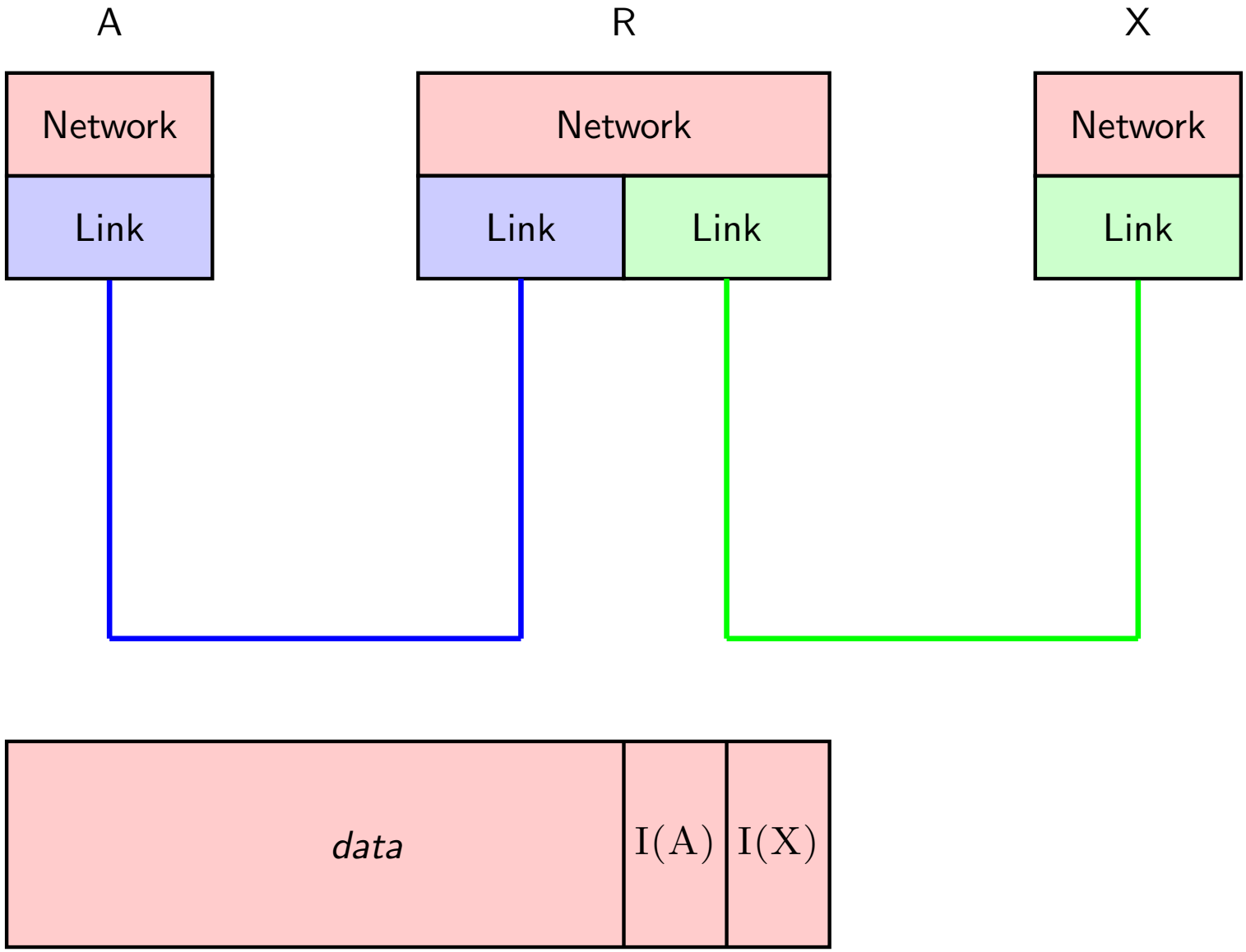
IS1211/IS2111

Computer Networks

Dr. Chamath Keppitiyagama

University of Colombo School of Computing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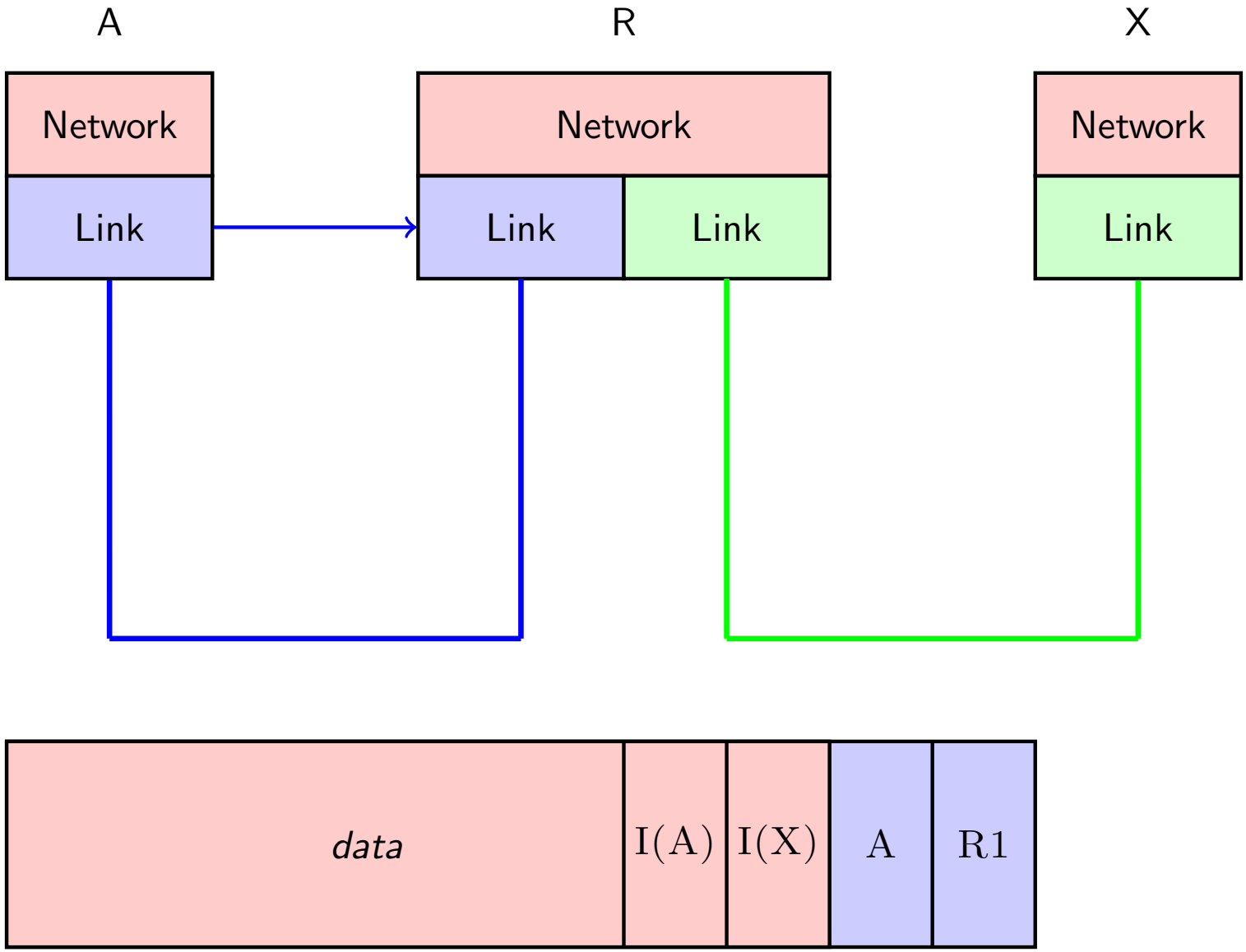
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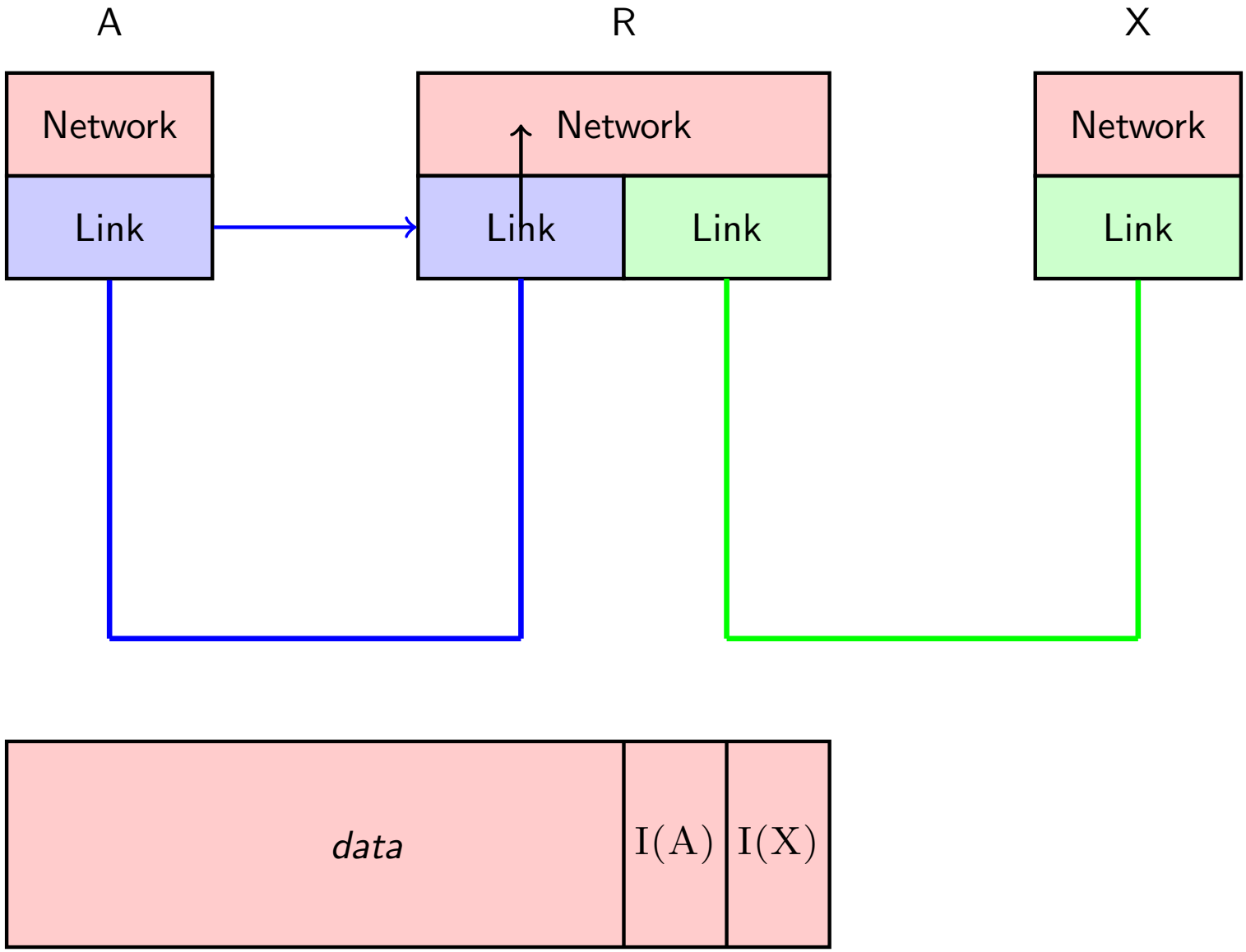
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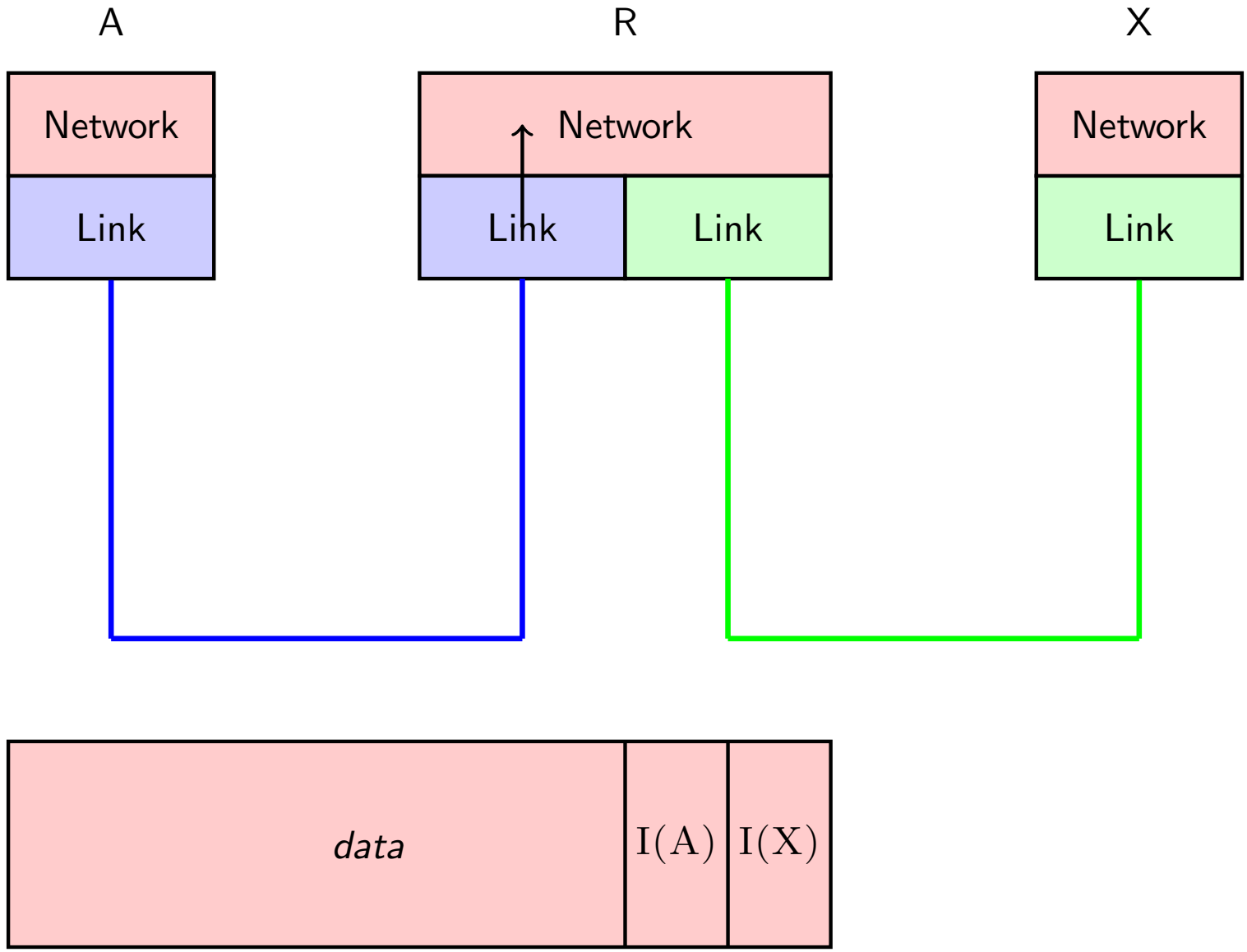
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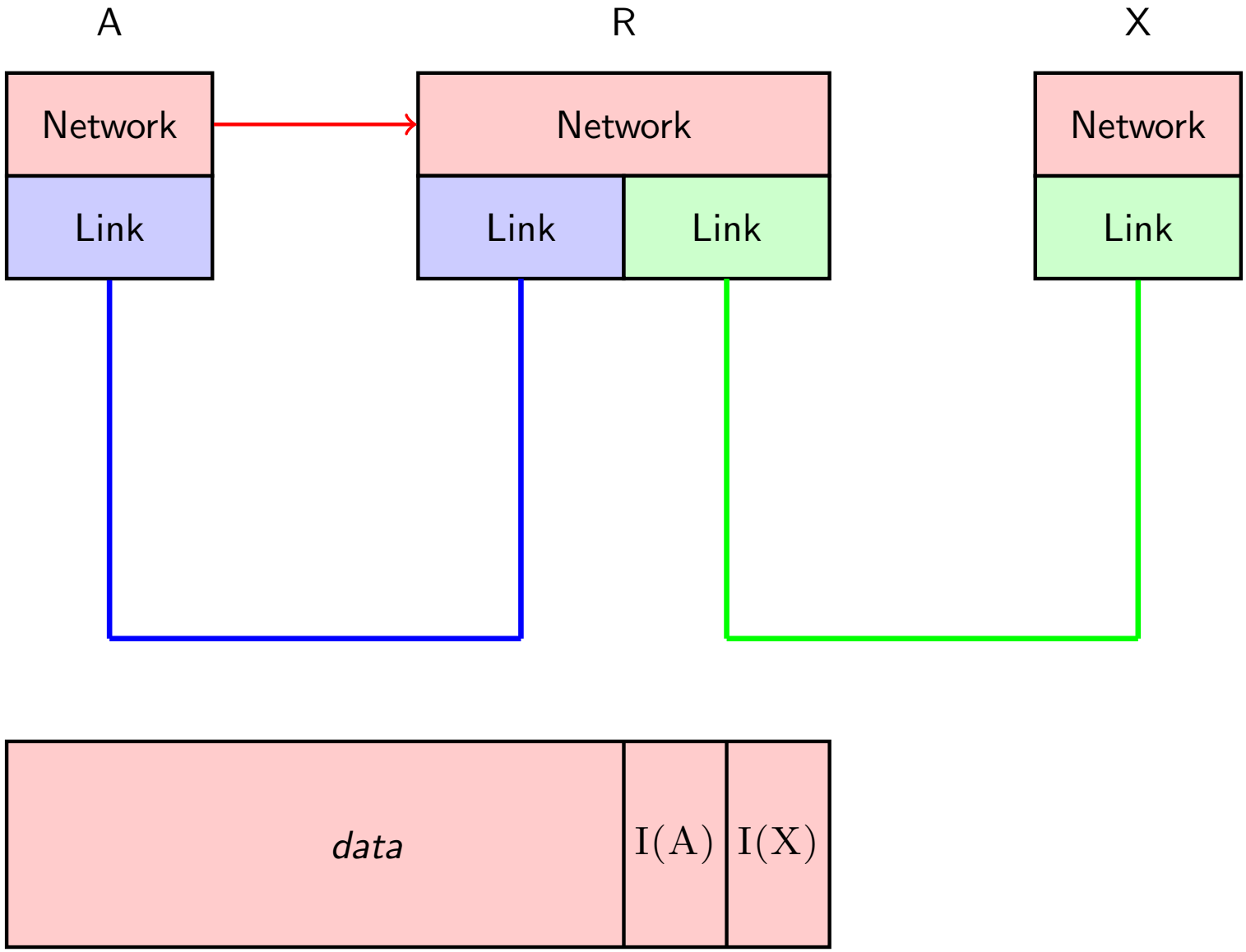
