

IP Pie

Chris' Guide to IP Subnetting using
Pies



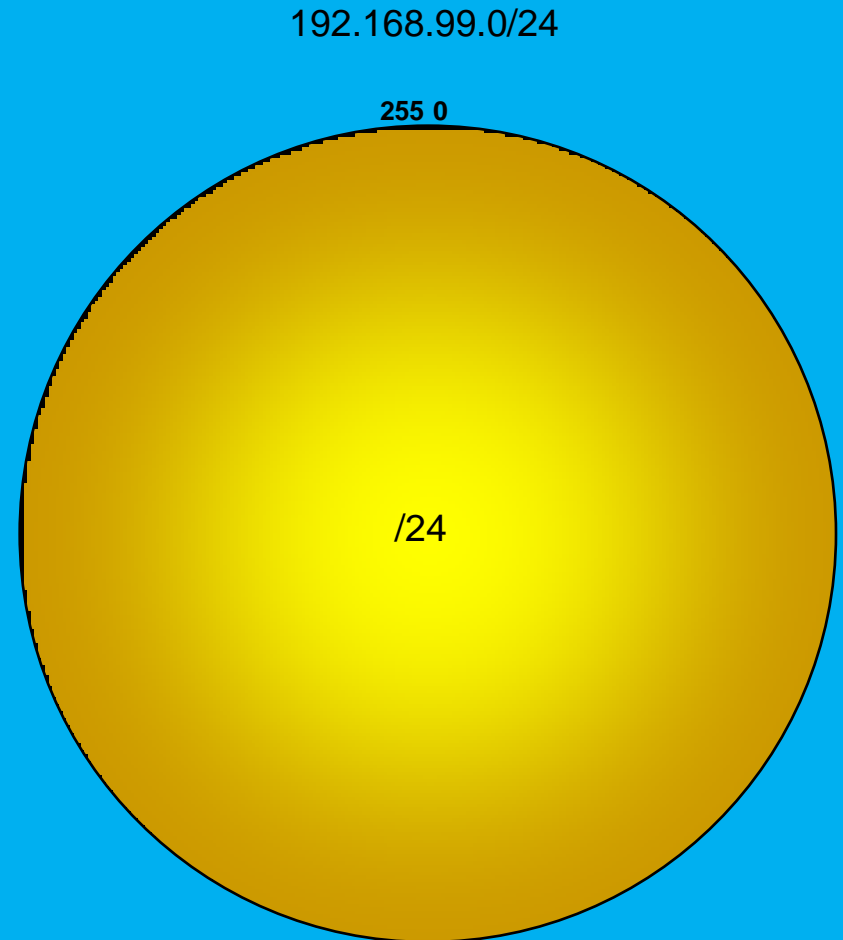
Easy as Pie

- Dividing IP networks into subnets is as easy as pie. All you need to do is remember one simple rule about how to cut the pie.
 - ***Every time you make a cut, you must cut the piece of pie in HALF.***



