Computer Science & IT

COMPUTER NETWORKS (CN)

IP address Subnetting Supernetting

Lecture No. 4

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Recap of Previous Lecture

- Topic
- Topic
- Topic

IP

Topics to be Covered

- Topic
- Topic
- Topic

Subnetting → 1 question

Unstoppable Indians: Stories to Ignite Student Motivation

Meghnad Saha (1893–1956) developed the thermal ionization equation, now known as the Saha equation, to explain how elements in stars become ionized at high temperatures. Working with limited resources at Calcutta University, he applied principles of physics to astrophysics, predicting stellar spectra accurately. Beyond research, Saha served as an institution-builder in India, founding institutes for nuclear and cosmic ray research. His work bridged theory and observation, earning global recognition and inspiring generations of Indian scientists.

Lesson: Applying core principles creatively can unlock new fields of discovery, even with scarce resources.

Unstoppable Indians: Stories to Ignite Student Motivation

C. N. R. Rao Chellapilla Narasimhacharya Ramarao Rao (b. 1934) is one of the most cited chemists globally. At the Indian Institute of Science, he pioneered transition metal oxide research, uncovering fundamental insights into superconductors and multifunctional materials. Rao founded and led the Jawaharlal Nehru Centre for Advanced Scientific Research, mentoring hundreds of researchers. His lifelong commitment to excellence, collaboration, and science communication has elevated Indian chemistry on the world stage. ***Lesson:*** Sustained passion for research and mentorship cultivates both innovation and future scientific leaders.

Unstoppable Indians: Stories to Ignite Student Motivation

Har Gobind Khorana (1922–2011) decoded the genetic code and synthesized the first artificial gene. Born in Raipur, India, he earned a PhD at Cambridge and later worked at MIT and the University of Wisconsin. Khorana's experiments showed how nucleotide sequences specify protein synthesis, revolutionizing molecular biology. Awarded the 1968 Nobel Prize in Medicine, he remained humble and focused on training young scientists from diverse backgrounds. ***Lesson:*** Rigorous experimentation combined with collaborative spirit can transform our understanding of life's fundamental processes.

Unstoppable Indians: Stories to Ignite Student Motivation

Roddam Narasimha (b. 1933) was an aerospace scientist instrumental in India's space and defense programs. After earning a doctorate at Caltech, he returned to India, contributing to wind tunnel design, fluid dynamics, and supersonic flight research at the National Aerospace Laboratories. Narasimha advised ISRO on launch vehicle technology and served on India's space policy committees, blending deep technical expertise with strategic vision to build indigenous capabilities. ***Lesson:*** Combining technical mastery with policy insight accelerates technological self-reliance and national progress.

CA – 1-126

CB – 128-191

CC – 192-223

Types of Casting

- Uni casting
  - 1:1
- Broad Casting
  - limited BC
    - within a N/W
  - Directed broadcasting
    - To other network

casting: Sending a packet

11.0.0.0

8 NID ✓ 24 HID ✓

unicast :- Sending a message from a host to only one host is called unicasting

Note:- If an IP add has all 0's in the HID, then that add in called NID of that N/W.