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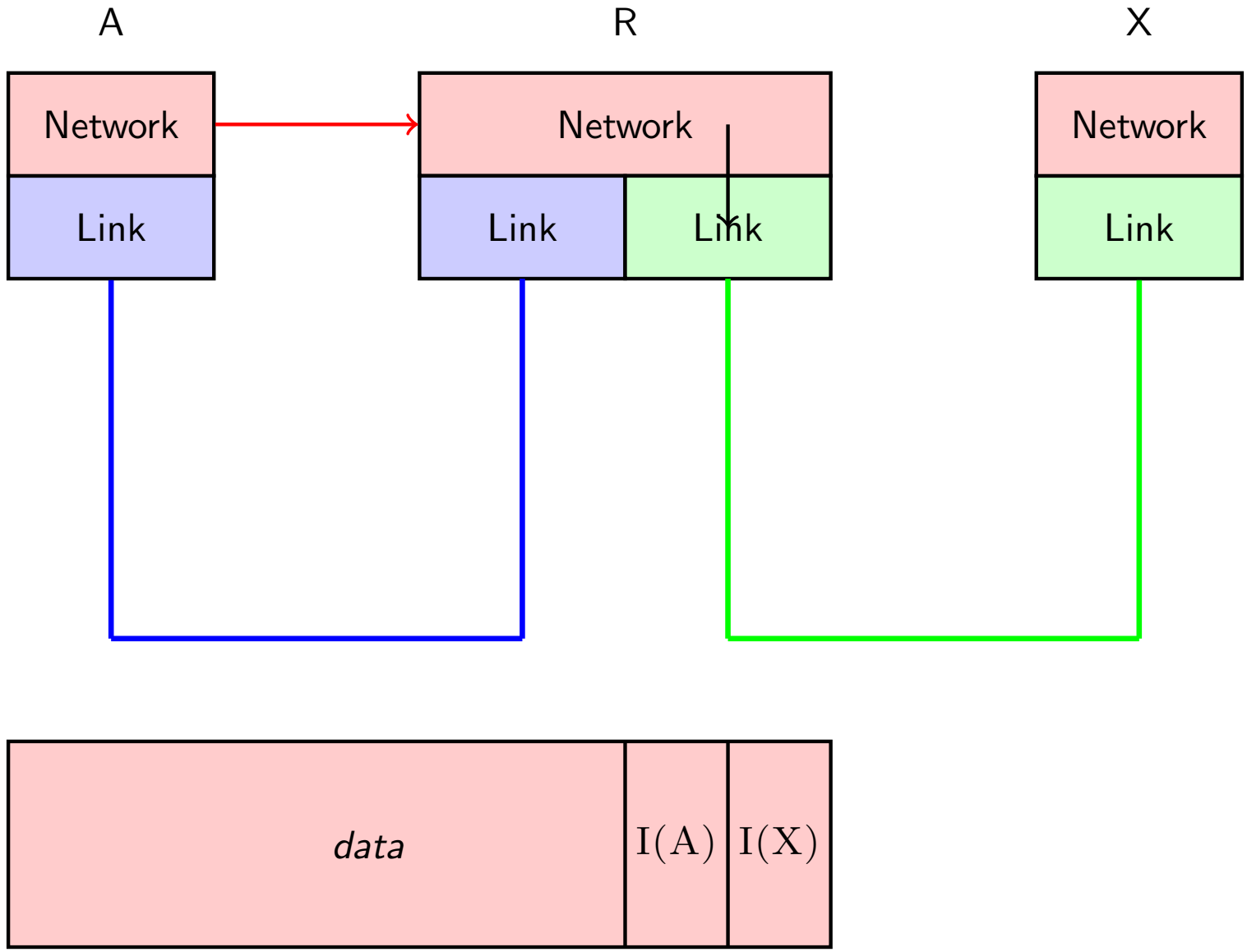
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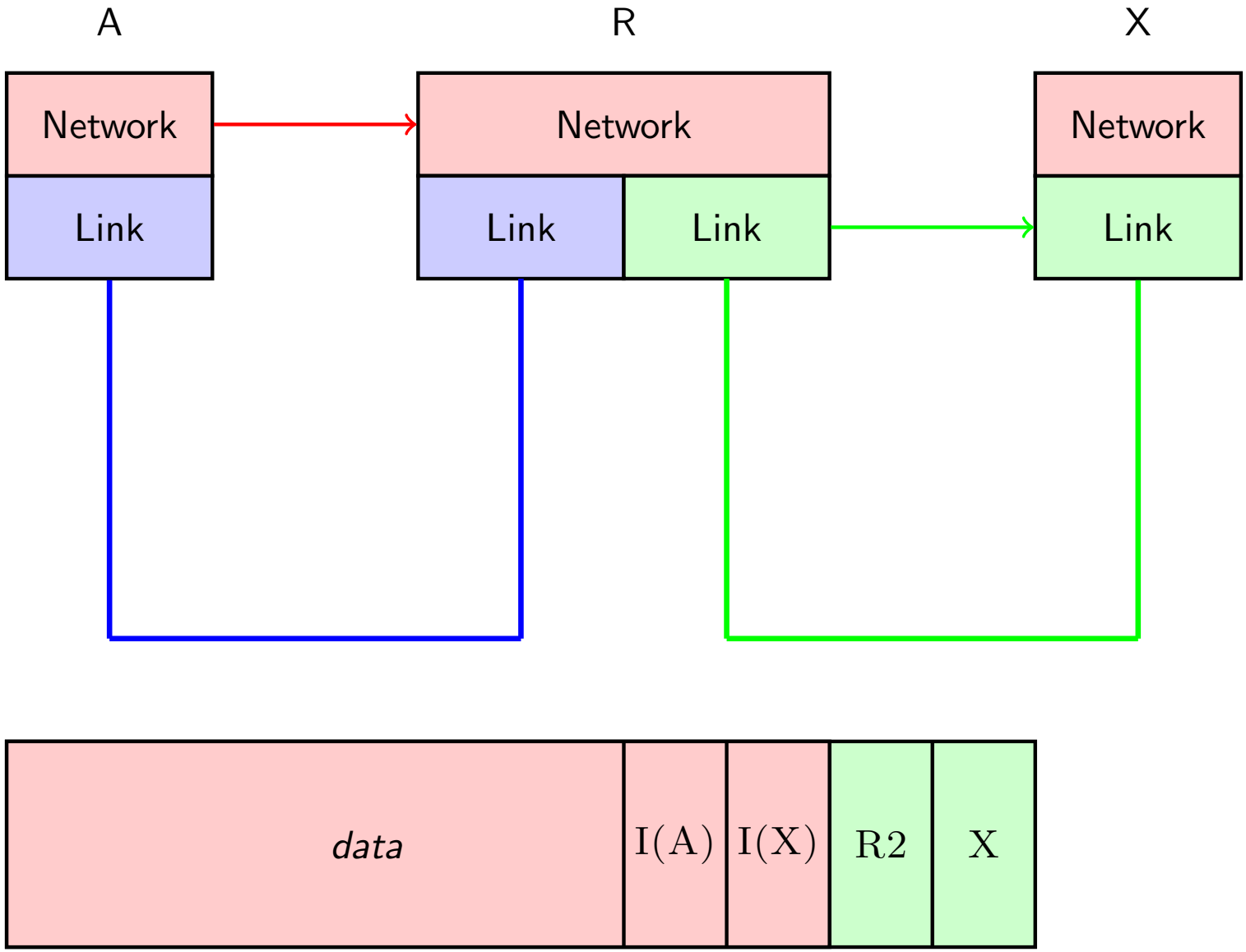
I(X)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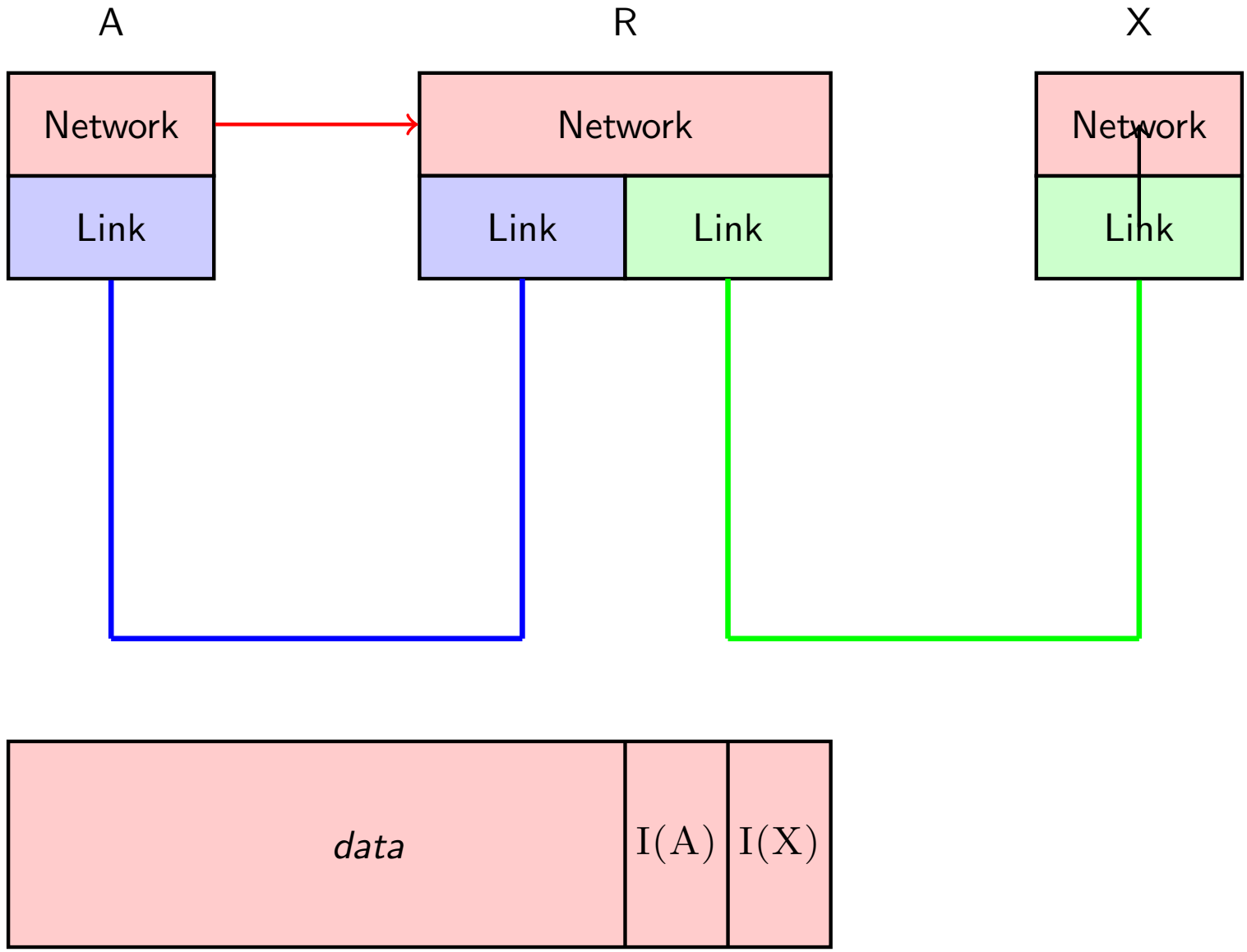
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Link
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data