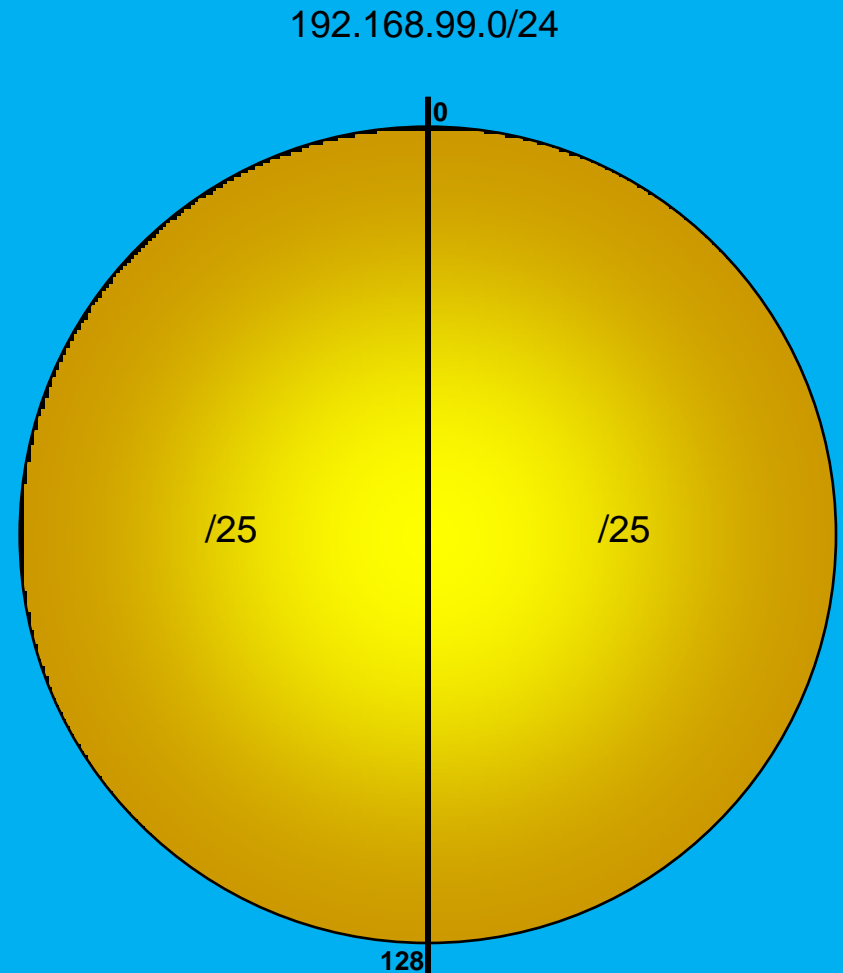
C class pie

- Here is an IP pie.
- This is the /24 IP pie of a class C network and represents 256 addresses numbered 0 to 255.
 - To illustrate the example, we will use the network 192.168.99.0
- With no subnets, we can use the whole pie, which could supply us with 254 usable IP addresses.



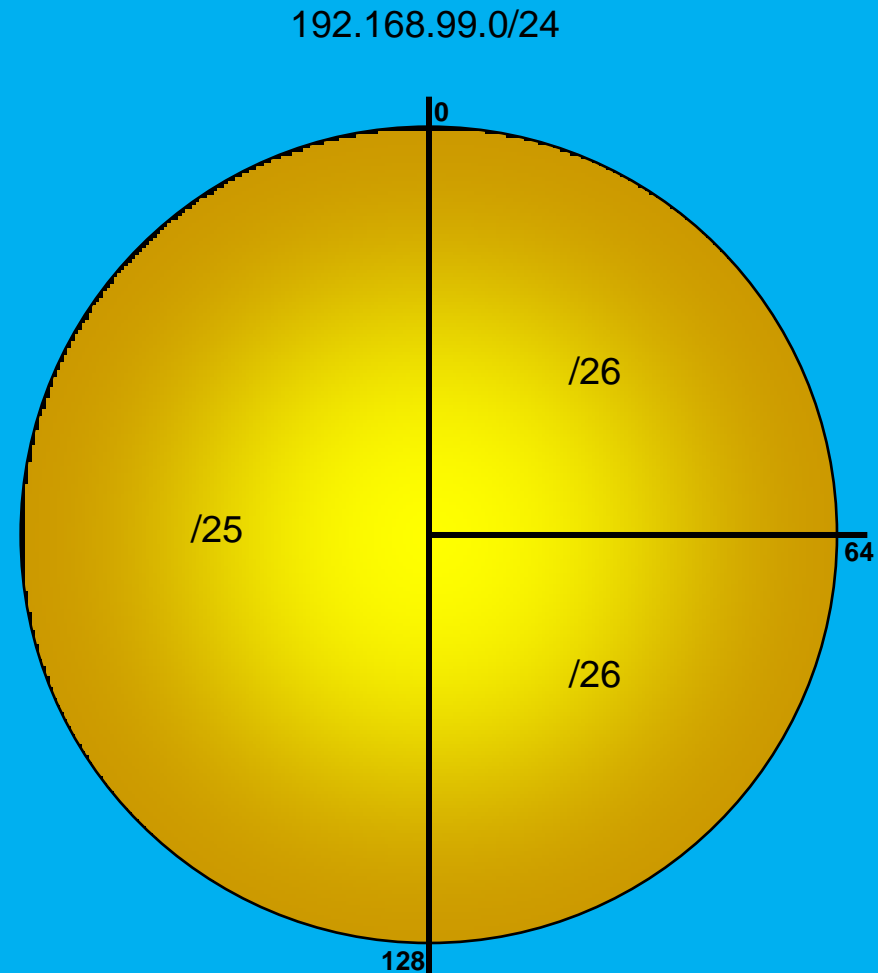
C class pie

- Lets cut the pie in half.
- We now have two subnets, the 192.168.99.0 subnet and the 192.168.99.128 subnet
- Each has a /25 mask and yields 126 usable host addresses



