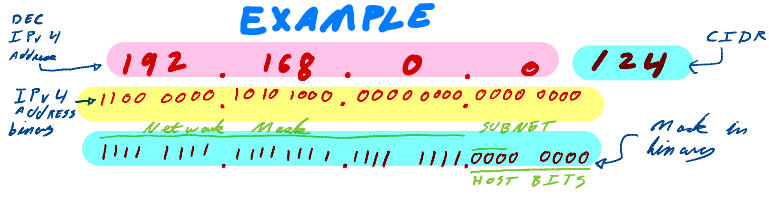
IPv4 SUBNETTING

THEORY OF ALL THINGS IPv4

STEPS

1. APPLY CONSTANTS FORMULA
2. DETERMIN HOW MANY BITS TO BORROW CONSERVATION
3. FIND ΔR [AKA MAGIC NUMBER]
4. INPUT INTO CHART

EXAMPLE



2^2	= 4
2^3	= 8
2^4	= 16
2^5	= 32
2^6	= 64
2^7	= 128
2^8	= 256

SUBNET SIZE

$H_{no} \leq 2^{b_{av}} - 2$

- H_{no}: NUMBER OF HOST REQUIRED BY SUBNET. CLIENT DEFINED
- b_{av}: BITS AVAILABLE. APPROX MATE UNTIL CONSTRAINT SATISFIED
- 2: CONSTANT FOR NET + BROADCAST ADDRESS

CONSERVATION OF BITS

$b_{sub} + b_{av} + b_{mas} = 32$

- b_{sub}: SUBNET BITS
- b_{av}: PREVIOUSLY THE EXPONENT IN THE CONSTRAINT
- b_{mas}: BITS FROM MASK

USE ALGEBRA IF PARTIAL VARIABLES ARE PROVIDED

CIDR FINDER

$LAN\ CIDR = b_{mas} + b_{sub}$

- b_{mas}: bit from mask PROVIDED TO US
- b_{sub}: BITS FOR SUBNET FROM CONSERVATION OF BITS FORMULA

USE THIS AS PROOF FOR PREVIOUS CALCULATIONS

THE SUBNET MASK

$$\mathcal{F}(x) = \sum_{i=7-x}^{7} 2^{x_i} \Delta x$$

$\Delta x = 1$

SOLVE FOR HOST

$256 - \mathcal{F}(b_{sub}) = \Delta R$ (THIS IS THE SUBNET MASK)

SOLVE FOR NETWORK

$8 - b_{sub} = x$

$2^x = \Delta R$ (CHANGE IN RANGE AKA: MAGIC NUMBER BIT INCREMENT)

$$\Delta R = (d_{br} - 2) - (d_{st} + 1)$$

- h_{max}: HOST MAX
- h_{min}: HOST MIN
- d_{br}: DECEMAL BROADCAST ADDRESS
- d_{st}: DECEMAL START ADDRESS

THE ΔR WILL DRIVE ADDRESS ALLOCATION

EXAMPLE

$h_{min} = START\ Address + 1$

SUBNET MASK	HOST REQUIRED	LAN CIDR	ΔR	START ADDRESS	h_{min}	h_{max}	BROADCAST
.192	60	/26	64	192.168.0.0	192.168.0.1	.62	192.168.0.63
.192	59	/26	64	192.168.0.64	.63	.126	.127
.224	28	/27	32	.128	.129	.148	.149
.224	20	/27	32	.150	.151	.180	.181
.240	12	/28	16	.182	.183	.196	.197
.248	6	/29	8	.198	.199	.206	.205
	1			.206			