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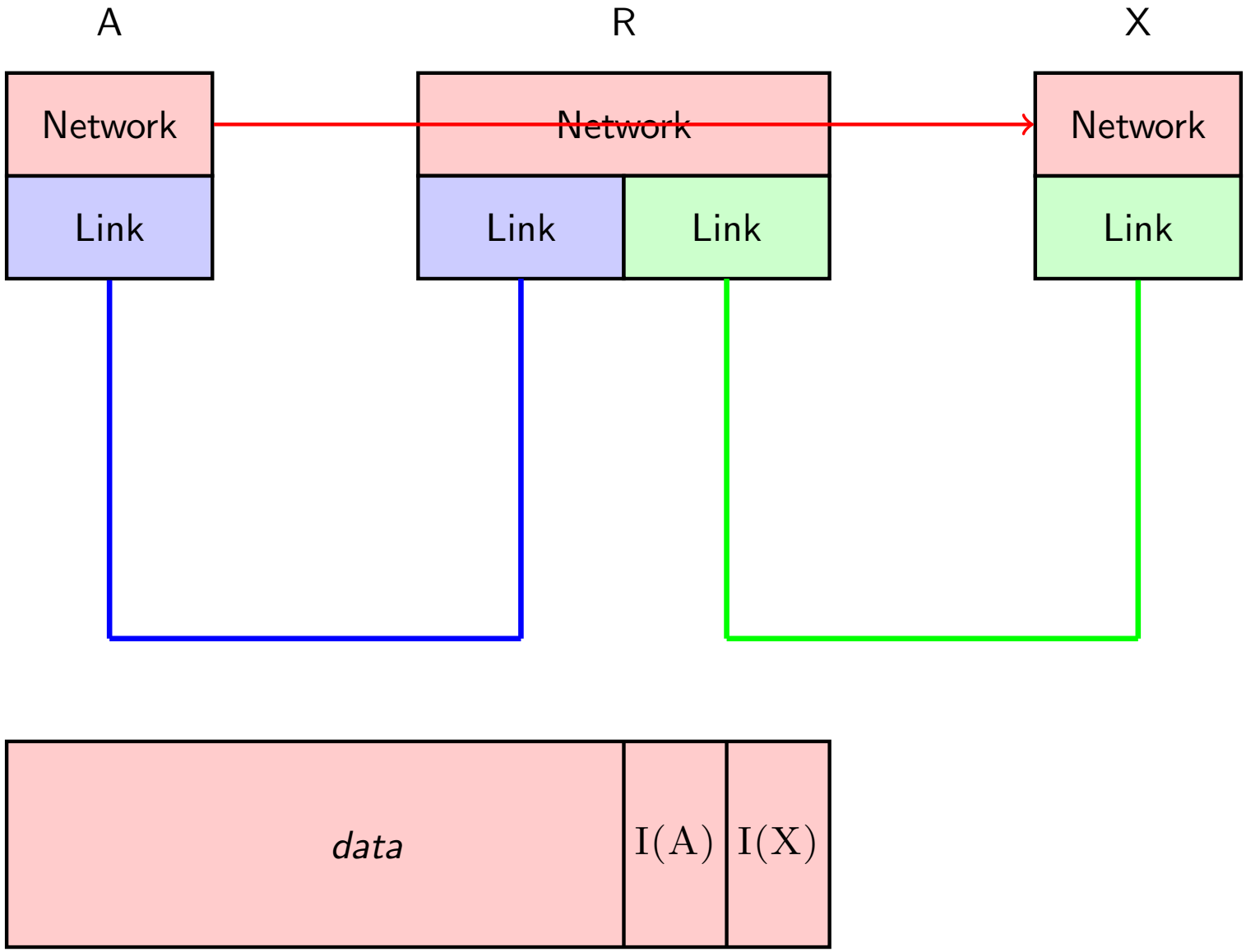
I(X)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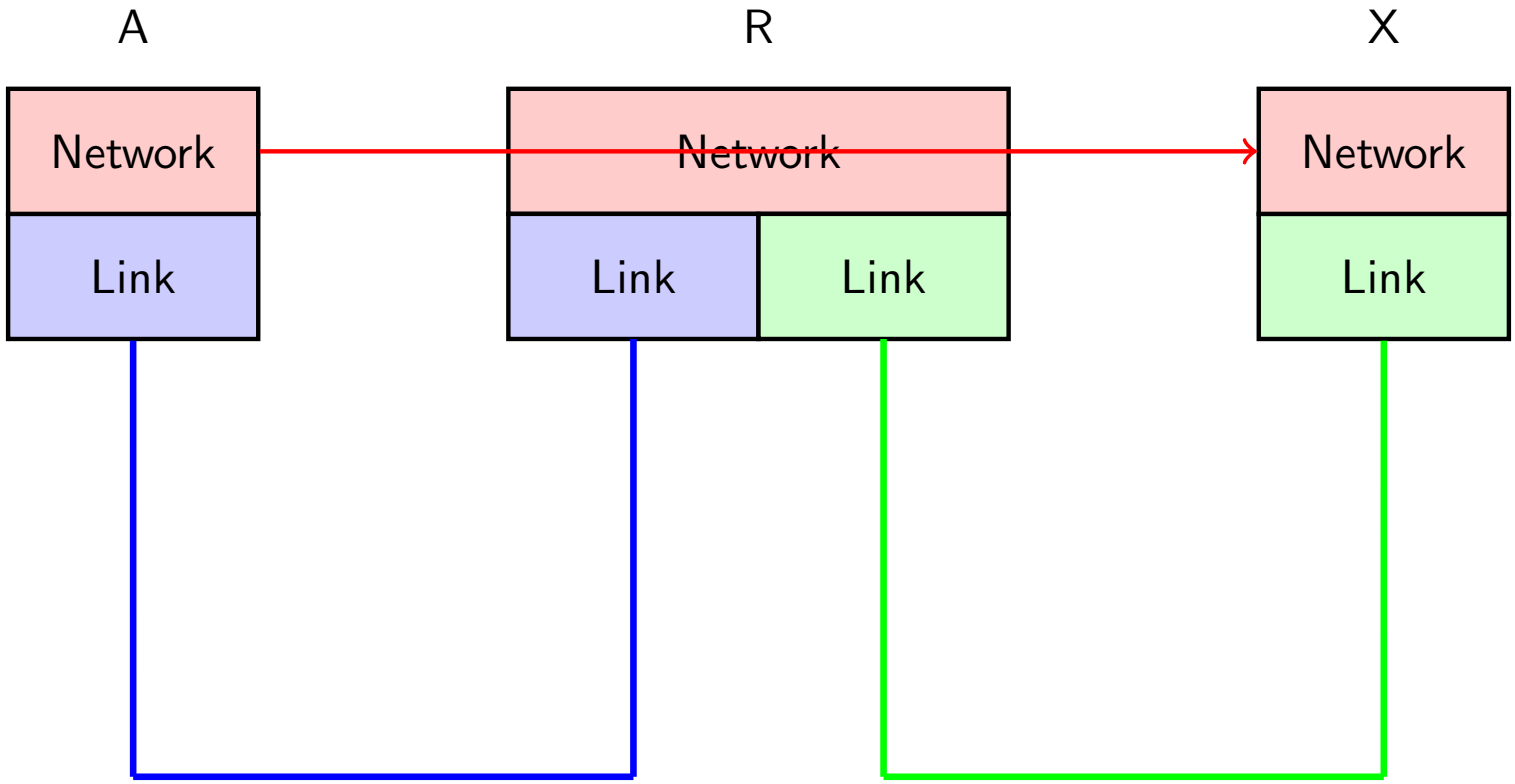
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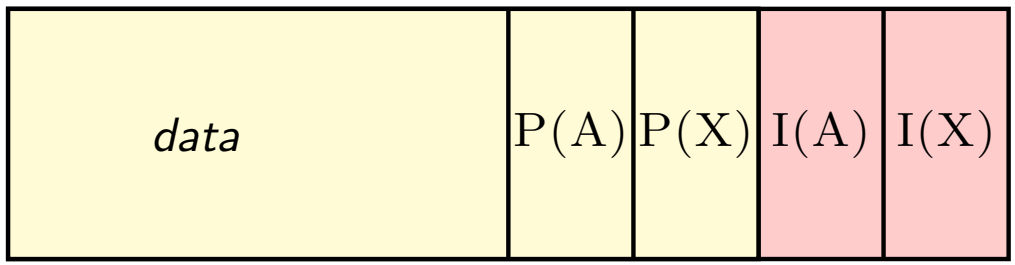
data
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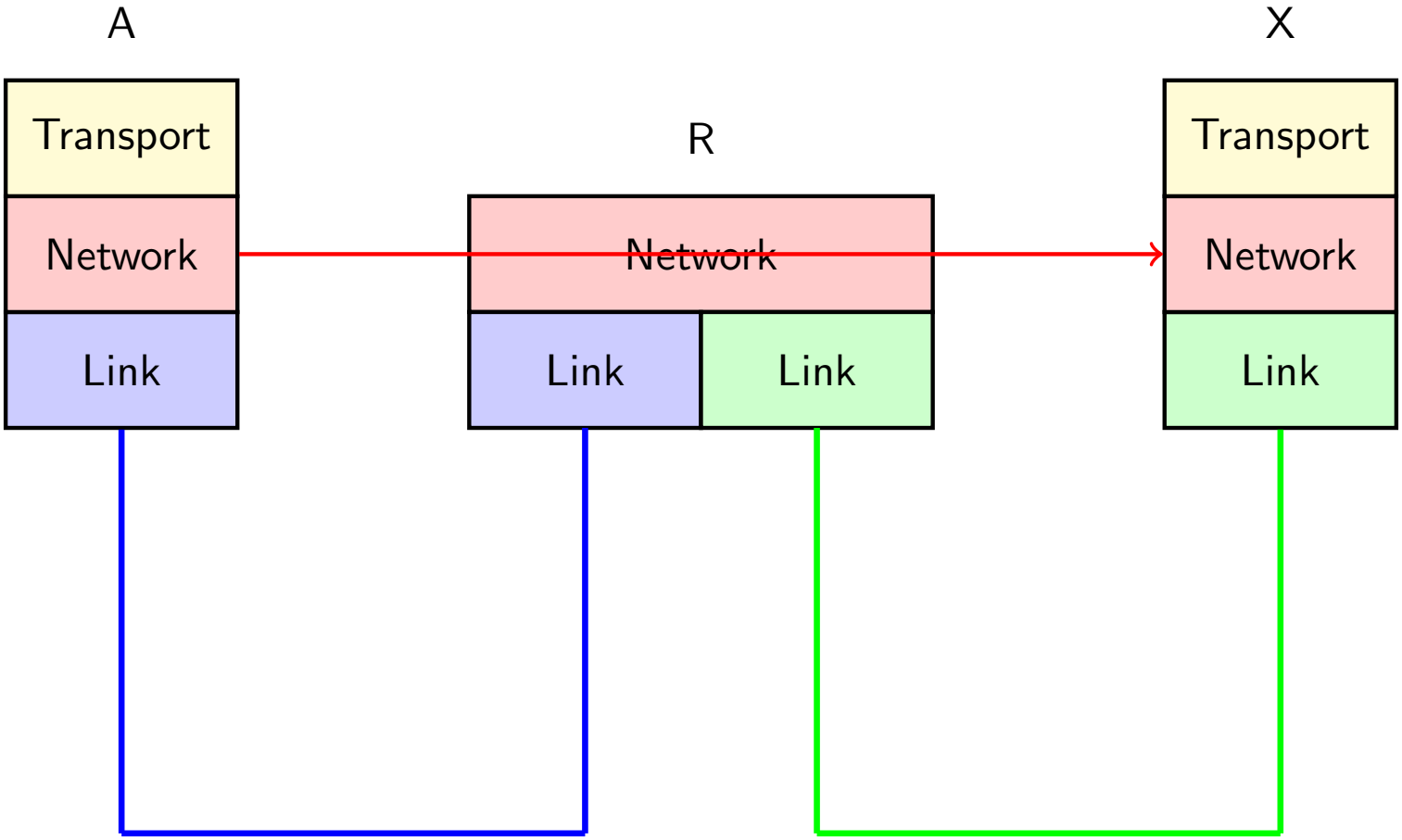
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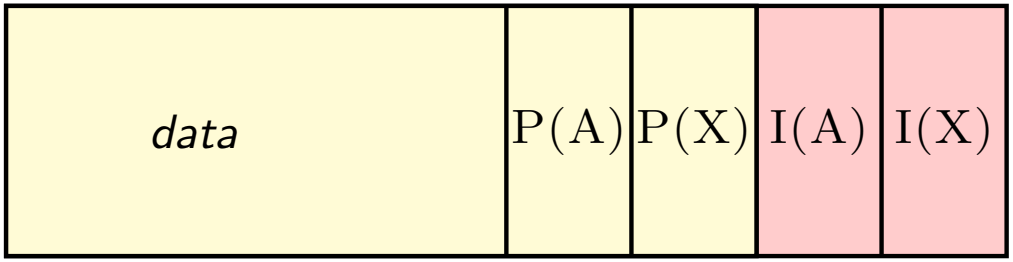
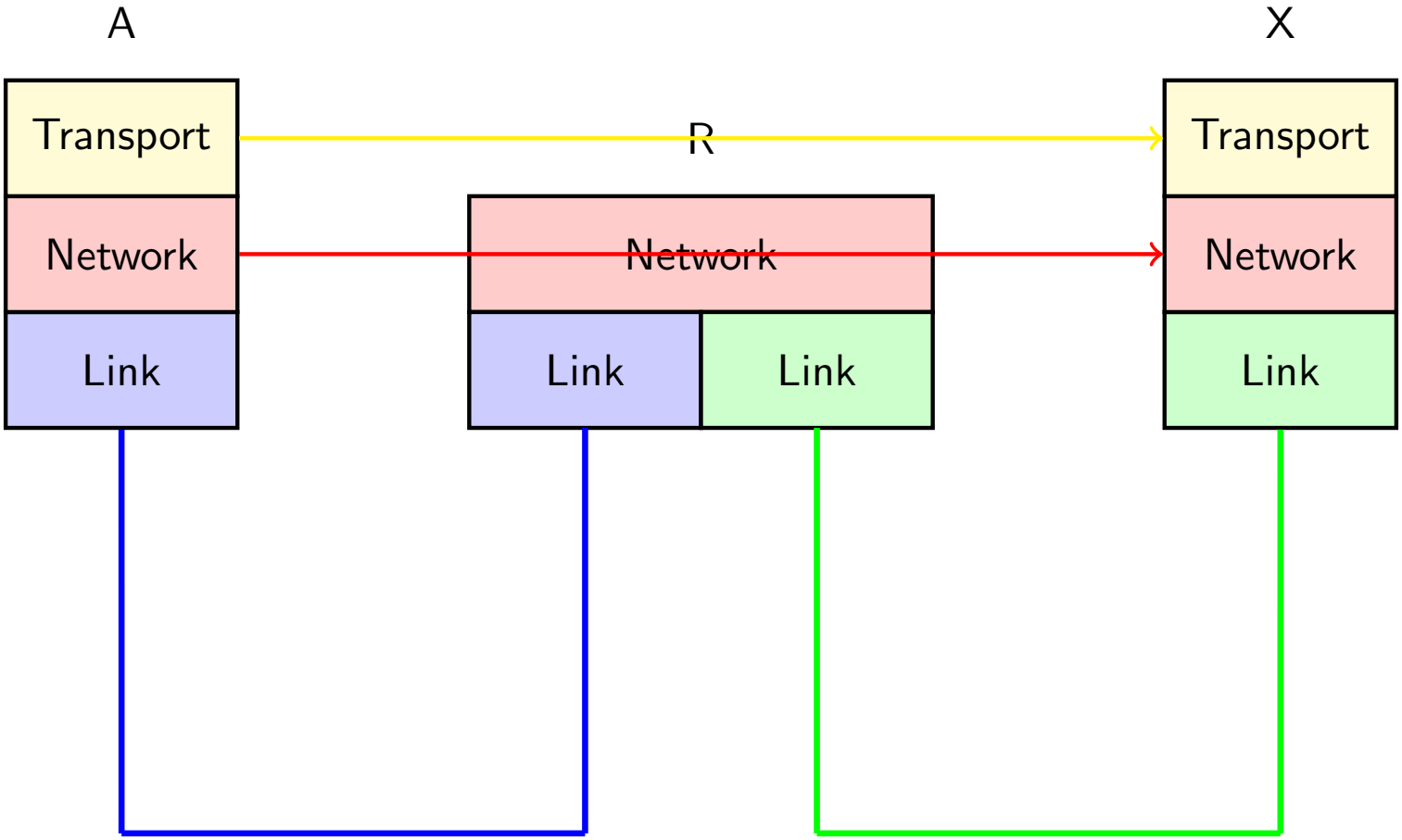
Link


