


Internetwork_Design_Guide_--_Subnetting_an_IP_Address_Space

This article provides a partial listing of a Class B area intended to be divided into approximately 500 Open Shortest Path First (OSPF) areas. For the purposes of this example, the network is assumed to be a Class B network with the address 150.100.0.0.

Guide Contents
Internetworking Design Basics
Designing various internetworks
Network Enhancements
IP Routing Concepts
UDP Broadcast Flooding
Large-Scale H.323 Network Design for Service Providers
LAN Switching
Subnetting an IP Address Space
IBM Serial Link Implementation Notes
References and Recommended Reading

 **Note:** Although a 500-area OSPF internetwork is unrealistic, using an address space like this can help to illustrate the general methodology employed to subnet an OSPF address space.

Only the address space for two of 512 areas is shown in [Table: Partial Example of Subnet Address Assignment Using VLSM](#). These areas are defined with the base address 150.100.2.0. Illustrating the entire address space for 150.100.0.0 would require hundreds of additional pages of addressing information. Each area would require the equivalent number of entries for each of the example areas illustrated here.

[Table: Partial Example of Subnet Address Assignment Using VLSM](#) illustrates the assignment of 255 IP addresses that have been split between two OSPF areas. [Table: Partial Example of Subnet Address Assignment Using VLSM](#) also illustrates the boundaries of the subnets and of the two OSPF areas shown (area 8 and area 17).

For the purposes of this discussion, consider a network that requires point-to-point serial links in each area to be assigned a subnet mask that allows two hosts per subnet. All other subnets are to be allowed 14 hosts per subnet. The use of bit-wise subnetting and variable-length subnet masks (VLSMs) permit you to customize your address space by facilitating the division of address spaces into smaller groupings than is allowed when subnetting along octet boundaries. The address layout shown in [Table: Partial Example of Subnet Address Assignment Using VLSM](#) illustrates a structured approach to assigning addresses that uses VLSM. [Table: Partial Example of Subnet Address Assignment Using VLSM](#) presents two subnet masks: 255.255.255.240 and of 255.255.255.252. The first mask creates subnet address spaces that are four bits wide; the second mask creates subnet address spaces that are two bits wide.

Because of the careful assignment of addresses, each area can be summarized with a single **area** router configuration command (used to define address range). The first set of addresses starting with 150.100.2.0xxxxxx (last octet represented here in binary) can be summarized into the backbone with the following command:

```
area 8 range 150.100.2.0 255.255.255.128
```

This command assigns all addresses from 150.100.2.0 to 150.100.2.127 to area 8. Similarly, the addresses from 150.100.2.128 to 150.100.2.255 for the second area can be summarized as follows:

```
area 17 range 150.100.2.128 255.255.255.128
```

This command assigns all addresses from 150.100.2.128 to 150.100.2.255 to area 17.

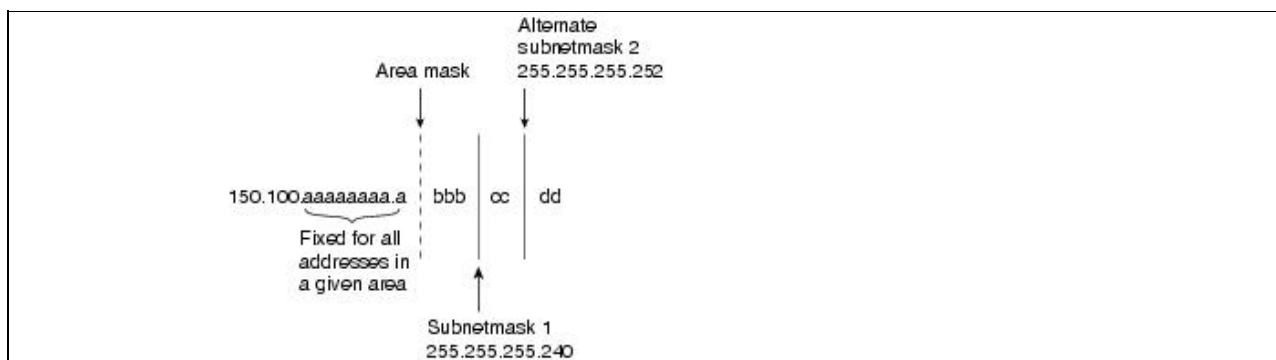
Internetwork_Design_Guide_-_Subnetting_an_IP_Address_Space