Ex:- 1.0.0.0 → NID

130.1.0.0 → NID of the N/W
NID HID

200.1.2.0 → NID of the N/W
NID HID

CA - $2^{24} - 2$
CB - $2^{16} - 2$
CC - $2^{8} - 2$
} Hosts

all 0's → NID

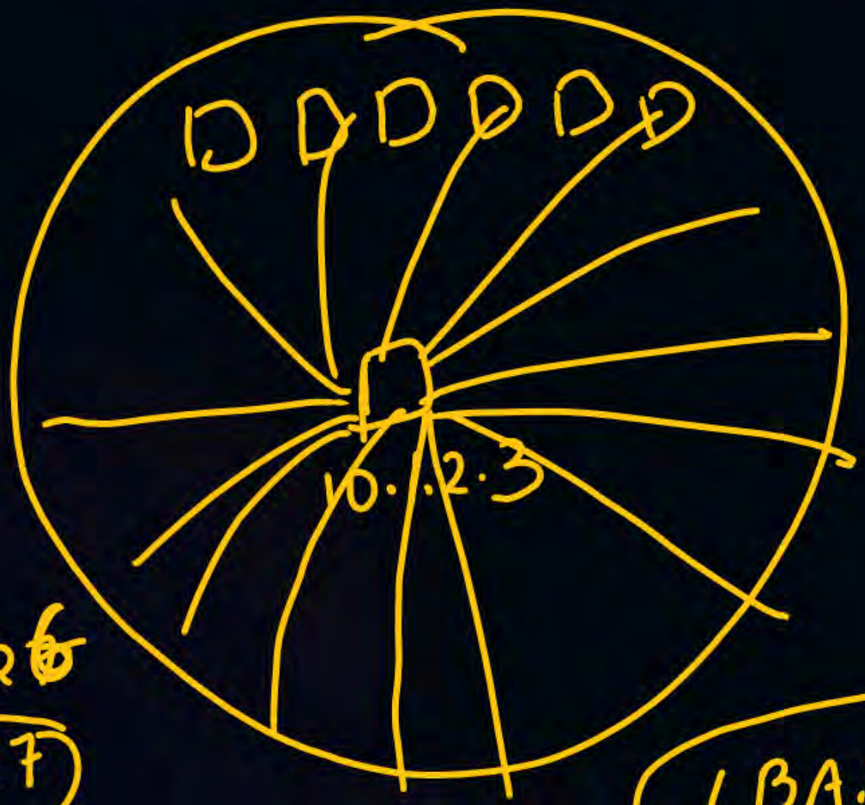
all 1's →

Note:- All 0's in the HID represents a special add called NID of the N/W

10.0.0.0 — CA — Hosts =? $2^{24} - 2$

≅ 16 M ✓

Station
- Host
- Computer
- Node



If a host wants to send a message to all other hosts in the same n/w, then it will use Limited broadcasting

LBA: 255.255.255.255

1 - 126

0 127

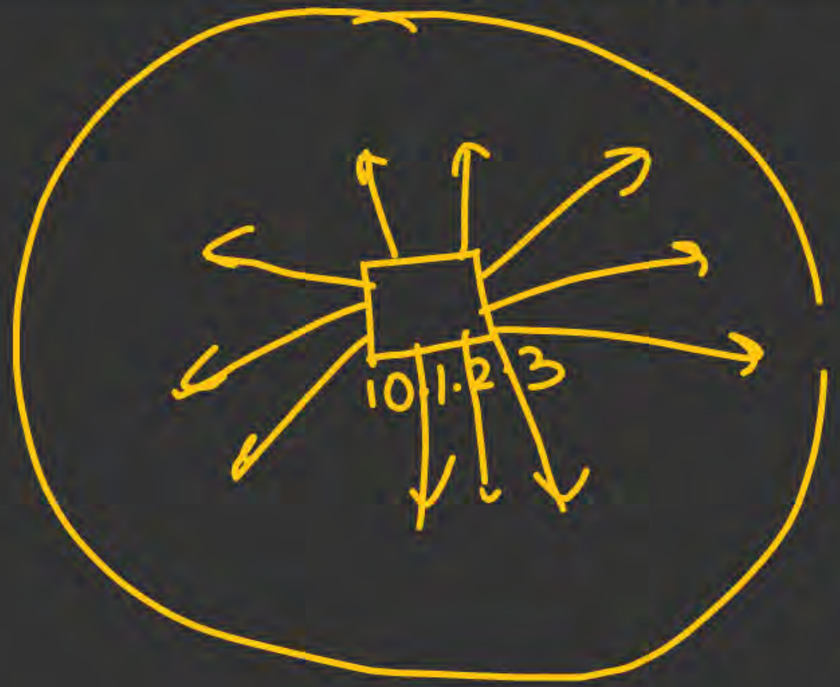
↓

Special

↓

IP layer

10.0.0.0 → CA



$2^8 - 1$

Limited Broadcasting

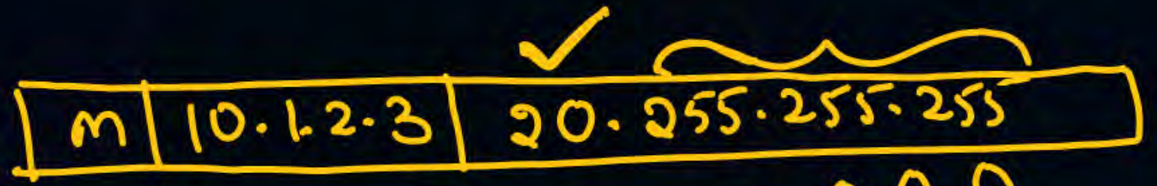
	SIP	DIP
message	10.1.2.3	255.255.255.255

