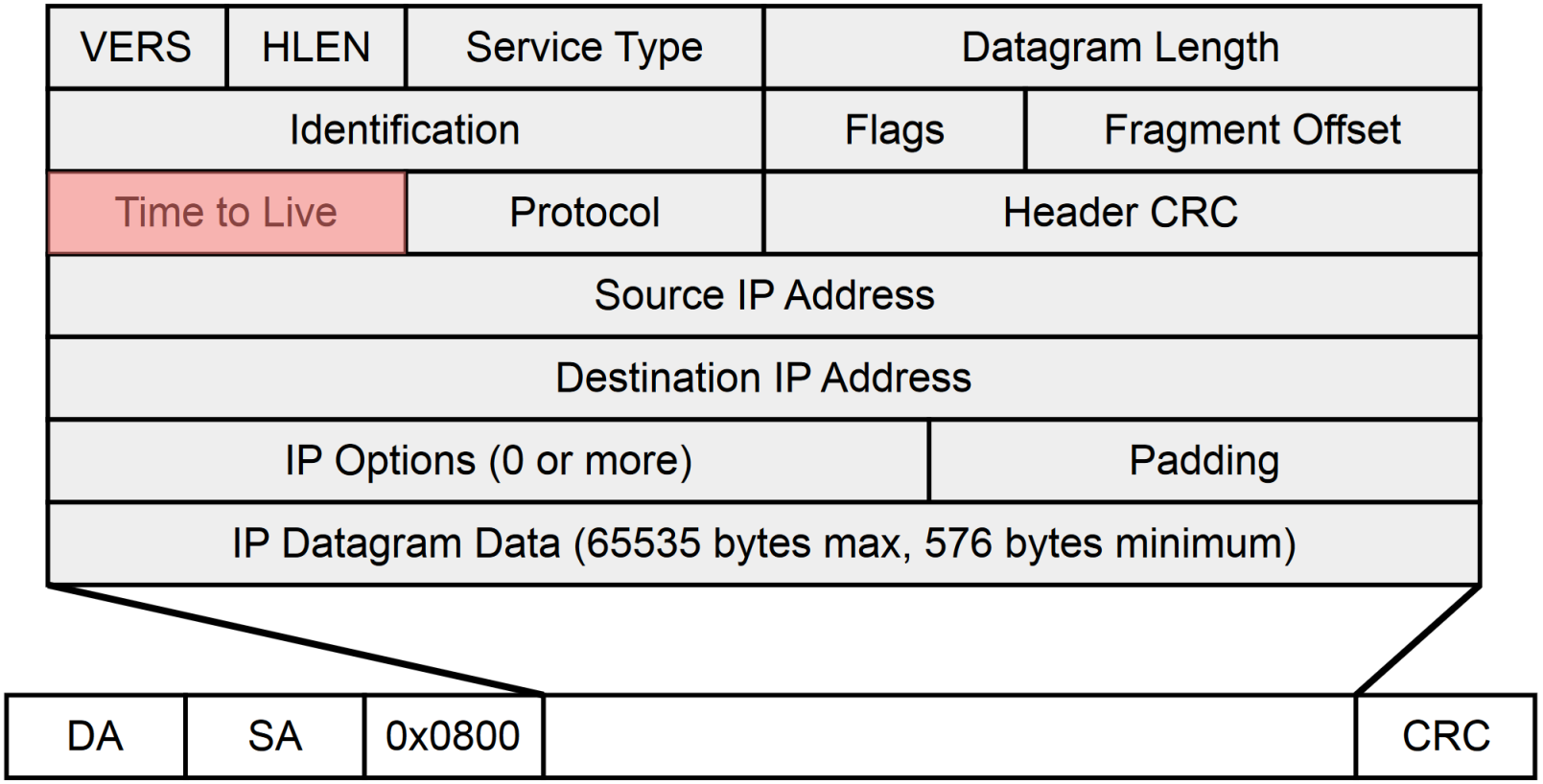
Ethernet - 1500 bytes MTU

Datagrams are fragmented into multiple packets when an IP router encounters a medium for which the current packet is too big

Fragments get reassembled only at the final destination

Sending host can also request the path MTU before sending to avoid fragmentation

IP Packets


VERS
HLEN
Service Type
Datagram Length
Identification
Flags
Fragment Offset
Time to Live
Protocol
Header CRC
Source IP Address
Destination IP Address
IP Options (0 or more)
Padding
IP Datagram Data (65535 bytes max, 576 bytes minimum)
DA
SA
0x0800
CRC