data
P(A)
P(X)
I(A)
I(X)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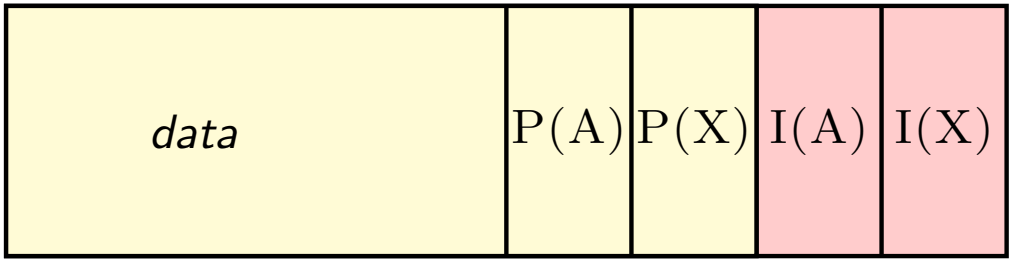
data
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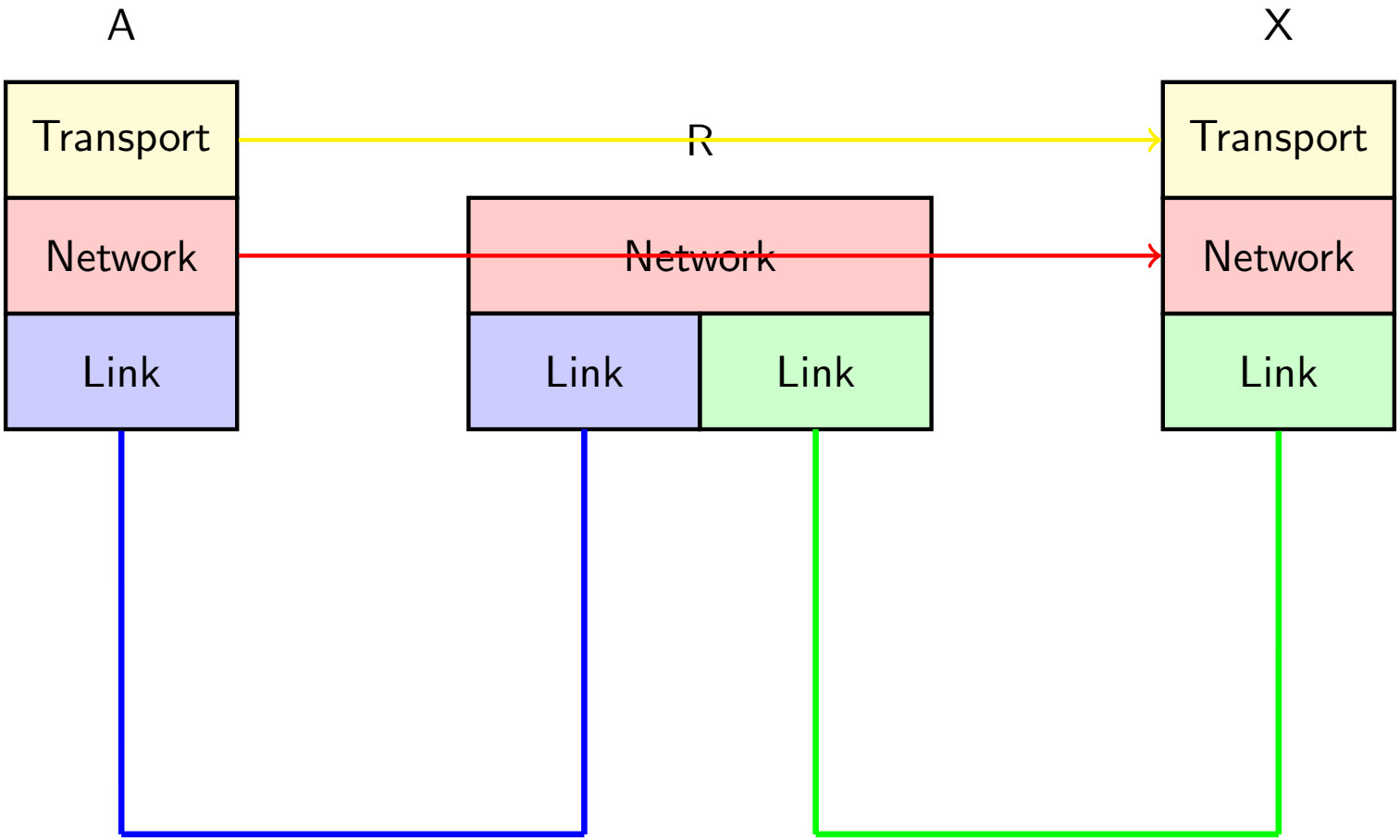
P(X)
I(A)
I(X)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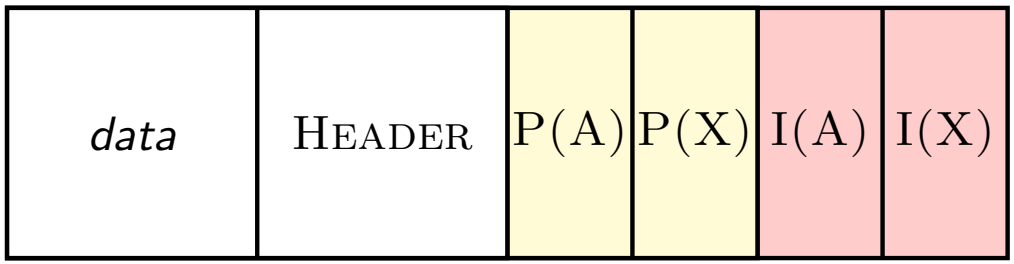
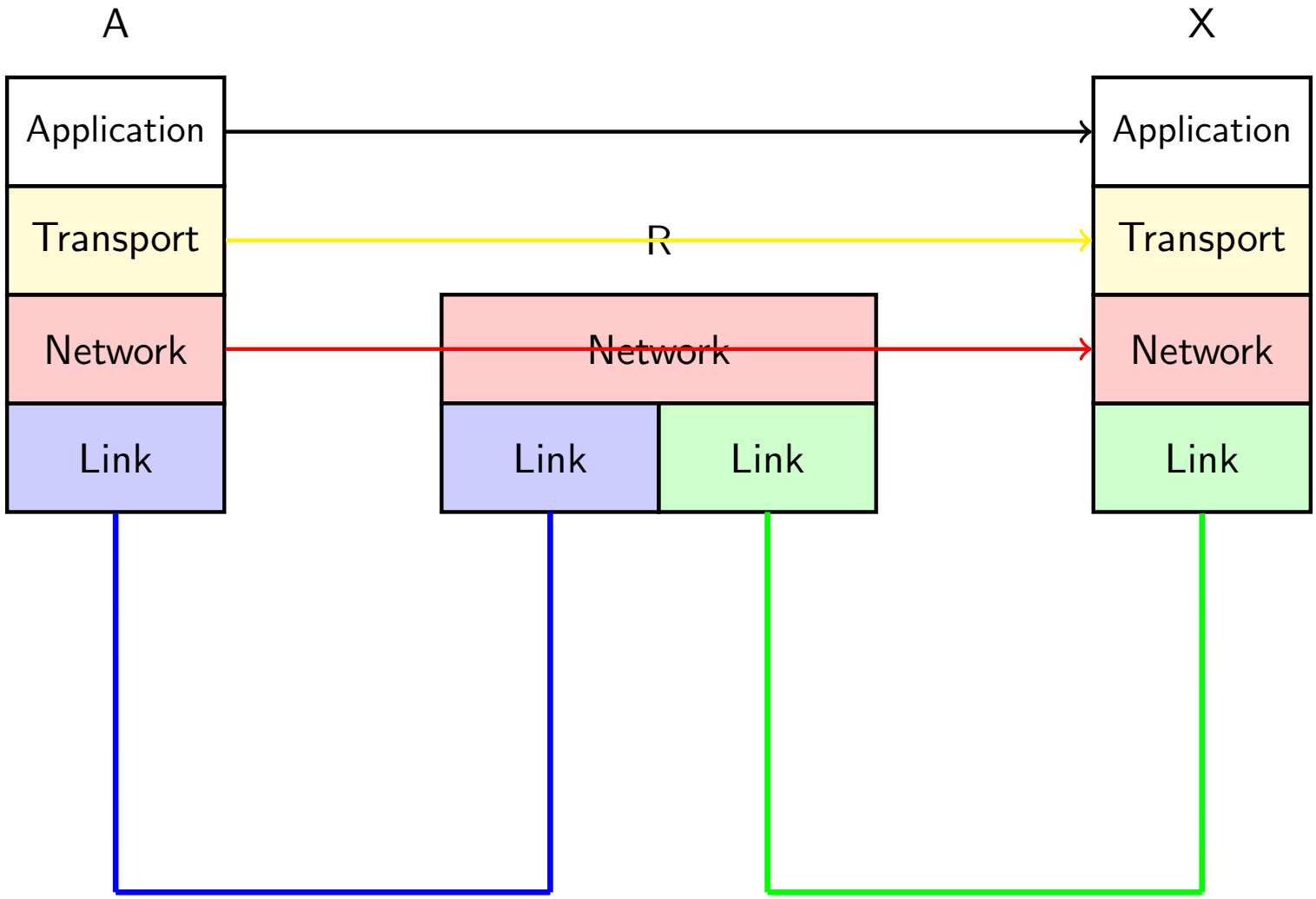