Allocation of subnets allows you to decide where to draw the line between the subnet and host (using a subnet mask) within each area. Note that in this example there are only seven bits remaining to use because of the creation of the artificial area mask. The nine bits to the left of the area mask are actually part of the subnet portion of the address. By keeping these nine bits the same for all addresses in a given area, route summarization is easily achieved at area border routers, as illustrated by the scheme used in [Table: Partial Example of Subnet Address Assignment Using VLSM](#).

[Table: Partial Example of Subnet Address Assignment Using VLSM](#) lists individual subnets, valid IP addresses, subnet identifiers, and broadcast addresses. This method of assigning addresses for the VLSM portion of the address space guarantees that there is no address overlap. If the requirement had been different, any number of the larger subnets might be chosen and divided into smaller ranges with fewer hosts, or combined into several ranges to create subnets with more hosts.

The design approach used in this article allows the area mask boundary and subnet masks to be assigned to any point in the address space, which provides significant design flexibility. A change in the specification of the area mask boundary or subnet masks may be required if a network outgrows its initial address space design. In [Table: Partial Example of Subnet Address Assignment Using VLSM](#), the area mask boundary is to the right of the most significant bit of the last octet of the address, as shown by [Figure: Breakdown of the addresses assigned by the example](#).

Figure: Breakdown of the addresses assigned by the example



With a subnet mask of 255.255.255.240, the a and b bits together represent the subnet portion of the address, whereas the c and d bits together provide four-bit host identifiers. When a subnet mask of 255.255.255.252 (a typical subnet mask for point-to-point serial lines), the a, b, and c bits together represent the subnet portion of the address, and the d bits provide two-bit host identifiers. As mentioned earlier, the purpose of the area mask is to keep all of the a bits constant in a given OSPF area (independent of the subnet mask) so that route summarization is easy to apply.

The following steps outline the process used to allocate addresses:

1. Determine the number of areas required for your OSPF network. A value of 500 is used for this example.
2. Create an artificial area mask boundary in your address space. This example uses nine bits of subnet addressing space to identify the areas uniquely. Because $2^9 = 512$, nine bits of subnet meet our requirement of 500 areas.
3. Determine the number of subnets required in each area and the maximum number of hosts required per subnet. This allows you to determine the placement of the subnet mask(s). In [Table: Partial Example of Subnet Address Assignment Using VLSM](#), the requirement is for seven subnets with 14 hosts each and four subnets with two hosts each.