Routers

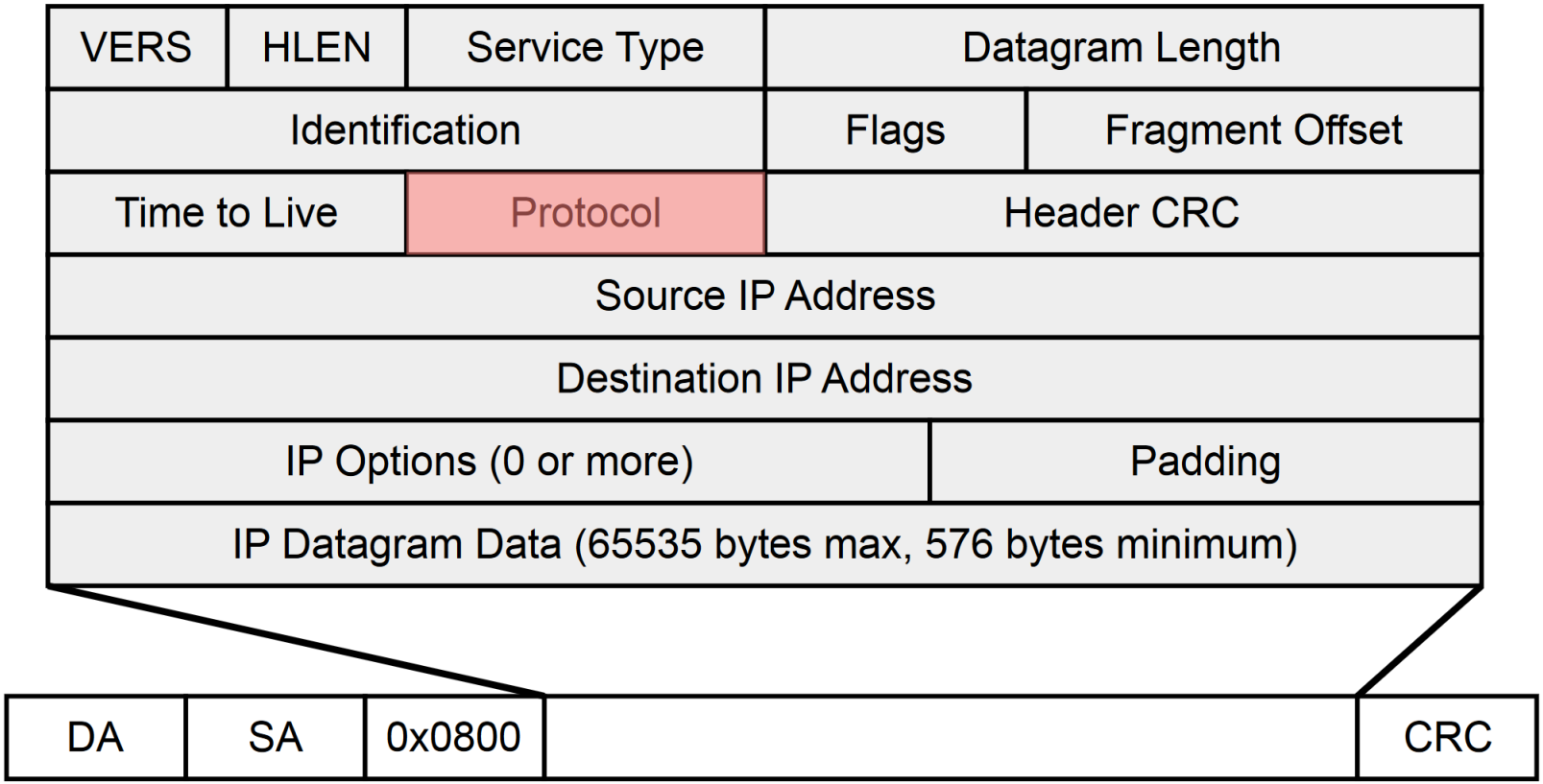
Routers are the devices that connect networks together and direct traffic from one network to the next