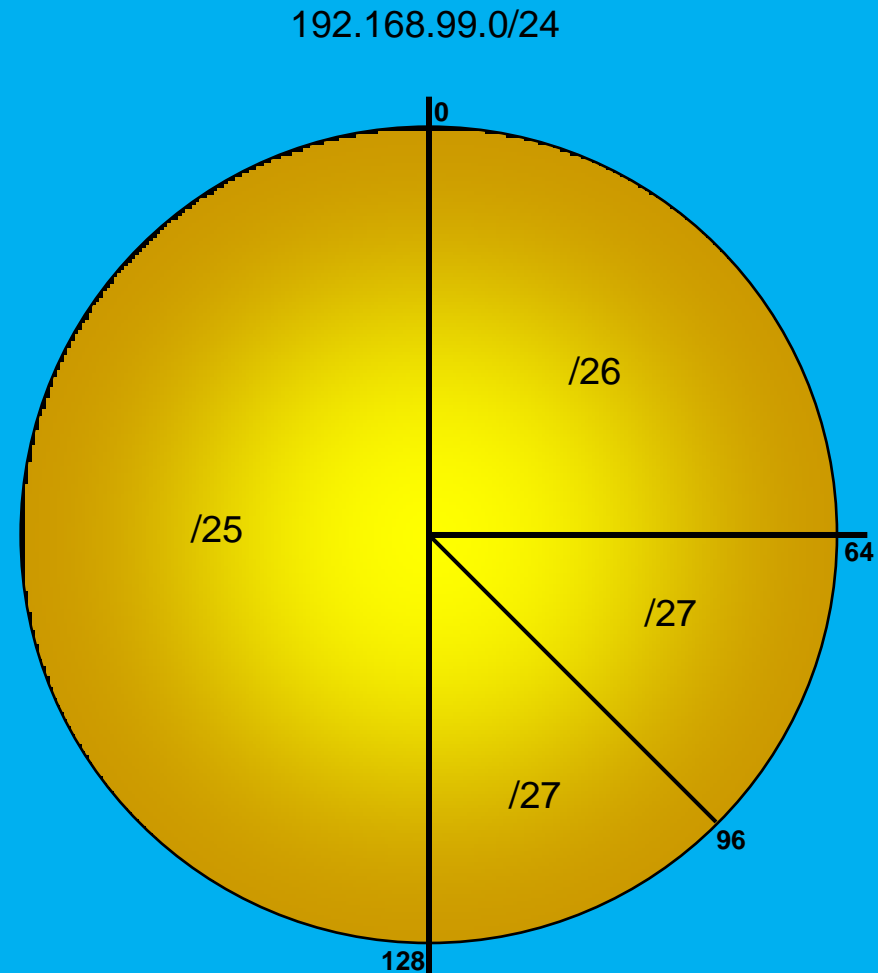
C class pie

- Lets cut the .0 piece in half.
- This gives us the 192.168.99.0/26 and the 192.168.99.64/26 subnet
 - Each of these subnets could have 62 hosts
- The 192.168.99.128/25 subnet hasn't changed, and could still accommodate 126 hosts.



C class pie

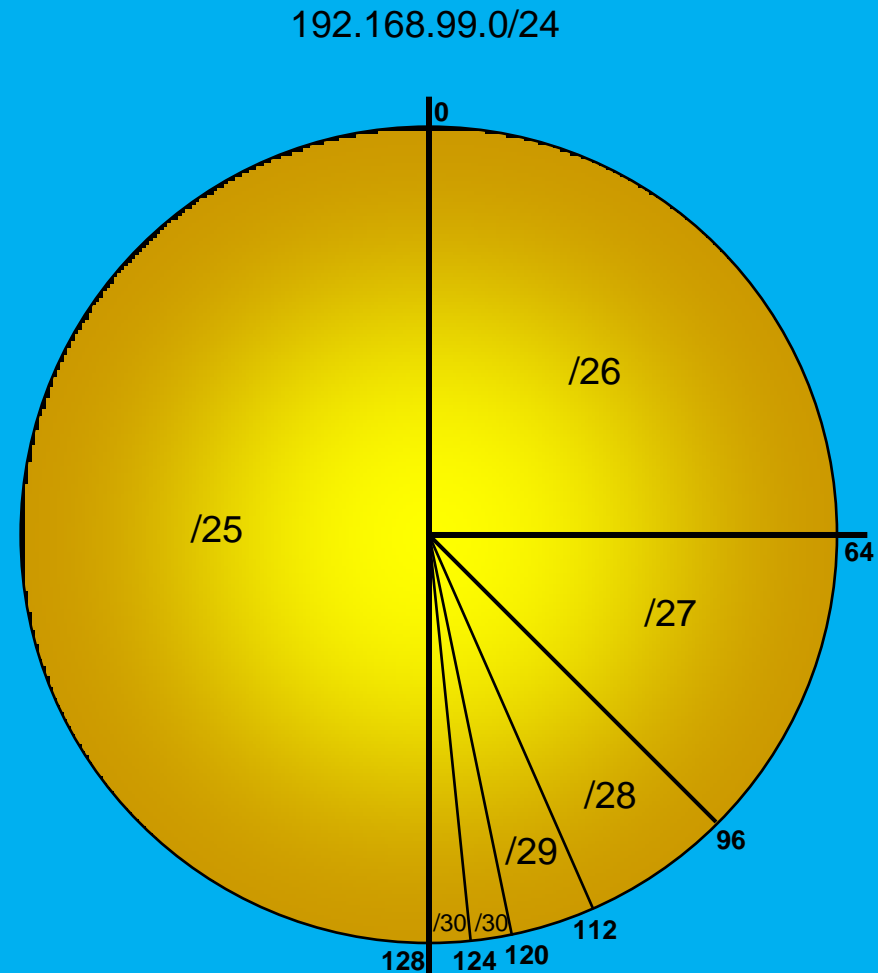
- Assume we have a WAN connection where we want to use as few IP addresses as possible.
 - The smallest slice of pie we can allocate to a subnet is 4 IP addresses
- We would have to start by slicing one of our /26 pieces in half.
 - giving us two /27 slices, each yielding 30 addresses