Internetwork_Design_Guide_--_Subnetting_an_IP_Address_Space

Table: Partial Example of Subnet Address Assignment Using VLSM

IP Address (Decimal)	Subnet Portion of Last Octet (Binary)	Host Portion of Last Octet (Binary)	Subnet Number	Subnet Mask	Notes
150.100.2.0	0000	0000	150.100.2.0	255.255.255.240	Subnet identifier; area boundary; area 8 starts
150.100.2.1	0000	0001	150.100.2.0	255.255.255.240	
150.100.2.2	0000	0010	150.100.2.0	255.255.255.240	
150.100.2.3	0000	0011	150.100.2.0	255.255.255.240	
150.100.2.4	0000	0100	150.100.2.0	255.255.255.240	
150.100.2.5	0000	0101	150.100.2.0	255.255.255.240	
150.100.2.6	0000	0110	150.100.2.0	255.255.255.240	
150.100.2.7	0000	0111	150.100.2.0	255.255.255.240	
150.100.2.8	0000	1000	150.100.2.0	255.255.255.240	
150.100.2.9	0000	1001	150.100.2.0	255.255.255.240	
150.100.2.10	0000	1010	150.100.2.0	255.255.255.240	
150.100.2.11	0000	1011	150.100.2.0	255.255.255.240	
150.100.2.12	0000	1100	150.100.2.0	255.255.255.240	
150.100.2.13	0000	1101	150.100.2.0	255.255.255.240	
150.100.2.14	0000	1110	150.100.2.0	255.255.255.240	
150.100.2.15	0000	1111	150.100.2.0	255.255.255.240	Subnet broadcast
150.100.2.16	0001	0000	150.100.2.16	255.255.255.240	Subnet identifier
150.100.2.17	0001	0001	150.100.2.16	255.255.255.240	
150.100.2.18	0001	0010	150.100.2.16	255.255.255.240	
150.100.2.19	0001	0011	150.100.2.16	255.255.255.240	
150.100.2.20	0001	0100	150.100.2.16	255.255.255.240	
150.100.2.21	0001	0101	150.100.2.16	255.255.255.240	
150.100.2.22	0001	0110	150.100.2.16	255.255.255.240	
150.100.2.23	0001	0111	150.100.2.16	255.255.255.240	
150.100.2.24	0001	1000	150.100.2.16	255.255.255.240	
150.100.2.25	0001	1001	150.100.2.16	255.255.255.240	
150.100.2.26	0001	1010	150.100.2.16	255.255.255.240	
150.100.2.27	0001	1011	150.100.2.16	255.255.255.240	
150.100.2.28	0001	1100	150.100.2.16	255.255.255.240	
150.100.2.29	0001	1101	150.100.2.16	255.255.255.240	
150.100.2.30	0001	1110	150.100.2.16	255.255.255.240	
150.100.2.31	0001	1111	150.100.2.16	255.255.255.240	Subnet broadcast
150.100.2.32	0010	0000	150.100.2.32	255.255.255.240	Subnet identifier
150.100.2.33	0010	0001	150.100.2.32	255.255.255.240	
150.100.2.34	0010	0010	150.100.2.32	255.255.255.240	
150.100.2.35	0010	0011	150.100.2.32	255.255.255.240	
150.100.2.36	0010	0100	150.100.2.32	255.255.255.240	
150.100.2.37	0010	0101	150.100.2.32	255.255.255.240	

Table: Partial Example of Subnet Address Assignment Using VLSM

Internetwork_Design_Guide_--_Subnetting_an_IP_Address_Space

150.100.2.38	0010	0110	150.100.2.32	255.255.255.240	
150.100.2.39	0010	0111	150.100.2.32	255.255.255.240	
150.100.2.40	0010	1000	150.100.2.32	255.255.255.240	
150.100.2.41	0010	1001	150.100.2.32	255.255.255.240	
150.100.2.42	0010	1010	150.100.2.32	255.255.255.240	
150.100.2.43	0010	1011	150.100.2.32	255.255.255.240	
150.100.2.44	0010	1100	150.100.2.32	255.255.255.240	
150.100.2.45	0010	1101	150.100.2.32	255.255.255.240	
150.100.2.46	0010	1110	150.100.2.32	255.255.255.240	
150.100.2.47	0010	1111	150.100.2.32	255.255.255.240	Subnet broadcast
150.100.2.48	0011	0000	150.100.2.48	255.255.255.240	Subnet identifier
150.100.2.49	0011	0001	150.100.2.48	255.255.255.240	
150.100.2.50	0011	0010	150.100.2.48	255.255.255.240	
150.100.2.51	0011	0011	150.100.2.48	255.255.255.240	
150.100.2.52	0011	0100	150.100.2.48	255.255.255.240	
150.100.2.53	0011	0101	150.100.2.48	255.255.255.240	
150.100.2.54	0011	0110	150.100.2.48	255.255.255.240	
150.100.2.55	0011	0111	150.100.2.48	255.255.255.240	
150.100.2.56	0011	1000	150.100.2.48	255.255.255.240	
150.100.2.57	0011	1001	150.100.2.48	255.255.255.240	
150.100.2.58	0011	1010	150.100.2.48	255.255.255.240	
150.100.2.59	0011	1011	150.100.2.48	255.255.255.240	
150.100.2.60	0011	1100	150.100.2.48	255.255.255.240	
150.100.2.61	0011	1101	150.100.2.48	255.255.255.240	
150.100.2.62	0011	1110	150.100.2.48	255.255.255.240	
150.100.2.63	0011	1111	150.100.2.48	255.255.255.240	Subnet broadcast
150.100.2.64	010000	00	150.100.2.64	255.255.255.252	Subnet identifier
150.100.2.65	010000	01	150.100.2.64	255.255.255.252	
150.100.2.66	010000	10	150.100.2.64	255.255.255.252	
150.100.2.67	010000	11	150.100.2.64	255.255.255.252	Subnet broadcast
150.100.2.68	010001	00	150.100.2.68	255.255.255.252	Subnet identifier
150.100.2.69	010001	01	150.100.2.68	255.255.255.252	
150.100.2.70	010001	10	150.100.2.68	255.255.255.252	
150.100.2.71	010001	11	150.100.2.68	255.255.255.252	Subnet broadcast
150.100.2.72	010010	00	150.100.2.72	255.255.255.252	Subnet identifier
150.100.2.73	010010	01	150.100.2.72	255.255.255.252	
150.100.2.74	010010	10	150.100.2.72	255.255.255.252	
150.100.2.75	010010	11	150.100.2.72	255.255.255.252	Subnet broadcast
150.100.2.76	010011	00	150.100.2.76	255.255.255.252	Subnet identifier
150.100.2.77	010011	01	150.100.2.76	255.255.255.252	
150.100.2.78	010011	10	150.100.2.76	255.255.255.252	
150.100.2.79	010011	11	150.100.2.76	255.255.255.252	Subnet broadcast
150.100.2.80	0101	0000	150.100.2.80	255.255.255.240	Subnet identifier
150.100.2.81	0101	0001	150.100.2.80	255.255.255.240	

