

Layers	
@Layer2	btw 2 devices inside own NW or LAN
@Layer3	btw 2 NWs or 2 subnets

IPv4			
Notation	dotted-decimal 4x8bits = 32bits		
Subnet mask	defines NW proportion (1=NW, 0=host)		
Classes	i classful mask = default subnet mask		
- Class A	1-126	255.0.0.0	/8
- Class B	128-191	255.255.0.0	/16
- Class C	192-223	255.255.255.0	/24
- Class D	224-239	n/a	n/a

IP Types			
- Routable	Public IPs purchased and used by ISP		
- Private	non routable		
	A	10.0.0.0/8	10.255.255.255/8
	B	172.16.0.0/16	172.31.255.255/16
	C	192.168.0.0/24	192.168.255.255/24
- Specialized	127.x.x.x	loopback address for local testing	
- Automatic	APIPA	assigned by OS if DHCP u/s	
- Virtual	VIP(A)	not correlating to any NIC	
	ex @L7: loadbalancer, failover		
	ex @L3: HSRP (<i>Hot StandBy Routing Prot.</i>)		

IPv4 Data flows	
Unicast	single destination
Multicast	multi-specific destination
Broadcast	all devices on a network

Assignment	
Static	simple, time-consuming, prone to error, hard to setup in large scale
Dynamic	quick, easy, scalable
Content	IP adress, subnet mask, default GW, DNS server (or WINS)
TTL	time for which an IP is leased to a host. After, IP is given back to IP pool
APIPA	IP self-assigned in case of DHCP unavailable, from the network 169.254.0.0/16
ZeroConf	idem but more recent, using mDNS and DNS-SD

Subnet masks and available IPs			
Dotted-Decimal Notation	CIDR	Binary Notation	
255.0.0.0	/8	11111111.00000000.00000000.00000000	
255.255.0.0	/16	11111111.11111111.00000000.00000000	
255.255.255.0	/24	11111111.11111111.11111111.00000000	
255.255.255.128	/25	11111111.11111111.11111111.10000000	
255.255.255.192	/26	11111111.11111111.11111111.11000000	
255.255.255.224	/27	11111111.11111111.11111111.11100000	
255.255.255.240	/28	11111111.11111111.11111111.11110000	
255.255.255.248	/29	11111111.11111111.11111111.11111000	
255.255.255.252	/30	11111111.11111111.11111111.11111100	
3 network bits : 2^3 = 8 subnets		5 hosts bits : 2^5-2 = 32-2 = 30 av. IPs	

Subnetting	
Purpose	scaling NW according to its scope of use, to control bandwidth
How	borrow bits from original host portion and add them to the NW portion
Calculation	
IP	10. 180. 122. 244 /13
Mask	255. 248. 0. 0
$256-248 = 8 \text{ hosts/subnet} \mid 180\%8 = 4 \mid 180-4 = 176$	
Subnet	10. 176. 0. 0
⚡ the next subnet is $176+8=184$	
Brdcst	10. 183. 255. 255
1st IP	10. 176. 0. 1
Last IP	10. 183. 255. 254