C class pie

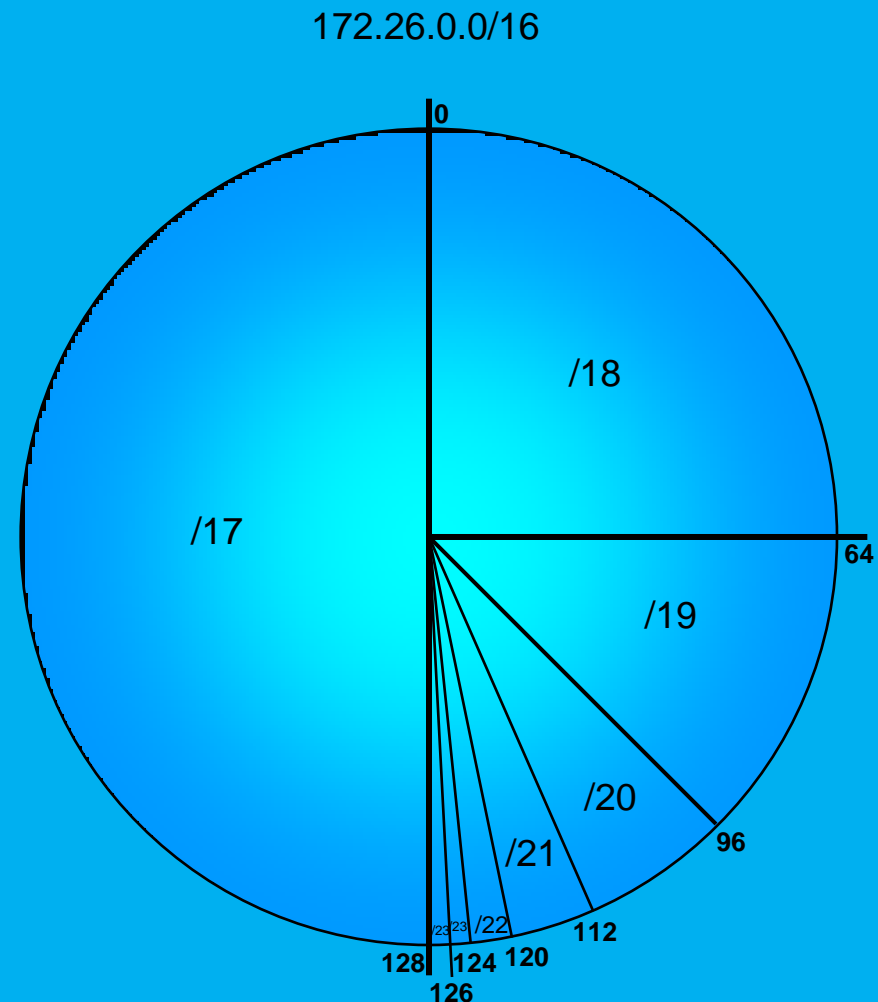
- Now divide one of the /27 slices into two
- And one of the /28 pieces
- And one of the /29 pieces

- Our pie now has:
 - 2 x /30 subnets
 - 1 x /29 subnet
 - 1 x /28 subnet
 - 1 x /27 subnet
 - 1 x /26 subnet
 - 1 x /25 subnet