Table: Partial Example of Subnet Address Assignment Using VLSM

Internetwork_Design_Guide_--_Subnetting_an_IP_Address_Space

150.100.2.82	0101	0010	150.100.2.80	255.255.255.240	
150.100.2.83	0101	0011	150.100.2.80	255.255.255.240	
150.100.2.84	0101	0100	150.100.2.80	255.255.255.240	
150.100.2.85	0101	0101	150.100.2.80	255.255.255.240	
150.100.2.86	0101	0110	150.100.2.80	255.255.255.240	
150.100.2.87	0101	0111	150.100.2.80	255.255.255.240	
150.100.2.88	0101	1000	150.100.2.80	255.255.255.240	
150.100.2.89	0101	1001	150.100.2.80	255.255.255.240	
150.100.2.90	0101	1010	150.100.2.80	255.255.255.240	
150.100.2.91	0101	1011	150.100.2.80	255.255.255.240	
150.100.2.92	0101	1100	150.100.2.80	255.255.255.240	
150.100.2.93	0101	1101	150.100.2.80	255.255.255.240	
150.100.2.94	0101	1110	150.100.2.80	255.255.255.240	
150.100.2.95	0101	1111	150.100.2.80	255.255.255.240	Subnet broadcast
150.100.2.96	0110	0000	150.100.2.96	255.255.255.240	Subnet identifier
150.100.2.97	0110	0001	150.100.2.96	255.255.255.240	
150.100.2.98	0110	0010	150.100.2.96	255.255.255.240	
150.100.2.99	0110	0011	150.100.2.96	255.255.255.240	
150.100.2.100	0110	0100	150.100.2.96	255.255.255.240	
150.100.2.101	0110	0101	150.100.2.96	255.255.255.240	
150.100.2.102	0110	0110	150.100.2.96	255.255.255.240	
150.100.2.103	0110	0111	150.100.2.96	255.255.255.240	
150.100.2.104	0110	1000	150.100.2.96	255.255.255.240	
150.100.2.105	0110	1001	150.100.2.96	255.255.255.240	
150.100.2.106	0110	1010	150.100.2.96	255.255.255.240	
150.100.2.107	0110	1011	150.100.2.96	255.255.255.240	
150.100.2.108	0110	1100	150.100.2.96	255.255.255.240	
150.100.2.109	0110	1101	150.100.2.96	255.255.255.240	
150.100.2.110	0110	1110	150.100.2.96	255.255.255.240	
150.100.2.111	0110	1111	150.100.2.96	255.255.255.240	Subnet broadcast
150.100.2.112	0111	0000	150.100.2.112	255.255.255.240	Subnet identifier
150.100.2.113	0111	0001	150.100.2.112	255.255.255.240	
150.100.2.114	0111	0010	150.100.2.112	255.255.255.240	
150.100.2.115	0111	0011	150.100.2.112	255.255.255.240	
150.100.2.116	0111	0100	150.100.2.112	255.255.255.240	
150.100.2.117	0111	0101	150.100.2.112	255.255.255.240	
150.100.2.118	0111	0110	150.100.2.112	255.255.255.240	
150.100.2.119	0111	0111	150.100.2.112	255.255.255.240	
150.100.2.120	0111	1000	150.100.2.112	255.255.255.240	
150.100.2.121	0111	1001	150.100.2.112	255.255.255.240	
150.100.2.122	0111	1010	150.100.2.112	255.255.255.240	
150.100.2.123	0111	1011	150.100.2.112	255.255.255.240	
150.100.2.124	0111	1100	150.100.2.112	255.255.255.240	
150.100.2.125	0111	1101	150.100.2.112	255.255.255.240	