Routing Table - records kept in memory about which networks a router can reach

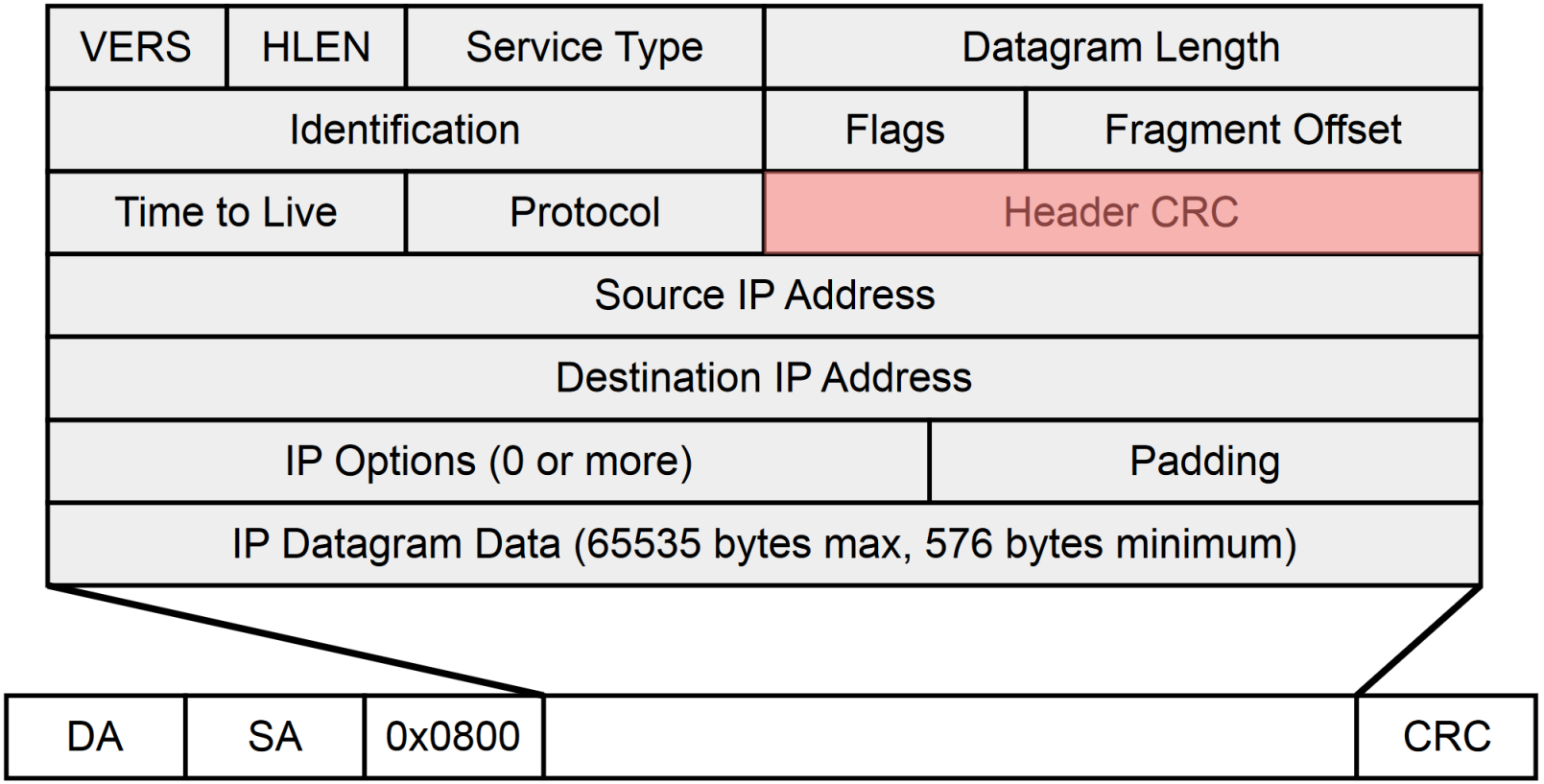
Routers can be either specialized devices or software that runs on an ordinary computer