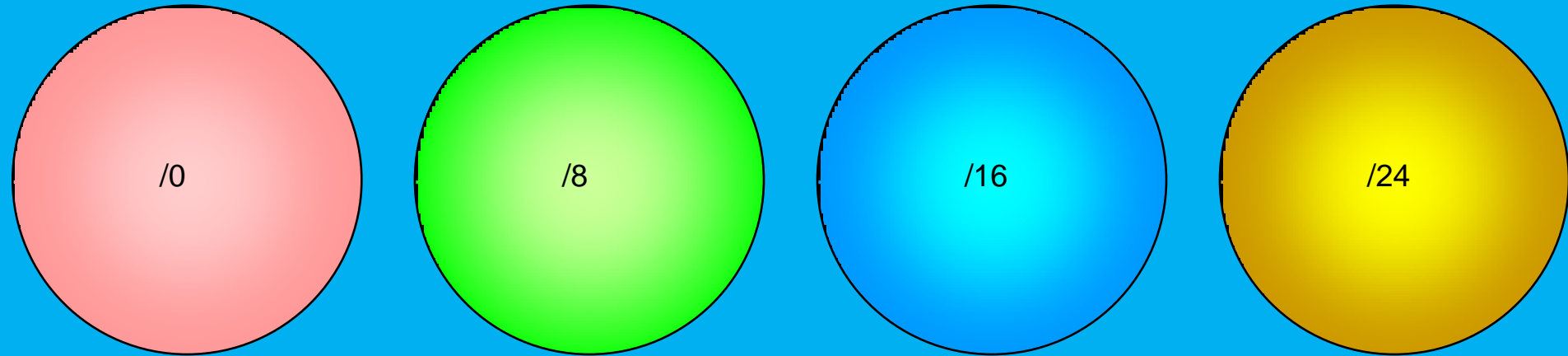
B class pie

- The same principles apply to each octet of the IP address space.
- For B class addresses, we could work with the /16 slice of pie, or the 3rd octet.

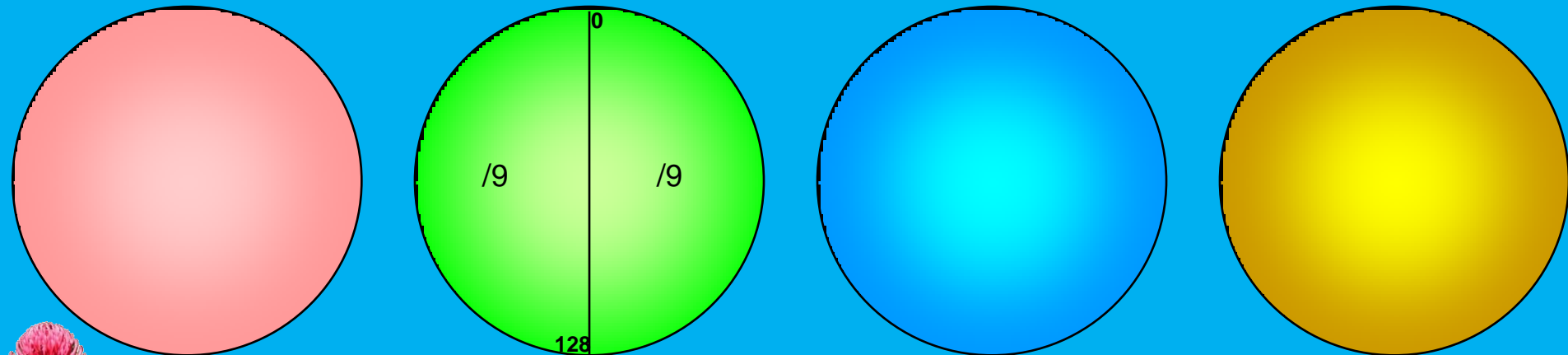


Classless Pie

- Each octet can be thought of as a pie.

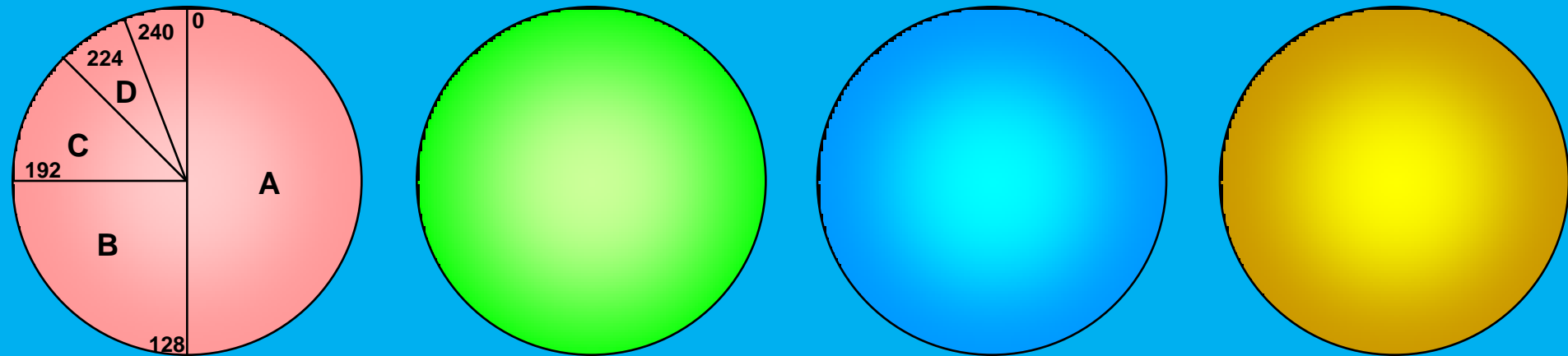


- Every time you cut a pie, the mask gets 1 bit longer.