Table: Partial Example of Subnet Address Assignment Using VLSM

Internetwork_Design_Guide_--_Subnetting_an_IP_Address_Space

150.100.2.126	0111	1110	150.100.2.112	255.255.255.240	
150.100.2.127	0111	1111	150.100.2.112	255.255.255.240	Subnet broadcast; area boundary; area 8 ends
150.100.2.128	1000	0000	150.100.2.128	255.255.255.240	Subnet identifier; area boundary; area 17 starts
150.100.2.129	1000	0001	150.100.2.128	255.255.255.240	
150.100.2.130	1000	0010	150.100.2.128	255.255.255.240	
150.100.2.131	1000	0011	150.100.2.128	255.255.255.240	
150.100.2.132	1000	0100	150.100.2.128	255.255.255.240	
150.100.2.133	1000	0101	150.100.2.128	255.255.255.240	
150.100.2.134	1000	0110	150.100.2.128	255.255.255.240	
150.100.2.135	1000	0111	150.100.2.128	255.255.255.240	
150.100.2.136	1000	1000	150.100.2.128	255.255.255.240	
150.100.2.137	1000	1001	150.100.2.128	255.255.255.240	
150.100.2.138	1000	1010	150.100.2.128	255.255.255.240	
150.100.2.139	1000	1011	150.100.2.128	255.255.255.240	
150.100.2.140	1000	1100	150.100.2.128	255.255.255.240	
150.100.2.141	1000	1101	150.100.2.128	255.255.255.240	
150.100.2.142	1000	1110	150.100.2.128	255.255.255.240	
150.100.2.143	1000	1111	150.100.2.128	255.255.255.240	Subnet broadcast
150.100.2.144	1001	0000	150.100.2.144	255.255.255.240	Subnet identifier
150.100.2.145	1001	0001	150.100.2.144	255.255.255.240	
150.100.2.146	1001	0010	150.100.2.144	255.255.255.240	
150.100.2.147	1001	0011	150.100.2.144	255.255.255.240	
150.100.2.148	1001	0100	150.100.2.144	255.255.255.240	
150.100.2.149	1001	0101	150.100.2.144	255.255.255.240	
150.100.2.150	1001	0110	150.100.2.144	255.255.255.240	
150.100.2.151	1001	0111	150.100.2.144	255.255.255.240	
150.100.2.152	1001	1000	150.100.2.144	255.255.255.240	
150.100.2.153	1001	1001	150.100.2.144	255.255.255.240	
150.100.2.154	1001	1010	150.100.2.144	255.255.255.240	
150.100.2.155	1001	1011	150.100.2.144	255.255.255.240	
150.100.2.156	1001	1100	150.100.2.144	255.255.255.240	
150.100.2.157	1001	1101	150.100.2.144	255.255.255.240	
150.100.2.158	1001	1110	150.100.2.144	255.255.255.240	
150.100.2.159	1001	1111	150.100.2.144	255.255.255.240	Subnet broadcast
150.100.2.160	1010	0000	150.100.2.160	255.255.255.240	Subnet identifier
150.100.2.161	1010	0001	150.100.2.160	255.255.255.240	
150.100.2.162	1010	0010	150.100.2.160	255.255.255.240	
150.100.2.163	1010	0011	150.100.2.160	255.255.255.240	
150.100.2.164	1010	0100	150.100.2.160	255.255.255.240	
150.100.2.165	1010	0101	150.100.2.160	255.255.255.240	

