Variable Length Subnet Mask

Classful subnetting:

FLSM (Fixed Length Subnet Mask) is also known as classful subnetting as all subnets have same number of hosts. In Classful subnetting all subnets use the same subnet mask.

Classless subnetting:

VLSM is also known as classless subnetting as all subnets may have different number of hosts depending upon network requirement.

VLSM Subnetting:

Variable Length Subnet Mask (VLSM) extends classic subnetting. VLSM is a process of breaking down subnets into the smaller subnets, according to the need of individual networks. In the following example a company has requirement of 6 subnets and 160 host addresses. With VSLM you can fulfill this requirement with single class C address space.

In VLSM Subnetting, we make a subnetting of subnets according to the network requirement.

Steps for VLSM Subnetting:

- Find the largest segment. Segment which needs a largest number of hosts addresses.
- Do subnetting to fulfill the requirement of largest segment.
- Assign the appropriate subnet mask for the largest segment.
- For second largest segments, take one of these newly created subnets and apply a different, more appropriate, subnet mask to it.
- Assign the appropriate subnet mask for the second largest segment.
- Repeat this process until the last network.

VLSM Example

Now you know the steps of VLSM Subnetting. Let's understand it with example. Our company requires 6 subnets and 160 hosts.

Step 1 :- Oder all segments according to the hosts requirement (Largest to smallest).

Subnet	Segment	Hosts
1	Development	74
2	Production	52
3	Administrative	28
4	Wan link 1	2
5	Wan link 2	2
6	Wan link 3	2

Step 2 :- Do subnetting for largest segment. Our largest segment needs 74 host addresses. /25 provide us two subnets with 128 hosts in each subnet.

192.168.1.0/25

Subnet	Subnet 1	Subnet 2
Network ID	192.168.1.0	192.168.1.128
First host address	192.168.1.1	192.168.1.129
Last host address	192.168.1.126	192.168.1.254
Broadcast ID	192.168.1.127	192.168.1.255

Step 3 :- Assign subnet mask to the largest segment. As you can see in above table, subnet 1 fulfills our largest segment requirement. Assign it to our segment.

Segment	Development
Requirement	74
CIDR	/25
Subnet mask	255.255.255.128
Network ID	192.168.1.0
First hosts	192.168.1.1
Last hosts	192.168.1.126
Broadcast ID	192.168.1.127

Step 4:- Do subnetting for second largest segment from next available subnet. Next segment requires 52 host addresses. Subnetting of /25 has given us two subnets with 128 hosts in each, from that we have assigned first subnet to development segment. Second segment is available; we would do subnetting of this. /26 provide us 4 subnets with 64 hosts in each subnet.

192.168.1.0/26

Subnet	Subnet 1	Subnet 2	Subnet 3	Subnet 4
Network ID	0	64	128	192
First address	1	65	129	193
Last address	62	126	190	254
Broadcast ID	63	127	191	255

We cannot use subnet 1 and subnet 2 (address from 0 to 127) as they are already assigned to development department. We can assign subnet 3 to our production department.

Segment	Production
Requirement	52
CIDR	/26
Subnet mask	255.255.255.192
Network ID	192.168.1.128
First hosts	192.168.1.129
Last hosts	192.168.1.190
Broadcast ID	192.168.1.191

Step 5 :- Our next segment requires 28 hosts. From above subnetting we have subnet 4 available. Do subnetting for the requirement of 28 hosts.

192.168.1.0/27

Subnet	Sub 1	Sub 2	Sub 3	Sub 4	Sub 5	Sub 6	Sub 7	Sub 8
Net ID	0	32	64	96	128	160	192	224
First Host	1	33	65	95	129	161	193	225
LastHost	30	62	94	126	158	190	222	254
Broadcast ID	31	63	95	127	159	191	223	255

Subnets 1 to 6 [address from 0 to 191] are already occupied by previous segments. We can assign subnet 7 to this segment.