Classful Pie

- Although the writers didn't know it, they used IP pie to divide the IP address space into address classes



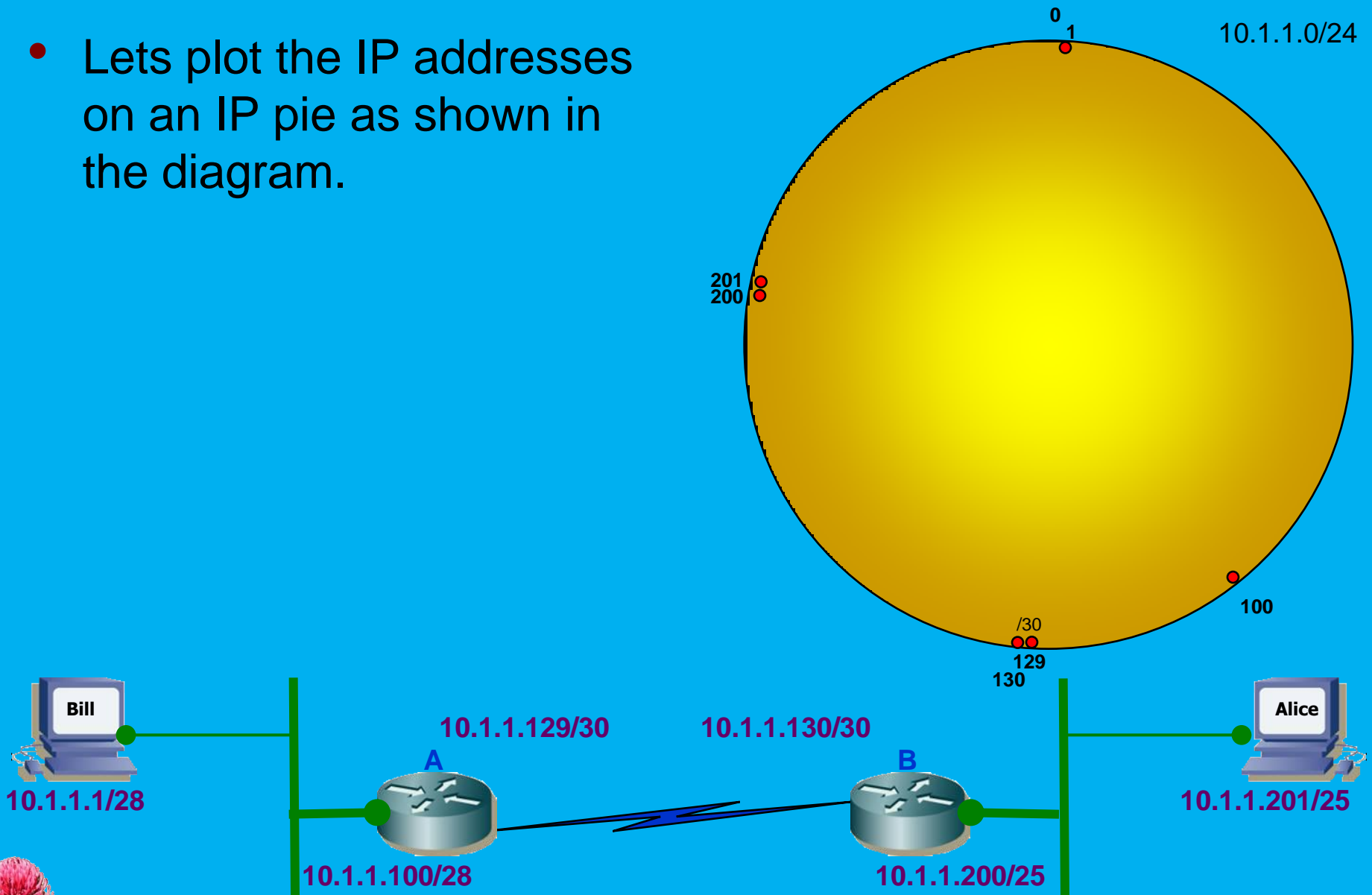
Pie Problem Solving

- Bill is having trouble connecting to server Alice. Can you spot the problem?