Table: Partial Example of Subnet Address Assignment Using VLSM

Internetwork_Design_Guide_--_Subnetting_an_IP_Address_Space

150.100.2.166	1010	0110	150.100.2.160	255.255.255.240	
150.100.2.167	1010	0111	150.100.2.160	255.255.255.240	
150.100.2.168	1010	1000	150.100.2.160	255.255.255.240	
150.100.2.169	1010	1001	150.100.2.160	255.255.255.240	
150.100.2.170	1010	1010	150.100.2.160	255.255.255.240	
150.100.2.171	1010	1011	150.100.2.160	255.255.255.240	
150.100.2.172	1010	1100	150.100.2.160	255.255.255.240	
150.100.2.173	1010	1101	150.100.2.160	255.255.255.240	
150.100.2.174	1010	1110	150.100.2.160	255.255.255.240	
150.100.2.175	1010	1111	150.100.2.160	255.255.255.240	Subnet broadcast
150.100.2.176	101100	00	150.100.2.176	255.255.255.252	Subnet identifier
150.100.2.177	101100	01	150.100.2.176	255.255.255.252	
150.100.2.178	101100	10	150.100.2.176	255.255.255.252	
150.100.2.179	101100	11	150.100.2.176	255.255.255.252	Subnet broadcast
150.100.2.180	101101	00	150.100.2.180	255.255.255.252	Subnet identifier
150.100.2.181	101101	01	150.100.2.180	255.255.255.252	
150.100.2.182	101101	10	150.100.2.180	255.255.255.252	
150.100.2.183	101101	11	150.100.2.180	255.255.255.252	Subnet broadcast
150.100.2.184	101110	00	150.100.2.184	255.255.255.252	Subnet identifier
150.100.2.185	101110	01	150.100.2.184	255.255.255.252	
150.100.2.186	101110	10	150.100.2.184	255.255.255.252	
150.100.2.187	101110	11	150.100.2.184	255.255.255.252	Subnet broadcast
150.100.2.188	101111	00	150.100.2.188	255.255.255.252	Subnet identifier
150.100.2.189	101111	01	150.100.2.188	255.255.255.252	
150.100.2.190	101111	10	150.100.2.188	255.255.255.252	
150.100.2.191	101111	11	150.100.2.188	255.255.255.252	Subnet broadcast
150.100.2.192	1100	0000	150.100.2.192	255.255.255.240	Subnet identifier
150.100.2.193	1100	0001	150.100.2.192	255.255.255.240	
150.100.2.194	1100	0010	150.100.2.192	255.255.255.240	
150.100.2.195	1100	0011	150.100.2.192	255.255.255.240	
150.100.2.196	1100	0100	150.100.2.192	255.255.255.240	
150.100.2.197	1100	0101	150.100.2.192	255.255.255.240	
150.100.2.198	1100	0110	150.100.2.192	255.255.255.240	
150.100.2.199	1100	0111	150.100.2.192	255.255.255.240	
150.100.2.200	1100	1000	150.100.2.192	255.255.255.240	
150.100.2.201	1100	1001	150.100.2.192	255.255.255.240	
150.100.2.202	1100	1010	150.100.2.192	255.255.255.240	
150.100.2.203	1100	1011	150.100.2.192	255.255.255.240	
150.100.2.204	1100	1100	150.100.2.192	255.255.255.240	
150.100.2.205	1100	1101	150.100.2.192	255.255.255.240	
150.100.2.206	1100	1110	150.100.2.192	255.255.255.240	
150.100.2.207	1100	1111	150.100.2.192	255.255.255.240	Subnet broadcast
150.100.2.208	1101	0000	150.100.2.208	255.255.255.240	Subnet identifier
150.100.2.209	1101	0001	150.100.2.208	255.255.255.240	