Routers reduce the TTL value of each packet before retransmitting

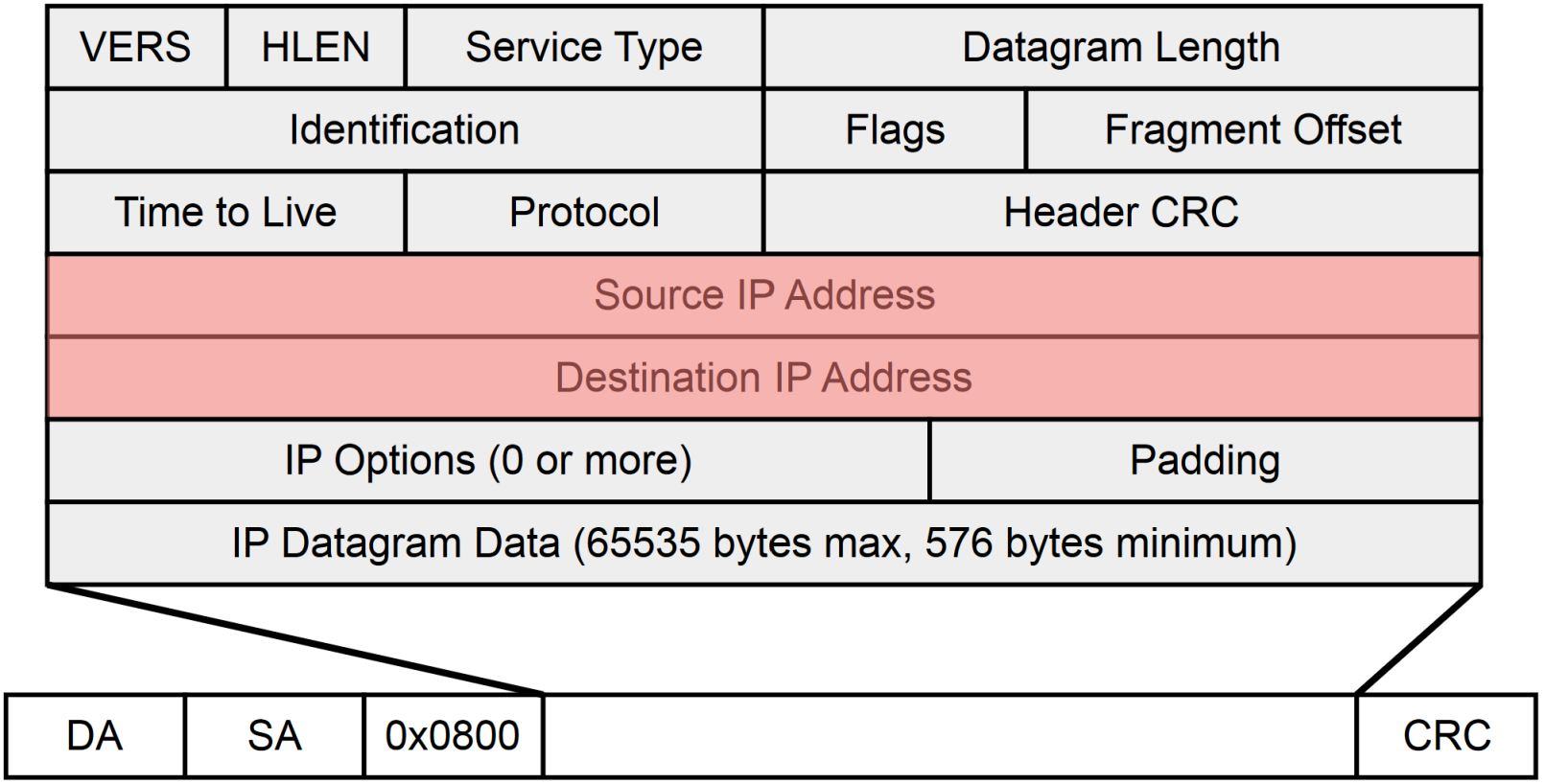
IP Packets


VERS
HLEN
Service Type
Datagram Length
Identification
Flags
Fragment Offset
Time to Live
Protocol
Header CRC
Source IP Address
Destination IP Address
IP Options (0 or more)
Padding
IP Datagram Data (65535 bytes max, 576 bytes minimum)
DA
SA
0x0800
CRC

IP Packets


VERS
HLEN
Service Type
Datagram Length
Identification
Flags
Fragment Offset
Time to Live
Protocol
Header CRC
Source IP Address
Destination IP Address
IP Options (0 or more)
Padding
IP Datagram Data (65535 bytes max, 576 bytes minimum)
DA
SA
0x0800
CRC

IP Packets


VERS
HLEN
Service Type
Datagram Length
Identification
Flags
Fragment Offset
Time to Live
Protocol
Header CRC
Source IP Address
Destination IP Address
IP Options (0 or more)
Padding
IP Datagram Data (65535 bytes max, 576 bytes minimum)
DA
SA
0x0800
CRC

IP Addressing

4-byte address

Written in dotted decimal notation

132.177.80.57

69.63.184.142

74.125.67.100

etc

Each 1 byte value ranges from 0 to 255

Special IP Addresses

Certain address ranges have special purposes

- 127.x.x.x - loopback, usually 127.0.0.1 used
- Private IP Networks
  - 10.0.0.0-10.255.255.255
  - 172.16.0.0-172.31.255.255
  - 192.168.0.0-192.168.255.255
- Zeroconf/IP Link Local/DHCP Self-Assigned
  - 169.254.0.0-169.254.255.255