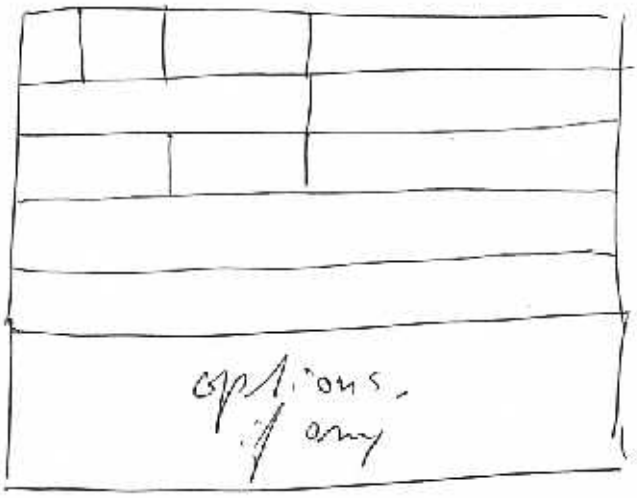
Week 6.

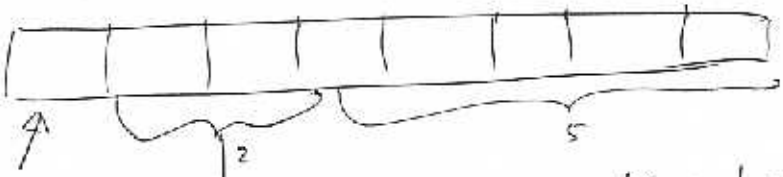
IP Options

Comer p 107 etc. (Better done after forwarding!).



Options:

Code:



Copy.
{ 1 copy in all fr.
{ 0 first fr. only.

Number.

Class 00 datagram control
10 debugging
01 } ?
11 }

Length:
Total Length in Bytes.
Not always present.

Options need not be aligned with 32-bit word boundaries.

Two special ones:

(1) No-Op. 0000 0001

Used as "filler" before and between and after options, to get them aligned with 32-bit word boundaries.

(2) E o O End of Options.

0000 0000

All must end, at end, to reach end of 32 bit word.

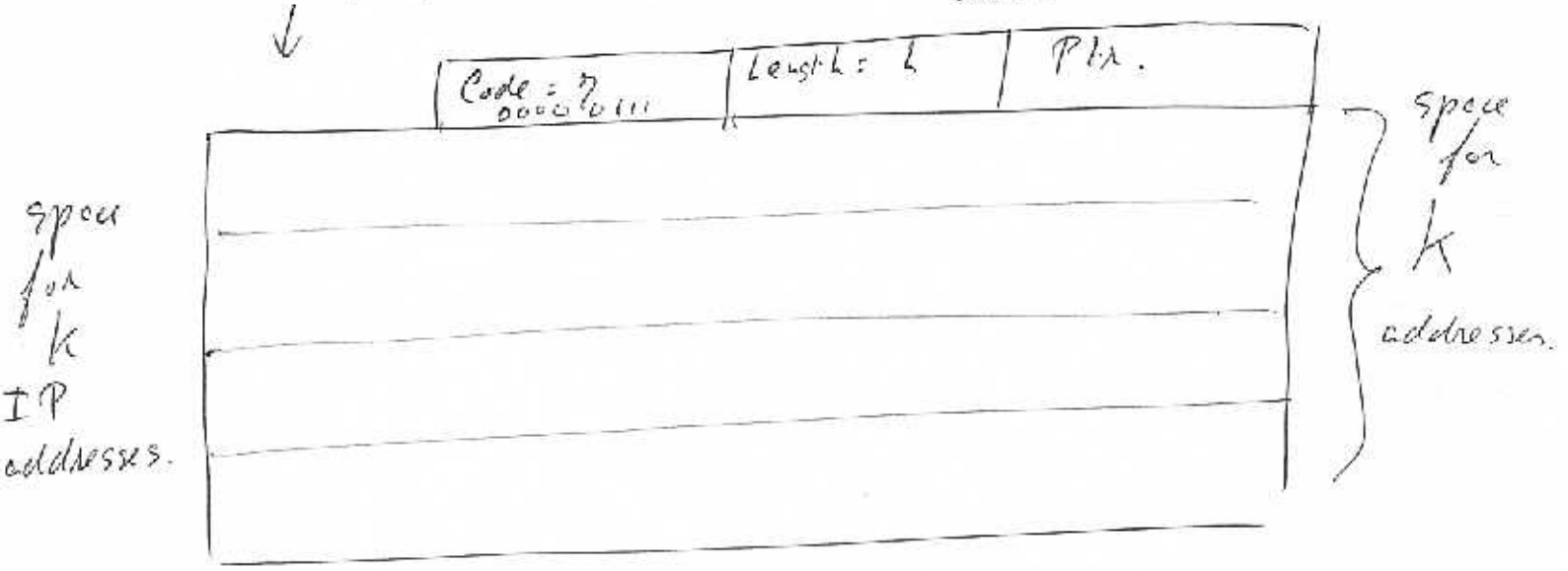
To here 02/24/04.