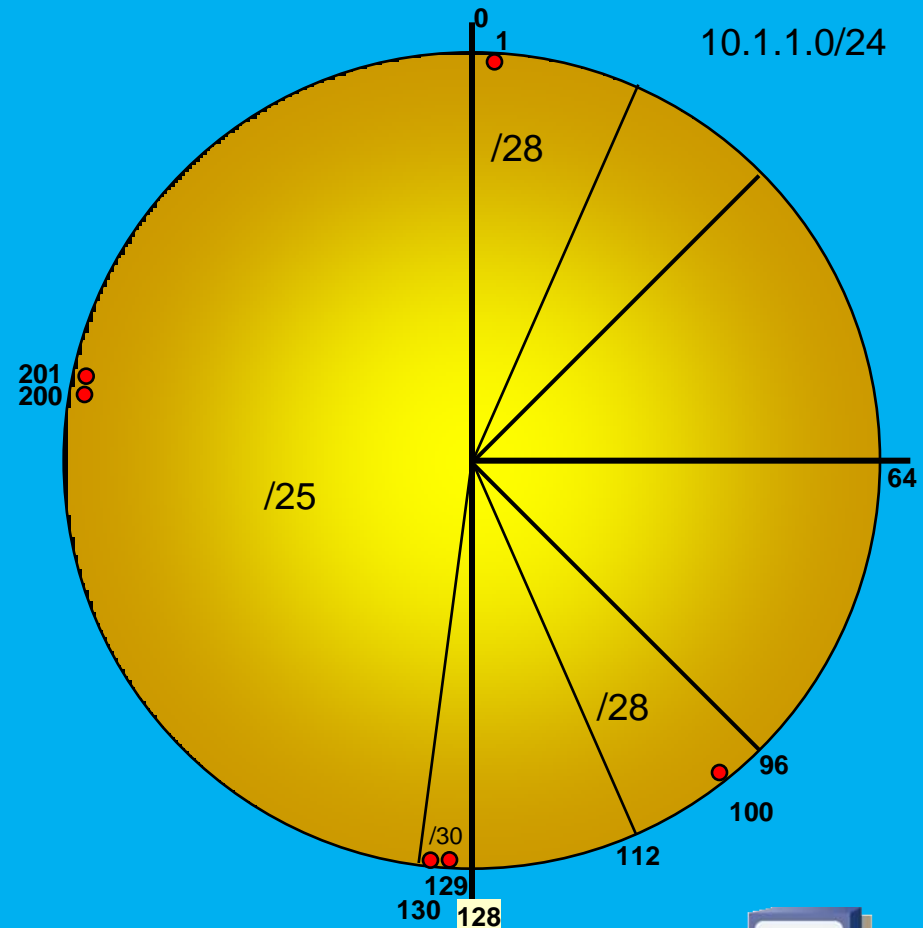
Pie Problem Solving

- Lets plot the IP addresses on an IP pie as shown in the diagram.



Pie Problem Solving

- Lets plot the IP addresses on an IP pie as shown in the diagram.
- Remember, all addresses on a common subnet must come from the same slice of pie