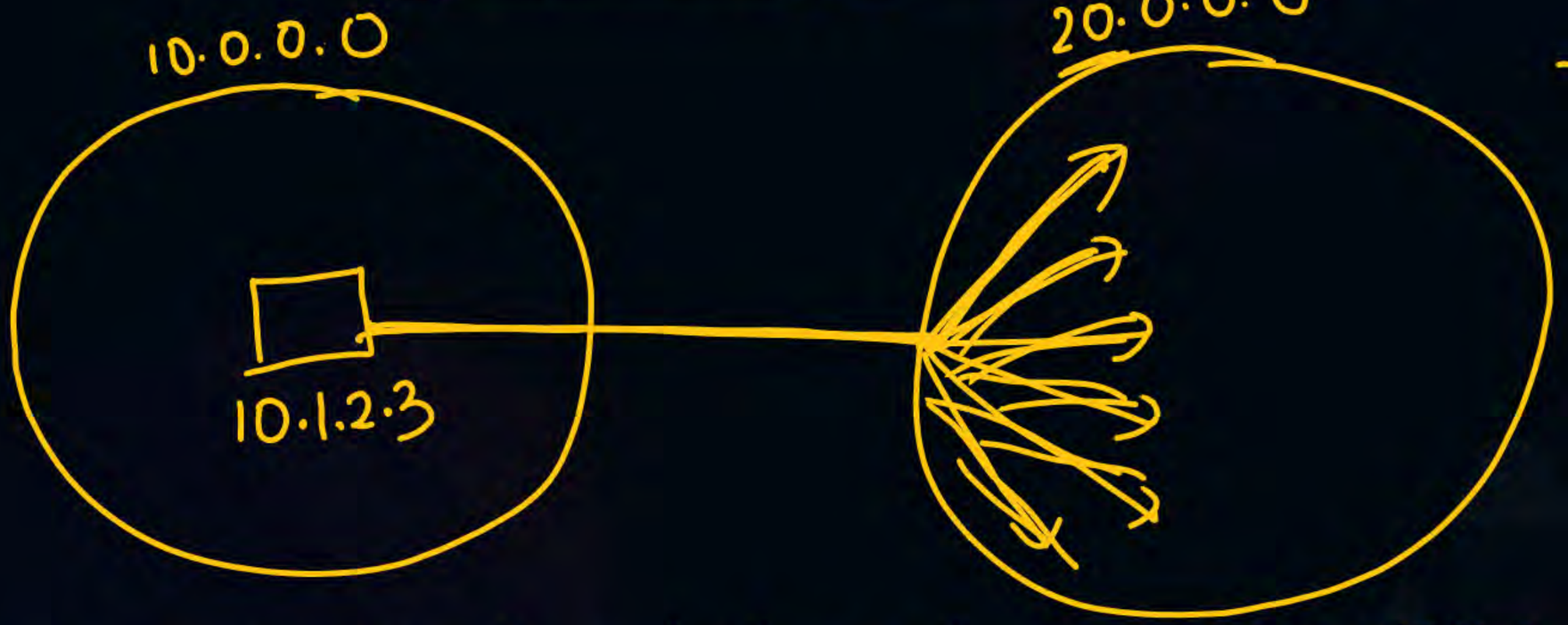
Limited Broadcast addrs

!!!!!!!!.!!!!!!!!.!!!!!!!!.!!!!!!!!.