data
Header
P(A)
P(X)
I(A)
I(X)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R
Network
Link
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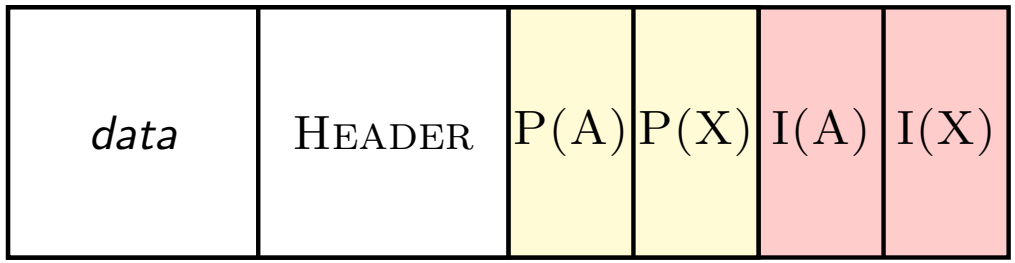
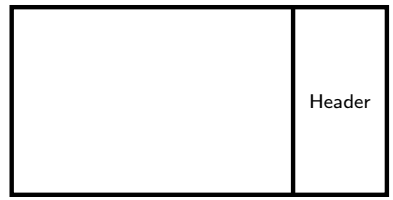
Application
Transport
Network
Link


data
HEADER
P(A)
P(X)
I(A)
I(X)