Record Route.

do not copy ↓ 00 00 0 111

datagram control.

No-Op (?) ↓



Start (Source): Ptr = 4 (points at 4-th Byte in option; 1, 2, 3, 4)

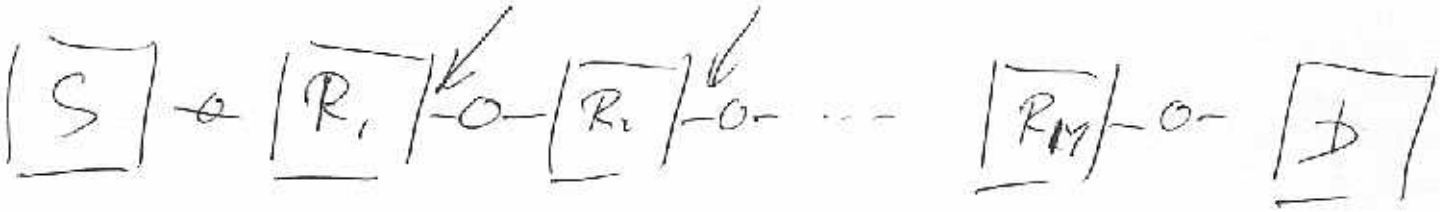
$$L = 4 * K + 3$$

Every Router:

(1) put outgoing IP address in place pointer points at.

(2) Ptr += 4

Result:



As long as $K \geq M$:

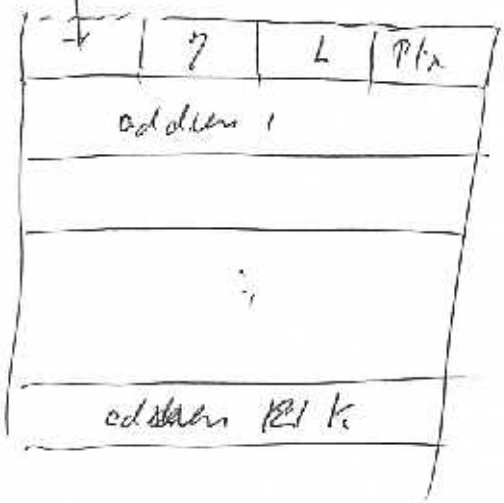
when the packet arrives at D,
the packet will have outgoing
addresses of $R_1, R_2, \ldots R_M$ in its
options field.

if $PLR > L$ (actually: $PLR = L+1$):
Router just routes. no more recording

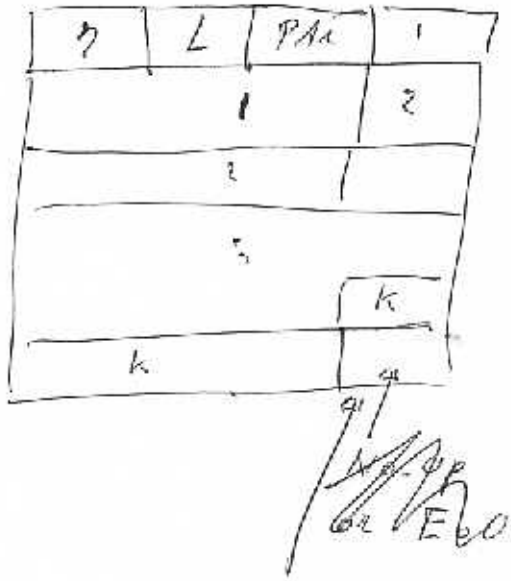
(Record Route)

Forouzan

No-Op



Comer
p 110. "unclear".



or E.O.