255.255.255.255

This a is a special addrs called LBA and it Cannot be assigned to any host





NID (0) — NID

NID (1) — DBA

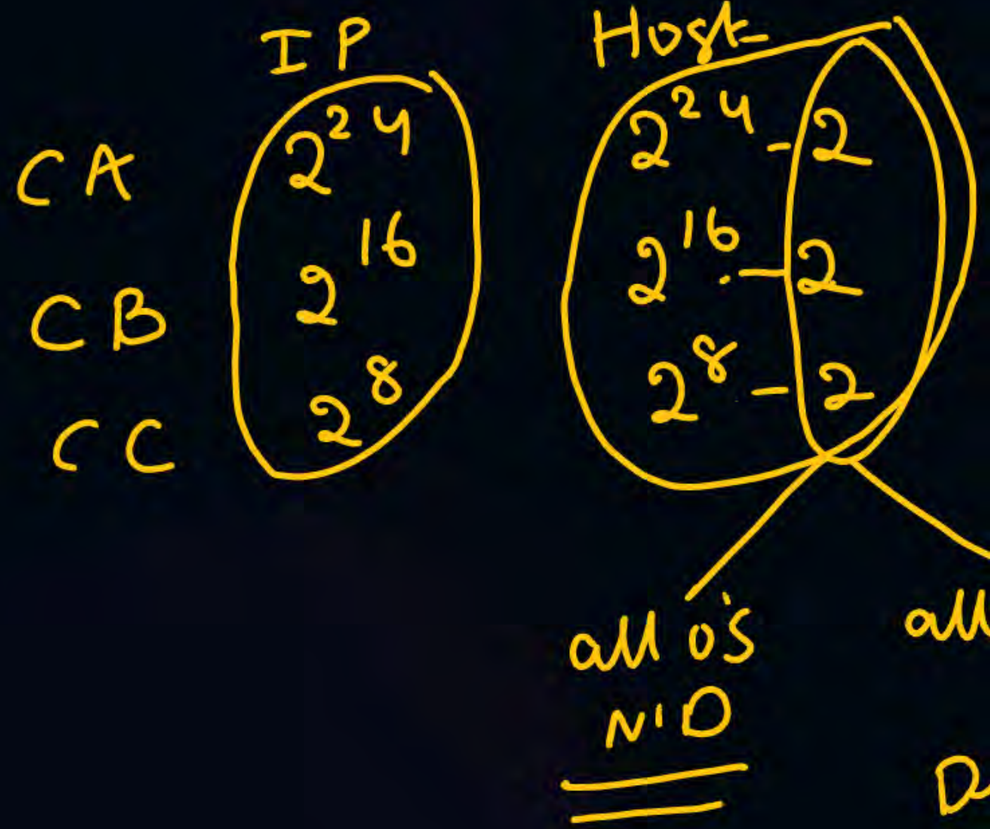
$2^{24} - 2$

$2^{16} - 2$

$2^{8} - 2$

Directed broadcast :- If a host wants to send a message to all the hosts in a different N/w, we use directed broadcasting

All 1's in a HID part represents directed broadcast address


IP
Host
CA
CB
CC
2^{24}
2^{16}
2^{8}
$2^{24}-2$
$2^{16}-2$
$2^{8}-2$
all 0's
NID
all 1's
DBA
Directed Broadcast add.