Table: Partial Example of Subnet Address Assignment Using VLSM

Internetwork_Design_Guide_--_Subnetting_an_IP_Address_Space

150.100.2.210	1101	0010	150.100.2.208	255.255.255.240	
150.100.2.211	1101	0011	150.100.2.208	255.255.255.240	
150.100.2.212	1101	0100	150.100.2.208	255.255.255.240	
150.100.2.213	1101	0101	150.100.2.208	255.255.255.240	
150.100.2.214	1101	0110	150.100.2.208	255.255.255.240	
150.100.2.215	1101	0111	150.100.2.208	255.255.255.240	
150.100.2.216	1101	1000	150.100.2.208	255.255.255.240	
150.100.2.217	1101	1001	150.100.2.208	255.255.255.240	
150.100.2.218	1101	1010	150.100.2.208	255.255.255.240	
150.100.2.219	1101	1011	150.100.2.208	255.255.255.240	
150.100.2.220	1101	1100	150.100.2.208	255.255.255.240	
150.100.2.221	1101	1101	150.100.2.208	255.255.255.240	
150.100.2.222	1101	1110	150.100.2.208	255.255.255.240	
150.100.2.223	1101	1111	150.100.2.208	255.255.255.240	Subnet broadcast
150.100.2.224	1110	0000	150.100.2.224	255.255.255.240	Subnet identifier
150.100.2.225	1110	0001	150.100.2.224	255.255.255.240	
150.100.2.226	1110	0010	150.100.2.224	255.255.255.240	
150.100.2.227	1110	0011	150.100.2.224	255.255.255.240	
150.100.2.228	1110	0100	150.100.2.224	255.255.255.240	
150.100.2.229	1110	0101	150.100.2.224	255.255.255.240	
150.100.2.230	1110	0110	150.100.2.224	255.255.255.240	
150.100.2.231	1110	0111	150.100.2.224	255.255.255.240	
150.100.2.232	1110	1000	150.100.2.224	255.255.255.240	
150.100.2.233	1110	1001	150.100.2.224	255.255.255.240	
150.100.2.234	1110	1010	150.100.2.224	255.255.255.240	
150.100.2.235	1110	1011	150.100.2.224	255.255.255.240	
150.100.2.236	1110	1100	150.100.2.224	255.255.255.240	
150.100.2.237	1110	1101	150.100.2.224	255.255.255.240	
150.100.2.238	1110	1110	150.100.2.224	255.255.255.240	
150.100.2.239	1110	1111	150.100.2.224	255.255.255.240	Subnet broadcast
150.100.2.240	1111	0000	150.100.2.240	255.255.255.240	Subnet identifier
150.100.2.241	1111	0001	150.100.2.240	255.255.255.240	
150.100.2.242	1111	0010	150.100.2.240	255.255.255.240	
150.100.2.243	1111	0011	150.100.2.240	255.255.255.240	
150.100.2.244	1111	0100	150.100.2.240	255.255.255.240	
150.100.2.245	1111	0101	150.100.2.240	255.255.255.240	
150.100.2.246	1111	0110	150.100.2.240	255.255.255.240	
150.100.2.247	1111	0111	150.100.2.240	255.255.255.240	
150.100.2.248	1111	1000	150.100.2.240	255.255.255.240	
150.100.2.249	1111	1001	150.100.2.240	255.255.255.240	
150.100.2.250	1111	1010	150.100.2.240	255.255.255.240	
150.100.2.251	1111	1011	150.100.2.240	255.255.255.240	
150.100.2.252	1111	1100	150.100.2.240	255.255.255.240	
150.100.2.253	1111	1101	150.100.2.240	255.255.255.240	

Table: Partial Example of Subnet Address Assignment Using VLSM

Internetwork_Design_Guide_--_Subnetting_an_IP_Address_Space

150.100.2.254	1111	1110	150.100.2.240	255.255.255.240	
150.100.2.255	1111	1111	150.100.2.240	255.255.255.240	Subnet broadcast; area boundary; area 17 ends