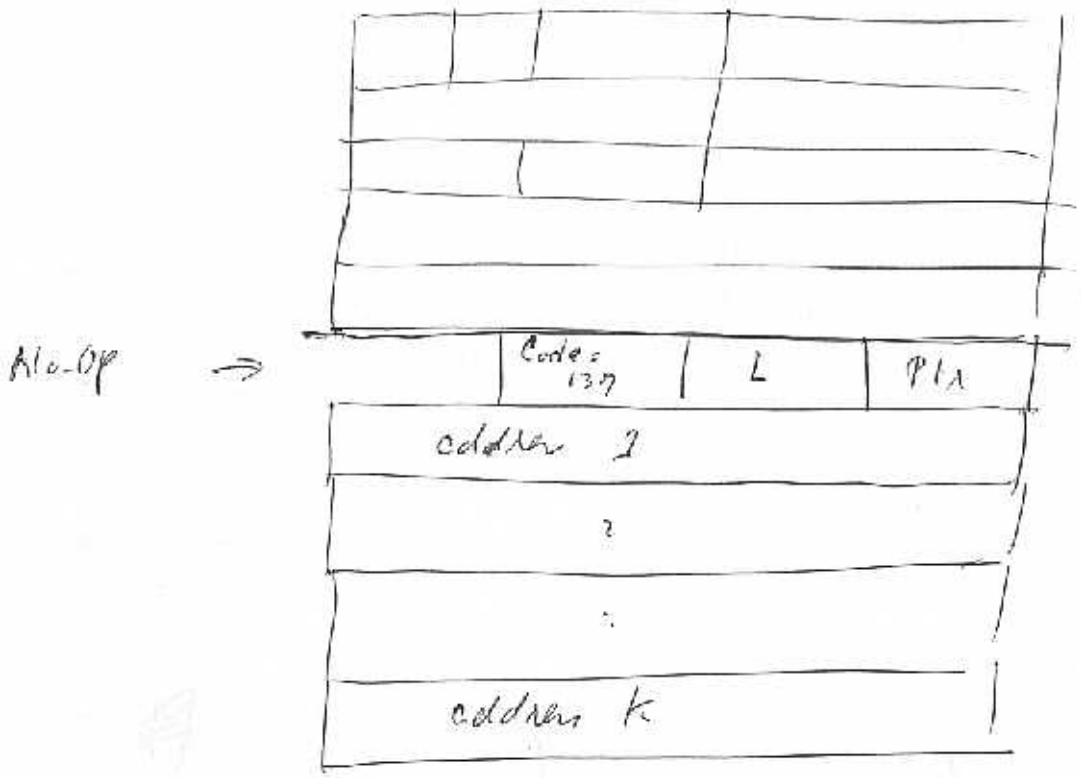
"probably" E.O.
(if no more options).

What is the largest number of IP addresses Record Route can carry?

$5 + 1 + k = 15 \qquad k = 9.$

$L = 4 * k + 3 = 39.$

Strict Source Route. ("Forward Way")



137 =

10001001

copy=1

Oper = 00

Number = 9

$L = 4k + 3.$

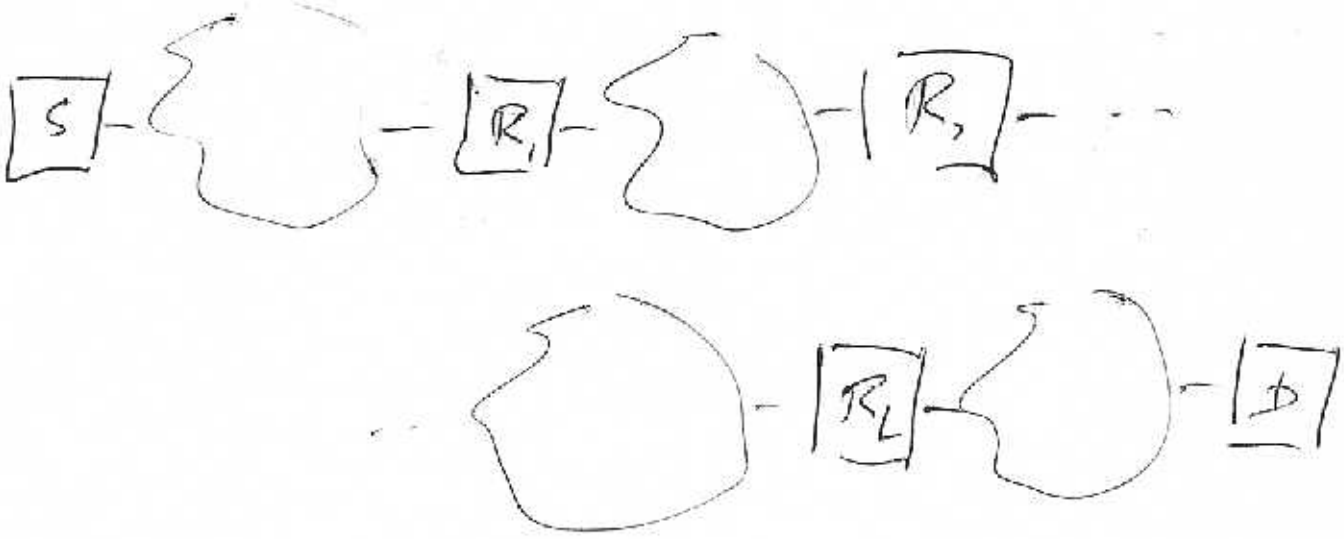
Loose Source Route

Copy = 1

Class = 00 1000 0011

Number = 3

Only specific routers must be visited in specific order, but gaps allowed



In $R_1, \ldots, R_L$: "same rotation as in strict source route".

But no requirement that "next" is reachable in one step.

Time Stamp option.
Comer p. 112