	Header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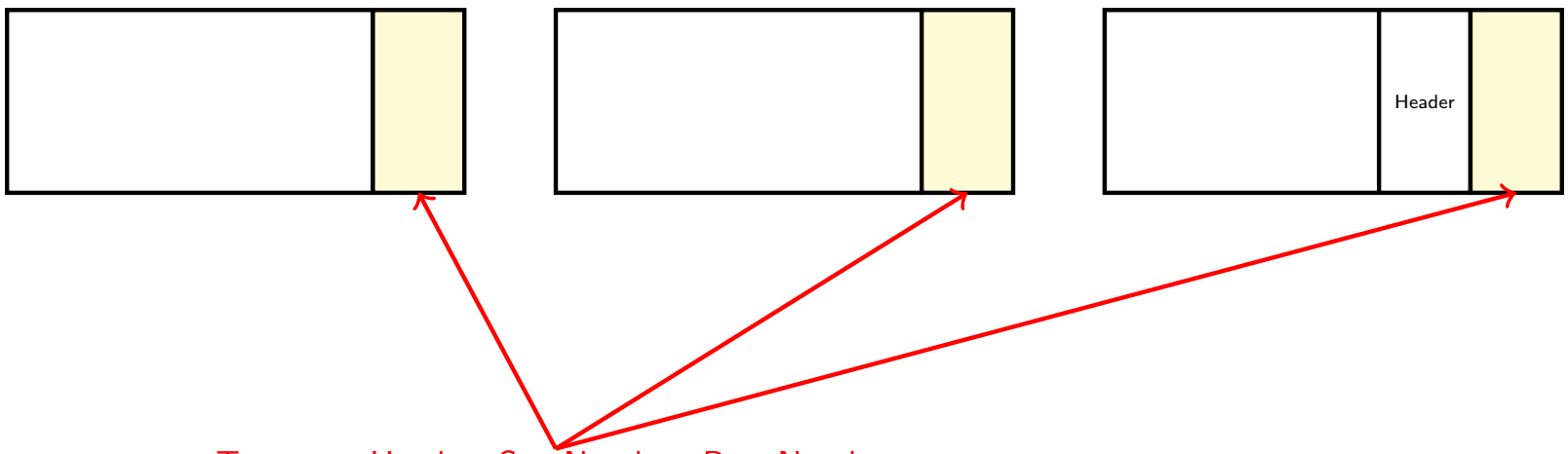
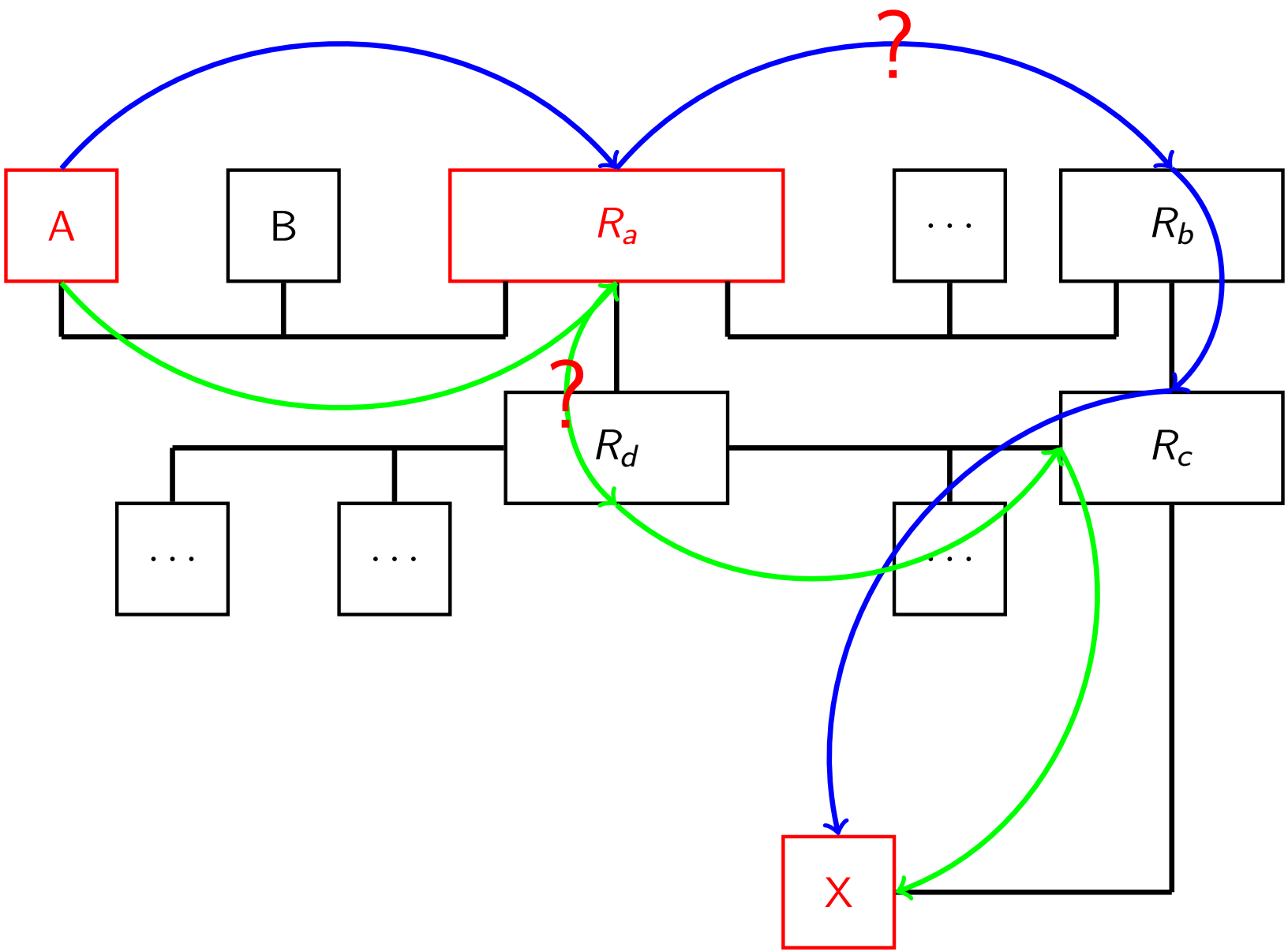
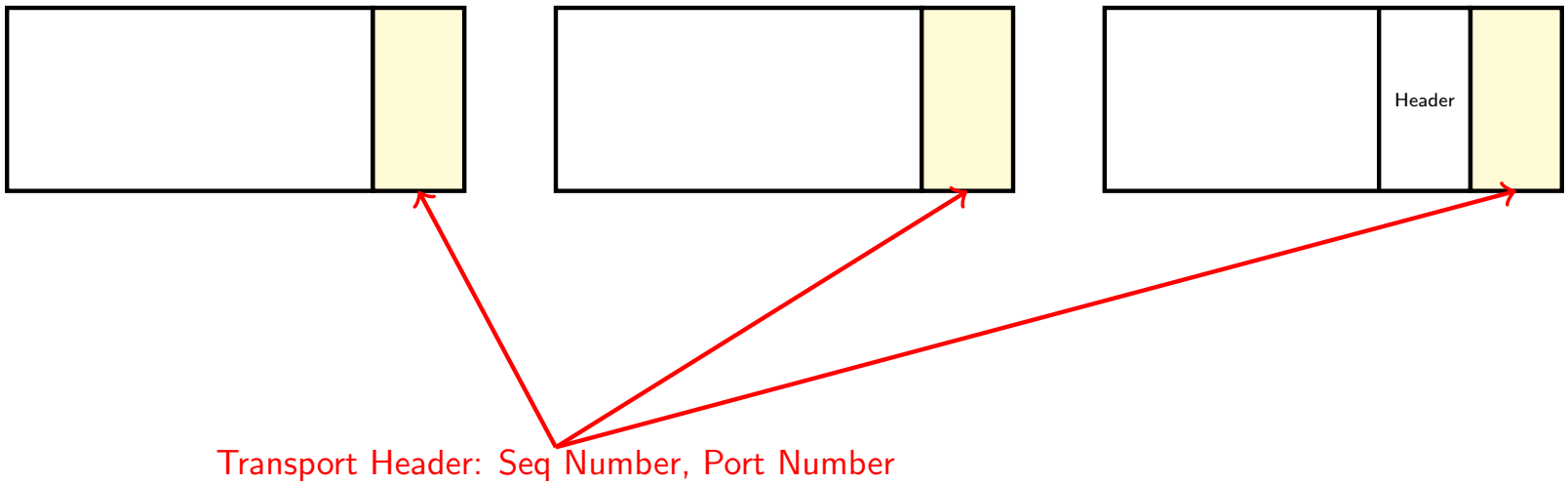

