We will continue to overview internet protocols and applications.

SMTP is a Simple Mail Transfer Protocol. It is a TCP/IP layer 5 (application) protocol that is stream-oriented. It allows for text messaging, and allows a user to send emails to multiple users at once. However, SMTP only allows for the transfer of text, and cannot send pictures or anything like that.

ISPs are Internet Service Providers. They were created to store email on a server, and additionally to allow users to download copies to a local machine so that (old) email could be checked at a later time, when the computer was offline.

Modern Mail Access Protocols like POP and IMAP allow users to access the server without downloading a local copy of the email. It allows messages to be created, deleted, or downloaded for later for offline message viewing.

Here are a few email standards.

- RFC2822: the name for the email standard that specifies to whom the email is sent, and from whom it has arrived. Essentially created the "To:" and "From:" portion of an email.
- MIME: Multipurpose Internet Mail Extensions allow non-text data to be stored in an email. This lets an email server send pictures, files, and other non-text data.

A Domain-Name System, or DNS, is a service that maps human-readable names to a computer's IP. When we send a message to joe_someone@gmail.com the DNS server translates that into Joe Someone's computer IP, and sends the message there.
Domains have a similar ordering style to that of a file system.

- The most significant part of the file (the root) is on the right.
- The least-significant part is on the left.
- Someone.JoeHouse.com is an example. ".com" is the biggest part of the file; ".JoeHouse" is more specific, and "Someone" is the most precise form of the DNS address. "Someone" is hosted inside of ".JoeHouse" and ".JoeHouse" is hosted inside of ".com"
- This is not a necessity, but it makes it much easier for humans to use computers, because humans are better at remembering a name than a string of numbers.
- Additionally, this allows organizations to operate within their own local servers. This prevents the organizations from having to go through an application process for a new DNS name.
- This also allows for server replication. For every server, a duplicate server with the same name can exist, and if someone tries to access that DNS address, the computer will link them to the closest, fastest server. All the servers must be identical.

The actual process of getting a domain name is called resolution, and is performed by a resolver.

- A socket uses the "gethostbyname" function
- Resolver becomes the client
- Resolver contacts DNS server
- Server retrieves the answer
- Server sends the info back
- Resolver helps the computer connect to the fetched address.

Reference locality is a term for DNS servers that are looked up frequently. If a user visits the same site over and over, locality allows it to be accessed quicker.

- Spatial locality is the actual physical location of the server being accessed. A nearby homegroup server is spatially local. DNS will usually contact local servers first.
- Temporal locality is the time a server was accessed. A server that was visited recently will still be ready to be accessed again.
- A cache will hold recent information. If your computer on a website downloads information, the cache will hold it for a short time in order to access it more easily in the near future. If you click a picture to enlarge it, a copy is downloaded to the cache; clicking it again within a few minutes will not re-download the picture from the internet, and will instead access a local, cached copy from your computer.

What is a DNS entry?

- A DNS entry is a domain name, a record type, and a value. The three of these determine the name of the entry for when a user looks it up, the type of file that is in the domain name, and the value help inside the DNS entry.
- Type A is a simple application, used commonly by ping, FTP, or a browser.
- Type MX is a Mail eXchange.
- The type will allow a server to return relevant information; if a user accesses a MX server, it will retrieve mail information.

Aliases allow a computer to keep its original name. Under use of an alias, if the alias is accessed, it is transferred to the main computer.

A DNS server only responds to a full name, not abbreviations. Resolvers can be configured to understand suffixes, but DNS does not understand “fcbk.com” as “facebook.com”.

International domain names can provide problems. All domain names are written in ASCII, but ASCII does not support all Chinese letters, Russian letters… if it’s not English, odds are, ASCII doesn’t understand it. Therefore, Unicode is used to translate the letters to ASCII. This approach is called IDNA – Internationalized Domain Name and Applications.

Extensible Representations allow DNS entries to share information. They agree upon a format for data transmission, and then send the data afterwards. XML, the Extensible Markup Language, defines a set of rules for creating a document that is both human- and machine-readable.