CA – 1-126

CB – 128-191

CC – 192-223

CD – 224-239

CE – 240-255

1.2.3.4

C → ? A

NID → ? 1.0.0.0

DBA – ? 1.255.255.255

LBA – ? 255.255.255.255

1 . 2 . 3 . 4

NID | HID

CA – 1-126

CB – 128-191

CC – 192-223

CD – 224-239

CE – 240-255

10.15.20.60

Class –? A

NID –? 10.0.0.0

DBA –? 10.255.255.255

LBA –? 255.255.255.255

10.15.20.60

NID HID

CA – 1-126

CB – 128-191

CC – 192-223

CD – 224-239

CE – 240-255

130.1.2.3 ✓

Class – ? B ✓

NID – 130.1.0.0

130.1.2.3

NID HID

DBA: 130.1.11111111.11111111

130.1.255.255

LBA: 255.255.255.255

CA – 1-126

CB – 128-191

CC – 192-223

CD – 224-239

CE – 240-255

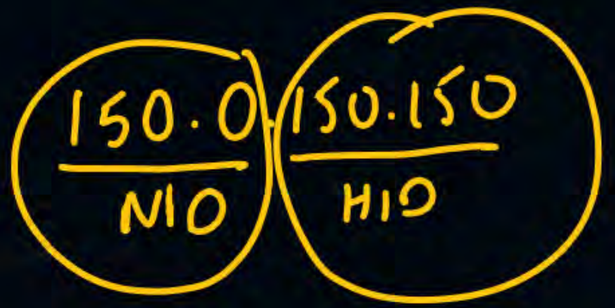
150.0.150.150

class-? B

NID-? 150.0.0.0

PBA: 150.0.255.255

LBA. 255.255.255.255



CA – 1-126

CB – 128-191

CC – 192-223

CD – 224-239

CE – 240-255

200.1.10.100

Class → C

NID → 200.1.10.0

DBA → 200.1.10.255

LBA → 255.255.255.255

$\underbrace{200.1.10.}_{\text{NID}}\underbrace{100}_{\text{HID}}$

CA – 1-126

CB – 128-191

CC – 192-223

CD – 224-239

CE – 240-255

220.15.1.10

class – C

NID – 220.15.1.0

DBA – 220.15.1.255

LBA – 255.255.255.255

220.15.1.10

NID HID

CA – 1-126

CB – 128-191

CC – 192-223

