

Tech Training: Networking 101

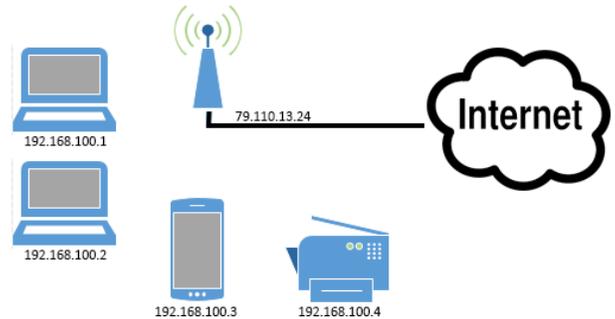
We will cover two basic aspects of networking; IP Addresses and Users. Then we will compare how these two aspects function on a simple home network and on the more complex Taylor network.

IP ADDRESSES: Home vs. Taylor

Home Network

A single router handles five main networking functions:

- Send/Receive
- Routing of packets
- Dynamic Host Configuration Protocol (DHCP)
- Domain Name System (DNS)
- Network Address Translation (NAT)



Other aspects:

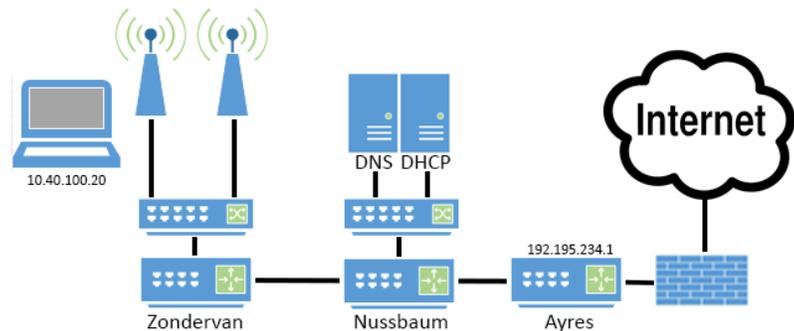
- Single router covers entire house
- ISP assigns router an external IP address
- Router's DHCP service assigns internal IP addresses
 - Devices must have DHCP enabled in order to accept instructions from a DHCP service
 - First 2 octets are identical, so all devices reside on same Local Area Network (i.e. every device can print)
- Router's DNS service translates friendly names to IP addresses (gmail.com = 216.58.216.197)

Taylor's Network

The five networking functions defined above are also required on Taylor's network.

However, the simple single-device strategy used at home is insufficient at Taylor due to:

- Distance: Single router can't provide wireless coverage for all of campus
- Volume: Single router can't handle the thousands of on-campus devices
- Security: Single LAN doesn't allow isolation of various client roles (guests, students, faculty, etc.)



To solve these complications while still providing all five networking functions, dedicated devices are used:

1. Send/Receive: Wireless Access Points are positioned all over campus. WAPs are simple antennas and do nothing more than transmit and receive data packets.
2. Routing: Each building has a router, connected by fiber to other building routers. Packets move through a switch, into that building's router, and on to another building's router before reaching the internet.
3. DHCP: A dedicated DHCP server (data center in Nussbaum) handles all IP assignments on campus.
4. DNS: A dedicated DNS server (data center) provides names to IP translation for all devices on-campus.
5. NAT: Taylor's external router (Ayres Building) handles internal/external IP address translation.

USERS: Home vs. Taylor

Home Network

Windows and MacOS have the ability to track multiple users, each with their own password and appropriate privileges. These are called local users because their account details are stored locally within the operating system. The OS stores:

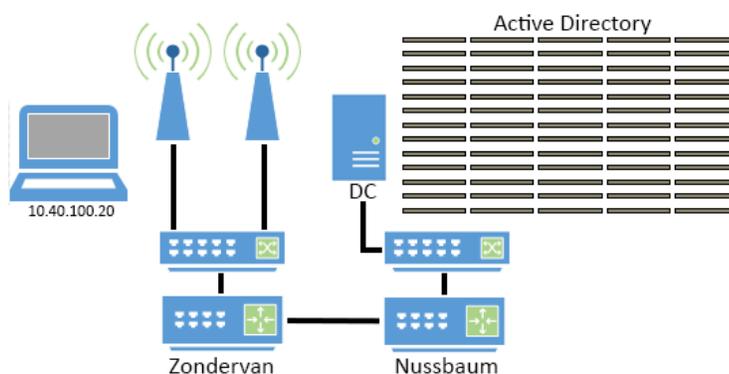
1. Usernames
2. Passwords
3. Permissions



Windows includes a special local user called the Administrator. This account has full privileges on the computer. Other local users can be created and added to the Administrator Group, giving that user full privileges on the computer as well. Windows also has several other groups, each with its own set of privileges (administrator, user, power user, guest, etc.). Users can be added to any of these groups, and membership in a group determines that user's permissions.

Taylor's Network

Use of Taylor's network also requires that we track usernames, passwords, and permissions. However, the simple OS-based strategy used at home is insufficient at Taylor because we want thousands of clients to be able to log onto any of the 1000 Taylor-owned computers.



To solve this complication, we offload

responsibility for all usernames, passwords, and

client roles to a dedicated server called a Domain Controller. A DC is required when running a Domain. Taylor's domain is named CAMPUS. The software that runs on the DC is called Active Directory and tracks tons of info including:

1. Usernames (domain users, not local users)
2. Passwords (domain, not local)
3. Permissions on both individual computers and Taylor services like email, Bb, myTAYLOR, etc.
4. Client Role (student, faculty, staff, guest, etc.)
5. Policies (we will discuss policies when we get to network printing)

More info:

- Fiber Optic Cable: https://www.youtube.com/watch?v=0MwMkBET_5I
- DNS: <https://www.youtube.com/watch?v=Rck3BALhI5c>
- TCP/IP: https://www.youtube.com/watch?v=PpsEaqJV_A0

Topics that build upon Networking 101:

DHCP: http://4040.taylor.edu/tutorials/techtraining/tt_networkdhcp.pdf

DNS: http://4040.taylor.edu/tutorials/techtraining/tt_networkdns.pdf

Isolation: http://4040.taylor.edu/tutorials/techtraining/tt_networkisolation.pdf

MAC Address: <http://4040.taylor.edu/tutorials/macaddress/macaddress.pdf>

Password Manager: http://4040.taylor.edu/tutorials/techtraining/tt_passwordmanager.pdf

TUCAN Registration: http://4040.taylor.edu/tutorials/techtraining/tt_TucanRegistration.pdf

VLANs: http://4040.taylor.edu/tutorials/techtraining/tt_networkvlans.pdf

WebPrint: <http://4040.taylor.edu/tutorials/printing/webprint.pdf>