Header
Transport Header: Seq Number, Port Number

Multiple Paths



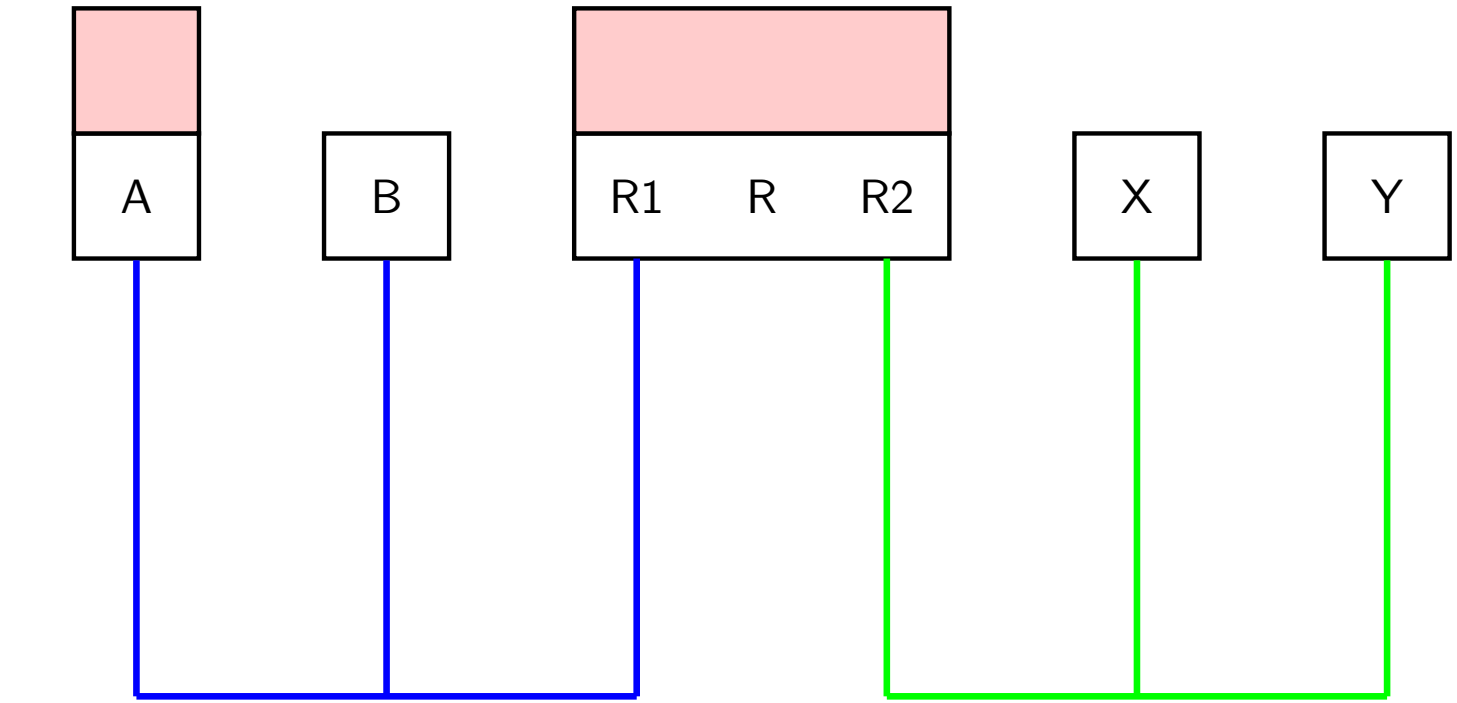

Header
Transport Header: Seq Number, Port Number

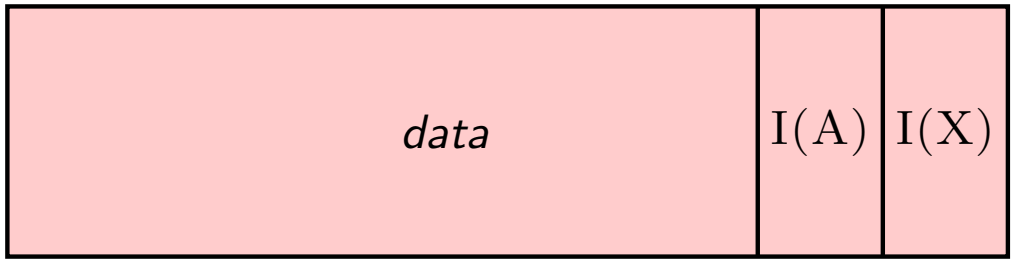

Header

TCP

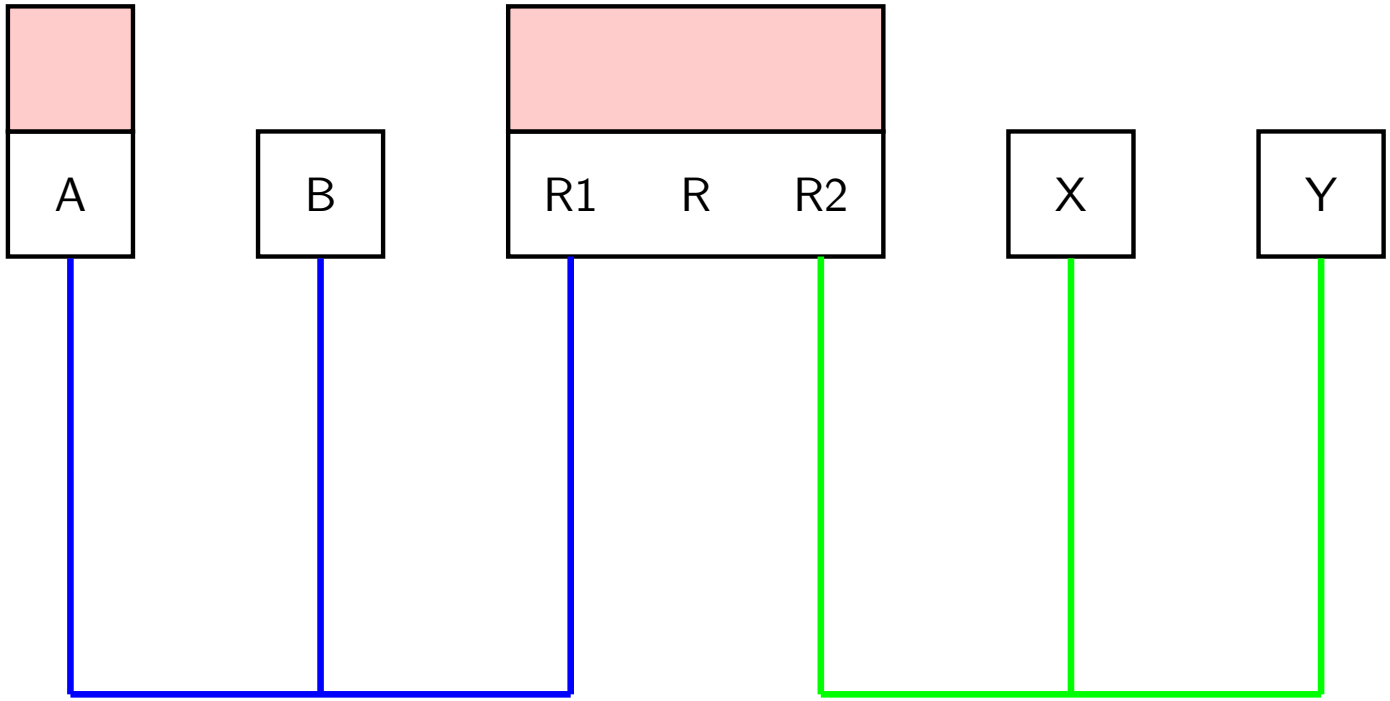
- ...
- Connection Establishment
- Flow Control
- Congestion Control

ARP - Who has $I(X)$?





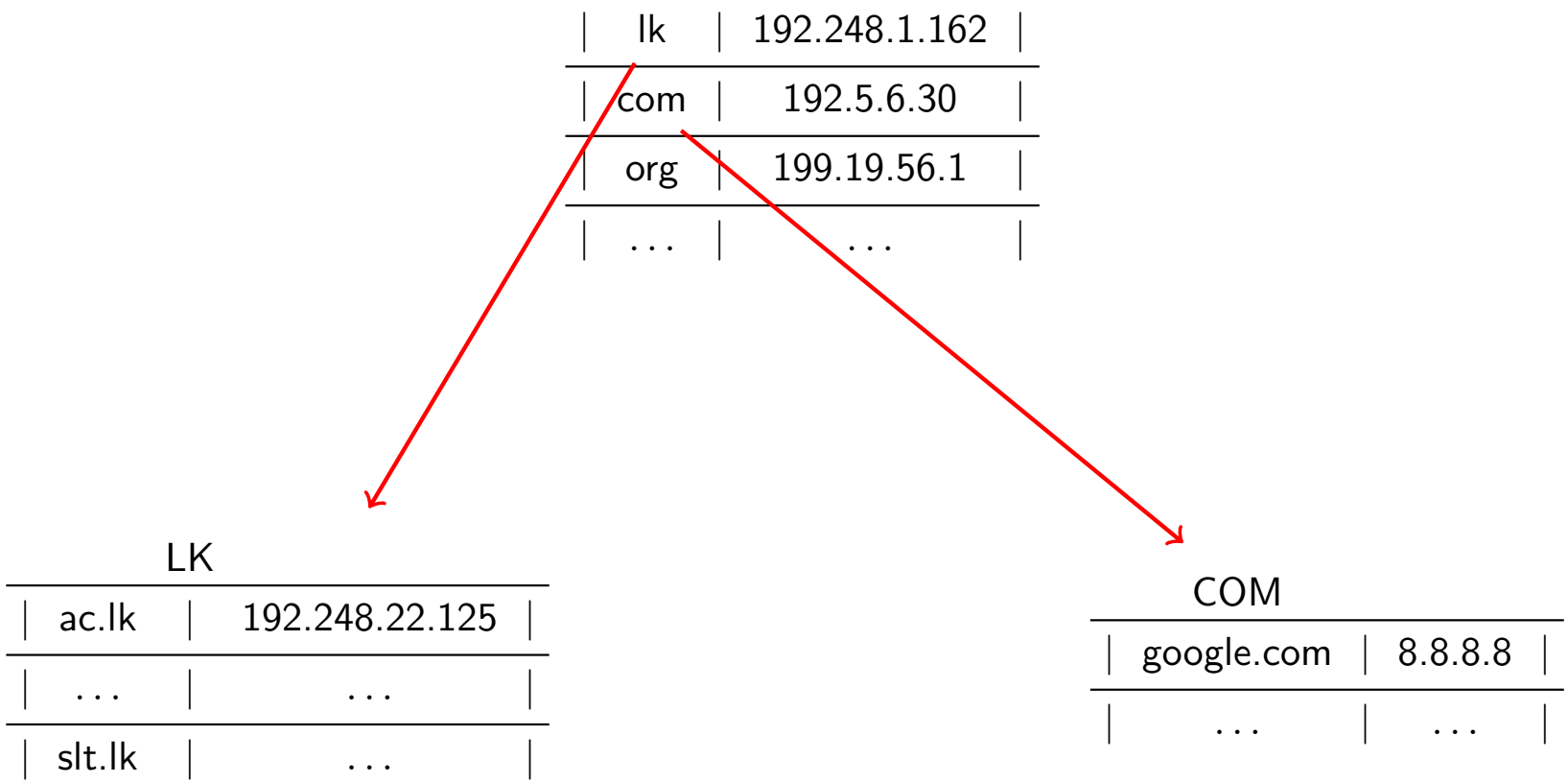
ARP - Who has $I(X)$?



DNS

www.ucsc.cmb.ac.lk	192.248.22.125
ugvle.ucsc.cmb.ac.lk	192.248.22.56
www.mrt.ac.lk	192.248.8.88
mail.ucsc.cmb.ac.lk	192.248.22.125
www.google.com	172.217.194.103
...	...

DNS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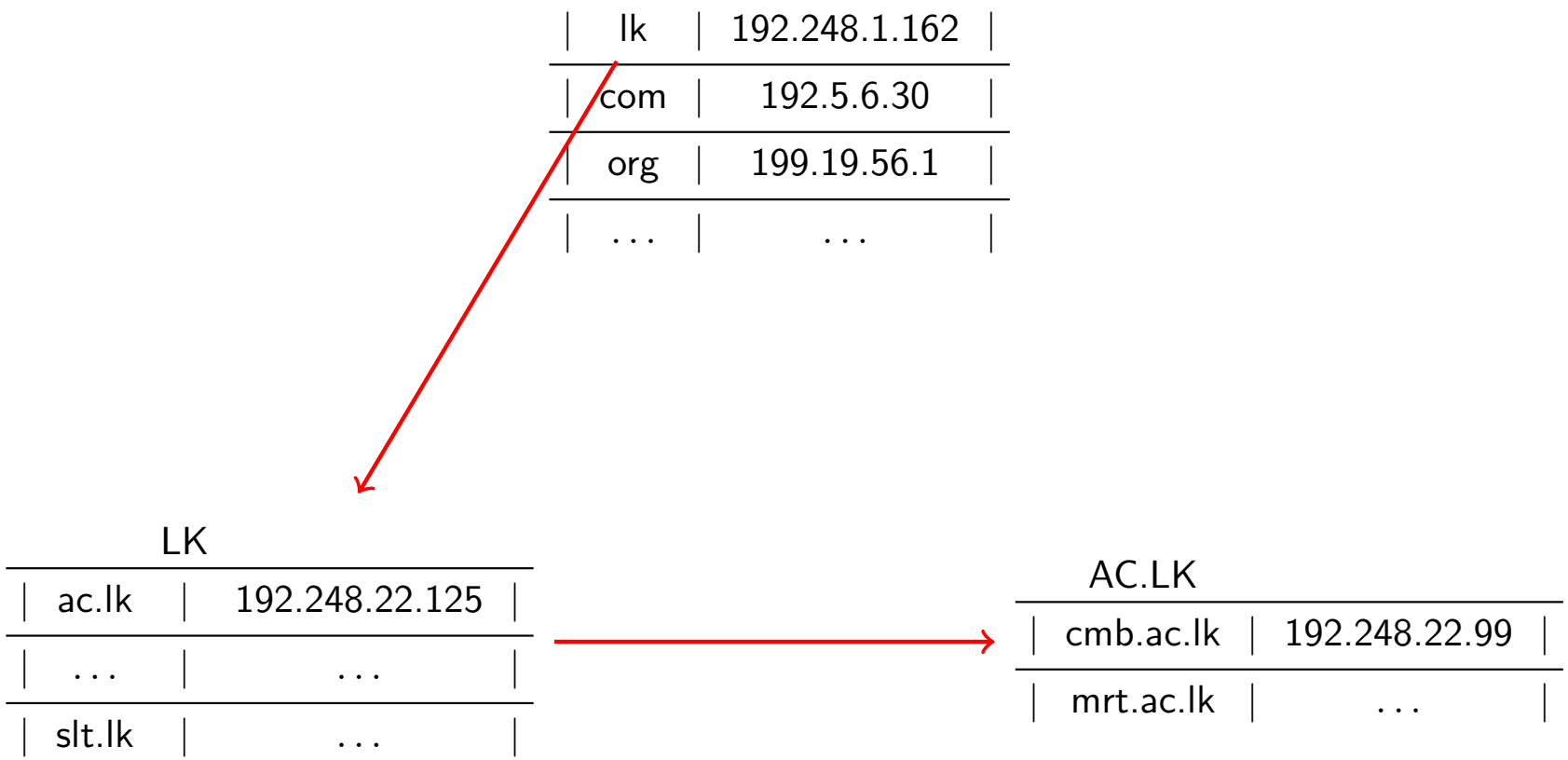
com | 192.5.6.30
org | 199.19.56.1
... | ...
LK
ac.lk | 192.248.22.125
... | ...
slt.lk | ...
COM
google.com | 8.8.8.8
... | ...