Pie Problem Solving

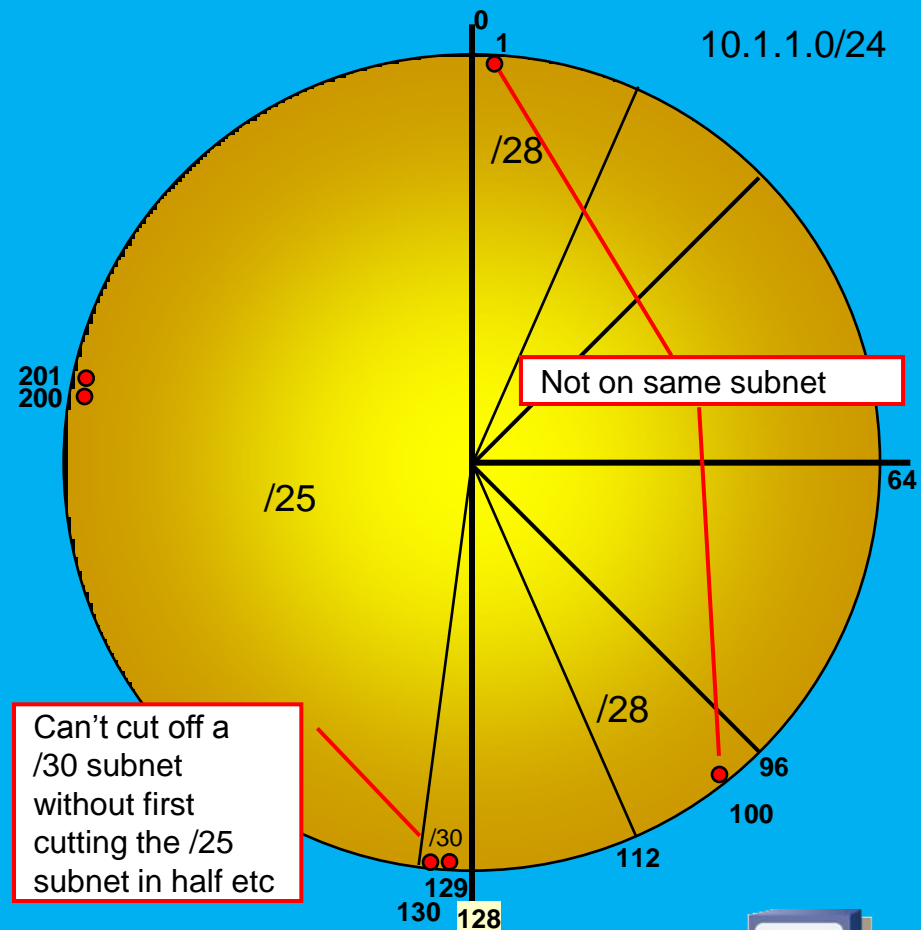
- This highlights two problems

1. Mismatched Subnets

- 10.1.1.1 & .100 are not on the same /28 subnet

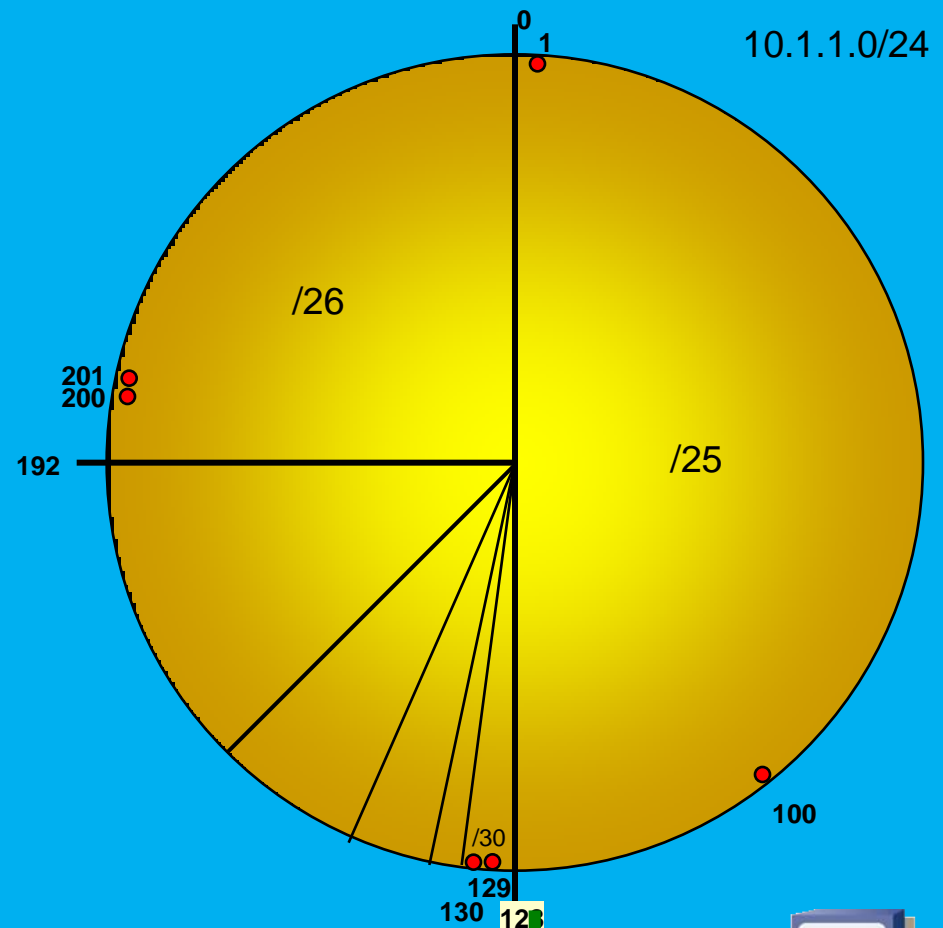
2. Overlapping Subnets

- 10.1.1.200 & .201 are on the 10.1.1.128/25 subnet
- 10.1.1.129 & .130 are on the 10.1.1.128/30 subnet
- These subnets overlap, indicating that *whoever designed this network didn't follow the rules of pie-cutting*



Pie Problem Solving

- A couple of possible solutions present themselves:
- Solution 1
 - Slice the pie properly, putting 10.1.1.200 & .201 on a /26 subnet, and
 - Give 10.1.1.1 and 10.1.1.100 a /25 subnet slice



Pie Problem Solving

- A couple of possible solutions present themselves:
- Solution 2
 - Slice the pie properly, putting 10.1.1.200 & .201 on a /26 subnet, and
 - Move 10.1.1.100 to the same /28 subnet as 10.1.1.1

