Campus Networking Workshop

IP Addressing
Who Needs Public IP Space?

Every campus must have Public IP address space

Where do you get it?

A REN needs must have IP address space

If the REN becomes ISP, it must have address space for its “customers”

Any University can get their own IP address space that is independent of the ISP
Provider Independent IP Addresses

What are provider independent IP addresses?

Public IP addresses that are not allocated to you by your Internet Service Provider.

Can move between service providers without changing IP addresses

If your REN gets space, then addresses provided to you by your REN is not provider independent
NAT is a reality

NAT is a common technique to reduce the number of public IP addresses required.

NAT makes some things hard.

NAT breaks some things:
- SIP (standard-based VoIP)
- H.323 Video Conferencing

It makes it harder to track down viruses and hackers.
Who Needs Provider independent IP and ASN?

**REN**
- Must have both ASN and Provider Independent IP

**Campus Network**
- All campuses must have Public IP, doesn’t have to be provider independent
- Only need ASN if campus is multi-homed

How much IP address space?
General Notes on IP Addressing

IP version 4 addresses are 32 bits long
IP address blocks allocated in powers of 2
Blocks of addresses: 1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096, etc.

CIDR notation: Address blocks are described with a notation of /number. /32 = 1 address, /31 = 2, /30 = 4, …. /24 = 256
Campus Network IP Addressing

Build a spreadsheet

- One row for every building on your campus
- Write down how many computers will be in each building
- Round up to the nearest power of 2
- Add a row for servers
- Add a row for wireless
A Simple Campus Example
## A Simple Campus Example

<table>
<thead>
<tr>
<th>Building</th>
<th>Hosts</th>
<th>CIDR Block</th>
<th>Size</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration Building</td>
<td>68</td>
<td>/25</td>
<td>128</td>
<td>128</td>
</tr>
<tr>
<td>Physics Building</td>
<td>220</td>
<td>/24</td>
<td>256</td>
<td>256</td>
</tr>
<tr>
<td>Chemistry Building</td>
<td>120</td>
<td>/24</td>
<td>256</td>
<td>256</td>
</tr>
<tr>
<td>Computer Science</td>
<td>200</td>
<td>/24</td>
<td>256</td>
<td>256</td>
</tr>
<tr>
<td>Literature Building</td>
<td>44</td>
<td>/26</td>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td>Server Network</td>
<td>20</td>
<td>/27</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>Wireless Network</td>
<td>300</td>
<td>/23</td>
<td>512</td>
<td>512</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>1504</strong></td>
</tr>
</tbody>
</table>

Round 1504 up to the next CIDR block gives you 2048 or a /21

Note: this doesn’t provide for any expansion of number of networks
Questions?