CD – 224-239

CE – 240-255

250.0.1.2

class → E class

NID – ? X

1+10 → X

DBA X

CBA X

CA – 1-126

CB – 128-191

CC – 192-223

CD – 224-239

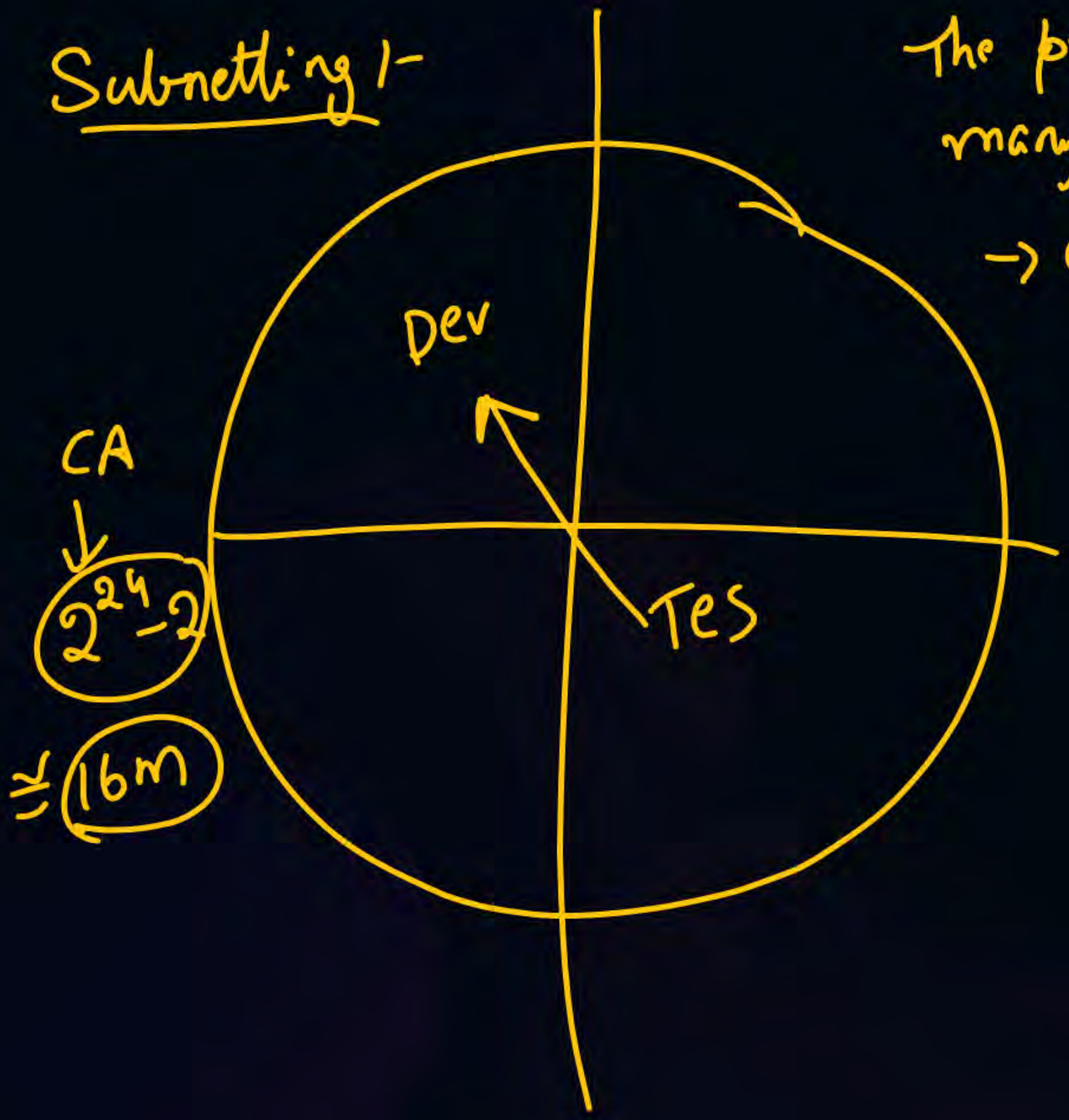
CE – 240-255

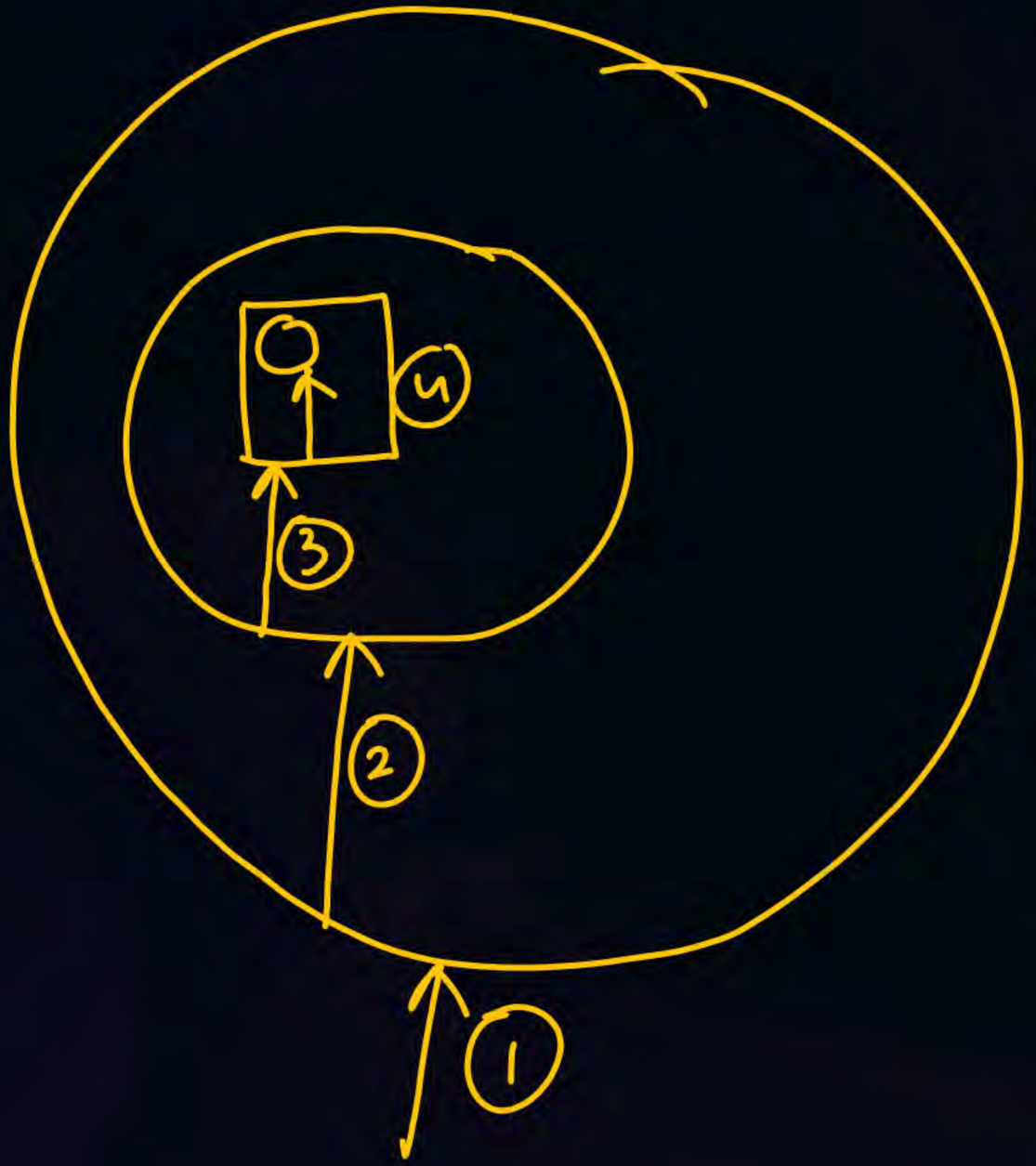
300.1.2.3 ✗ invalid IP

Subnetting :-

The process of dividing a big n/w into many small n/w's is called Subnetting

→ adv :- maintenance will be easy
Security can be improved

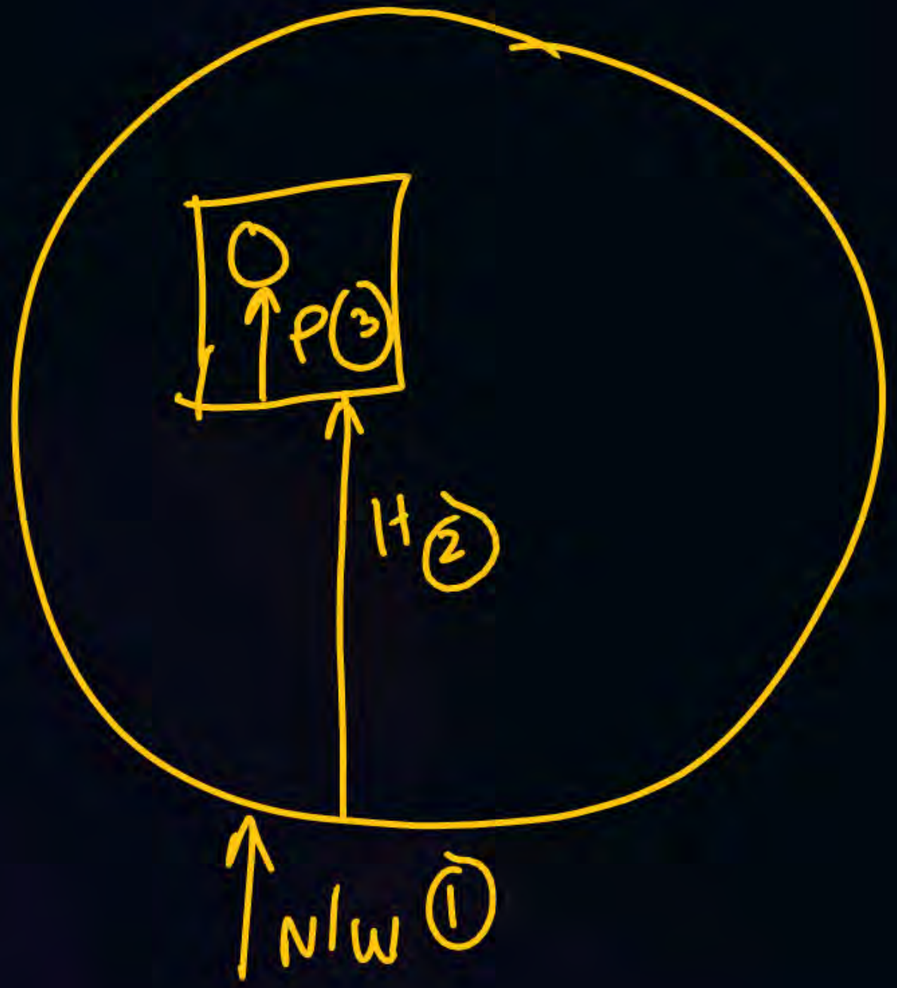




Disadv:-

4 steps

1) Identify n/w ✓
2) Identify the SN ✓
3) Identify the Host ✓
4) Identify the process. ✓



RBR SIR PW

THANK - YOU