Segment	Administrative
Requirement	28
CIDR	/27
Subnet mask	255.255.255.224
Network ID	192.168.1.192
First hosts	192.168.1.193
Last hosts	192.168.1.222
Broadcast ID	192.168.1.223

Step 6 :- Our last three segments require 2 hosts per subnet. Do subnetting for these.

192.168.1.0/30

Valid subnets are:-

0,4,8,12,16,20,24,28,32,36,40,44,48,52,56,60,64,68,72,76,80,84,88,92,96,100,104,108,112,116,120,124,128,132,136,140,144,148,152,156,160,164,168,172,176,180,184,188,192,196,200,204,208,212,216,220,224,228,232,236,240,244,248,252,256.

From these subnets, subnet 1 to subnet 56 (Address from 0 - 220) are already assigned to previous segments. We can use 224,228, and 232 for wan links.

Subnet	Subnet 57	Subnet 58	Subnet 59
Network ID	224	228	232
First host	225	229	233
Last host	226	230	234
Broadcast ID	227	231	235

Assign these subnets to wan links.

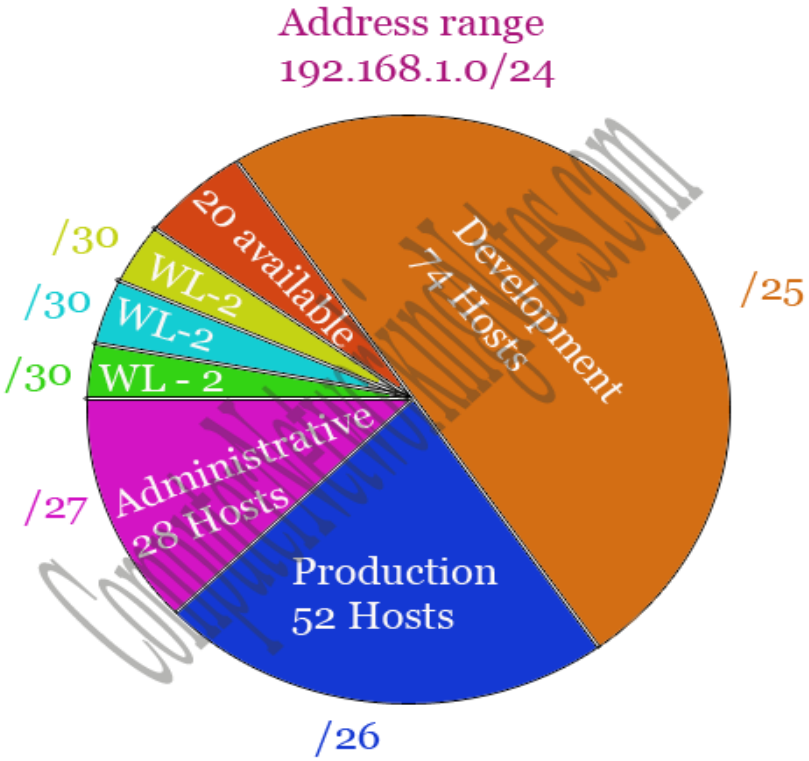
Wan Link 1

Segments	Wan Link 1
Requirement	2
CIDR	/30
Subnet mask	255.255.255.252
Network ID	192.168.1.224
First hosts	192.168.1.225
Last hosts	192.168.1.226
Broadcast ID	192.168.1.227

Wan Link 2

Segments	Wan Link 2
Requirement	2
CIDR	/30
Subnet mask	255.255.255.252
Network ID	192.168.1.228
First hosts	192.168.1.229
Last hosts	192.168.1.230
Broadcast ID	192.168.1.231

Wan link 3



Segments	Wan Link 3
Requirement	2
CIDR	/30
Subnet mask	255.255.255.252
Network ID	192.168.1.232
First hosts	192.168.1.233
Last hosts	192.168.1.234
Broadcast ID	192.168.1.235

We have assigned IP addresses to all segments; still we have 20 addresses available. This is the magic of VLSM.