DNS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... | ...
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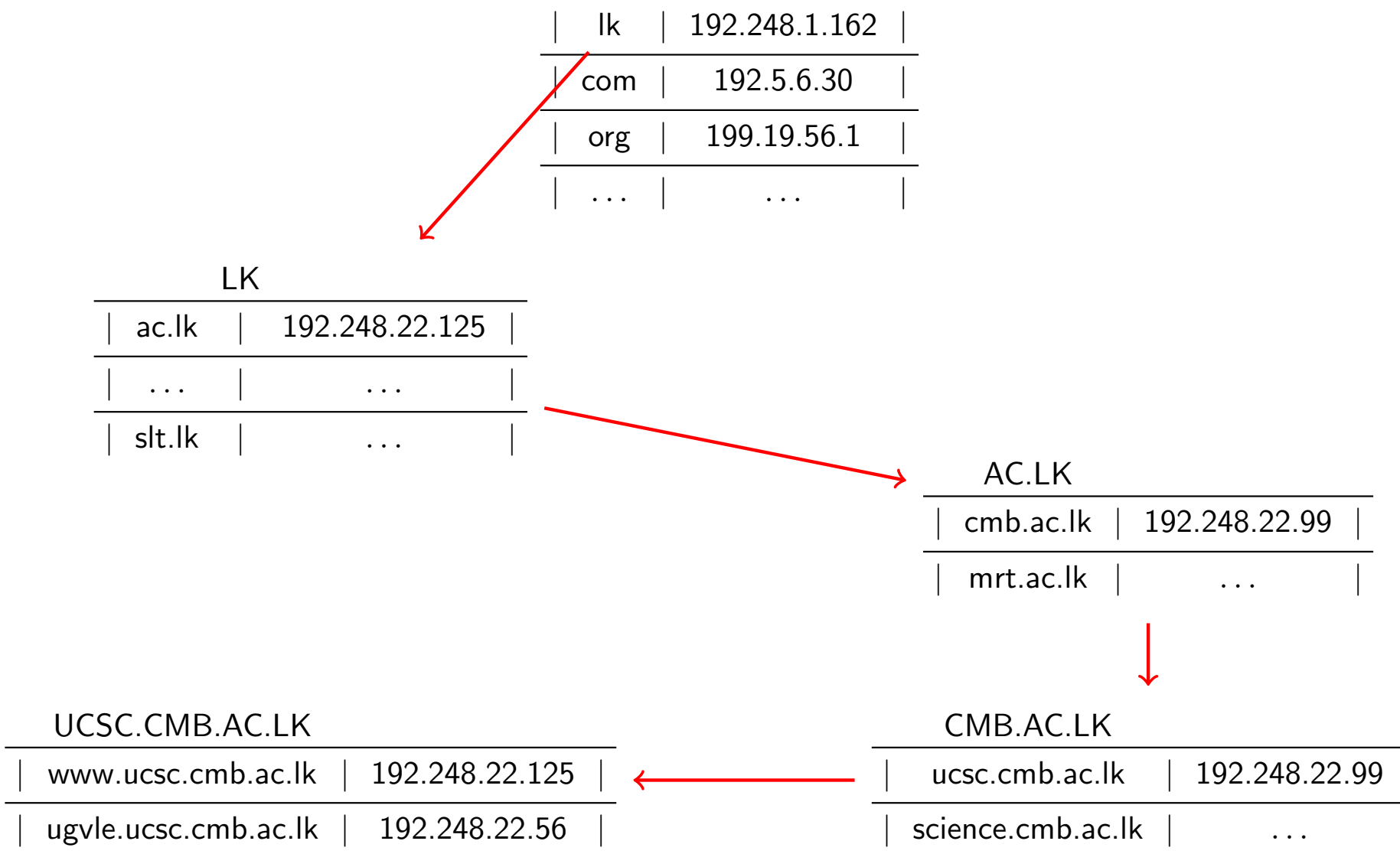
... | ...
slt.lk | ...
AC.LK
cmb.ac.lk | 192.248.22.99
mrt.ac.lk | ...

DNS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slt.lk | ...
AC.LK
cmb.ac.lk | 192.248.22.99
mrt.ac.lk | ...
UCSC.CMB.AC.LK
www.ucsc.cmb.ac.lk | 192.248.22.125
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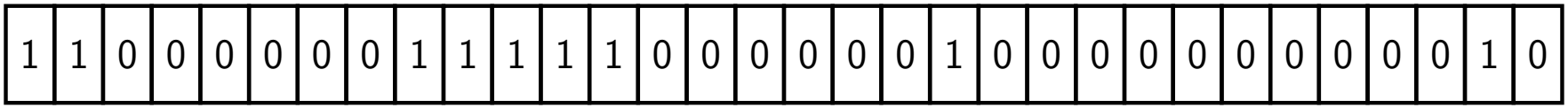
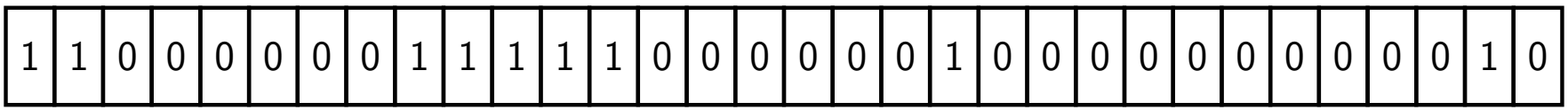
A Message

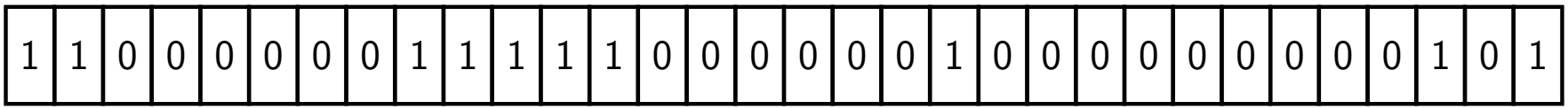


A Message - A Number



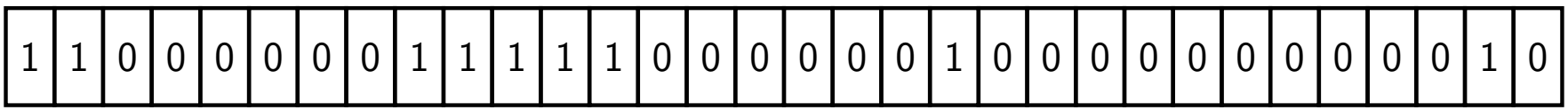
$$m = 114306$$

A Message - A Number



$$c = m+3 = 114306+3 = 114309$$

A Message - A Number



$$m = c - 3 = 114309 - 3 = 114306$$

Encryption

$$c = E(m, k)$$

Decryption

$$m = D(c, k)$$

Public Key Encryption

$$k_{private}$$

$$k_{public}$$

Encryption

$$c = E(m, k_{public})$$

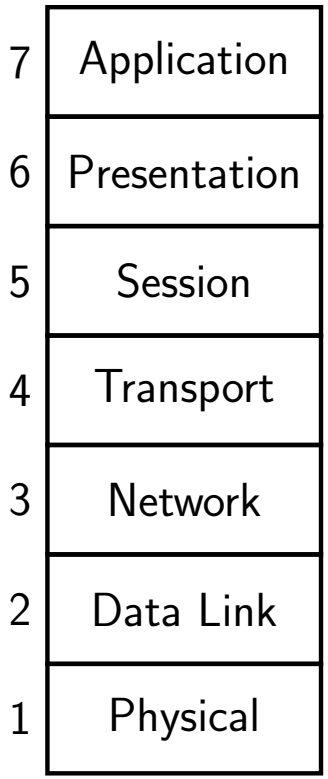
Decryption

$$m = D(c, k_{private})$$

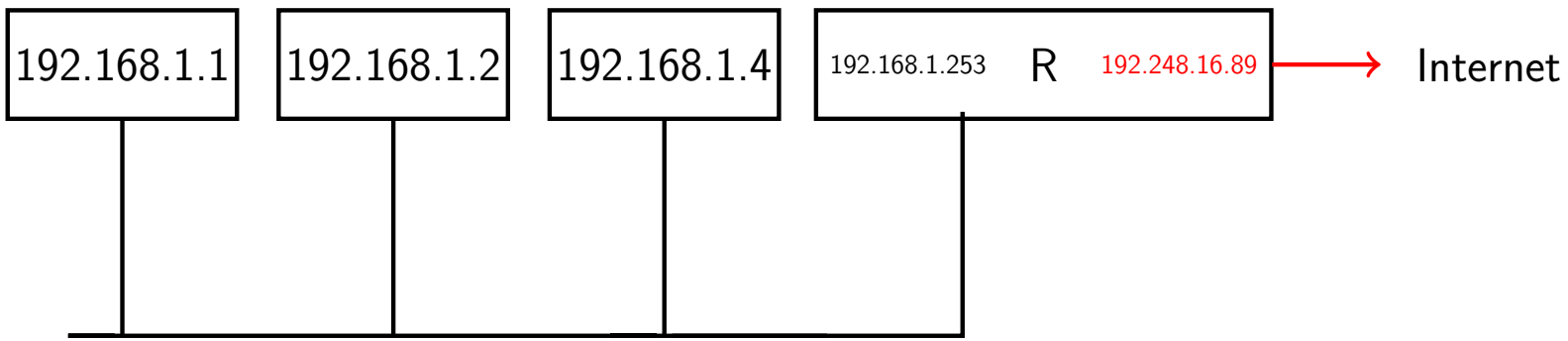
Encrypting With the Private Key ???

$$c = E(m, k_{private})$$

ISO/OSI Reference Model



NAT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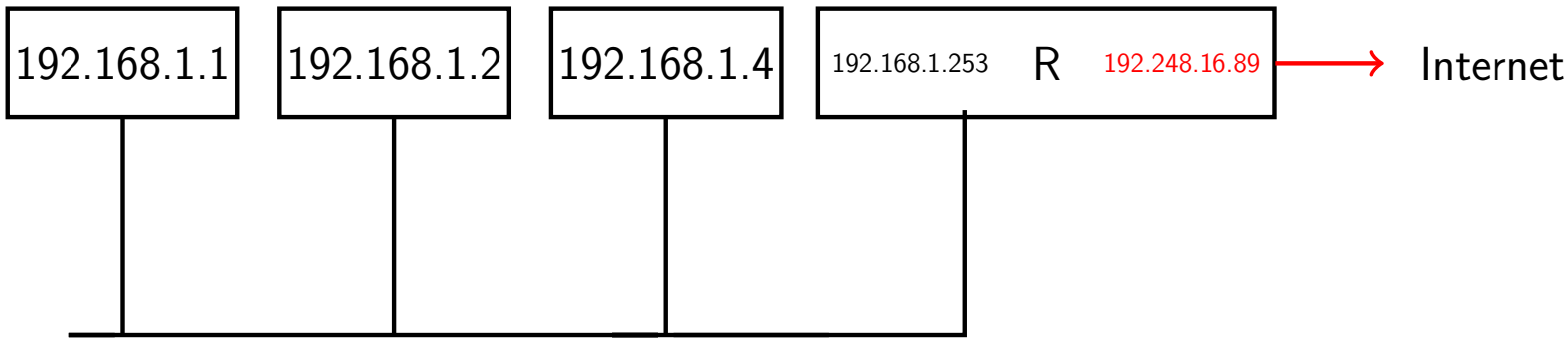
192.168.1.2
192.168.1.4
192.168.1.253
R
192.248.16.89
Internet

NAT



Source	Destination	Translation
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192.168.1.1:3250	220.247.222.74:25	192.248.16.89:5634
...	...	...