Assignemnt#0

Start Assignment

- Due Sunday by 5am
- Points 100
- Submitting a file upload
- Available Sep 7 at 12am - Sep 14 at 6am

1. Objectives (what this assignment assesses)

By completing this assignment you will demonstrate that you can:

- Explain and compare the DoD (TCP/IP) model and the OSI model in detail and map protocols/devices to layers.
- Distinguish TCP and UDP, explain reliability mechanisms and identify typical application use-cases.
- Reflect, summarize and report lessons learnt from each of the 17 course modules (observations, experiments, real-world relevance).
- Describe common network topologies, choose appropriate topologies for real scenarios and explain advantages/disadvantages based on experiments.
- Install required software platforms (**Packet Tracer**, **VirtualBox/VMware**, and **EVE-NG**) and set up virtual devices in EVE-NG (Cisco router/switch images, Red Hat Linux, Windows Server, Windows 2 client).
- Prepare a professional written report with screenshots and evidence of installation and Canvas profile updates.
- Commit to course rules in a formal agreement and demonstrate academic integrity.

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2. Deliverables (what you must submit as one PDF)

1. **Cover page** — Full name, Student ID, Course, Assignment title, Date, One-line originality statement.
2. **Table of contents.**
3. **Task A — DoD (TCP/IP) vs OSI model (detailed write-up)** (see Task 1 below).
4. **Task B — TCP vs UDP (detailed write-up)** (see Task 2 below).
5. **Task C — Module-by-Module Reflection** (17 modules; see Task 3 below).
6. **Task D — Network Topologies (detailed descriptions + experiments/observations).**

7. **Task E — Installation evidence** (screenshots of installed software: Packet Tracer, VirtualBox, EVE-NG, Virtual machines/images list; Canvas profile screenshot). Include short notes about any issues you faced and how you solved them.
8. **Task F — Networking Basics course evidence** (completion screenshot / certificate, Credly badge screenshot + link, LinkedIn evidence).
9. **Task G — Agreement & Commitment Plan** (signed/typed statement).
10. **Appendices** — list of references, commands used, image names and sources, any small diagrams used.

> Keep the main body clear and readable (use headings/subheadings). The whole PDF should be professional and proofread.

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3. Submission checklist (quick)

- PDF filename: `<StudentID>_FullName_Assignment#0.pdf`
- Cover page with originality declaration
- All tasks A–G completed and placed in the PDF in order
- Screenshots embedded (clear and annotated where relevant)
- Credly badge image + link included (if applicable)
- Canvas profile screenshot included
- Agreement & Commitment Plan signed (typed)
- References listed (books, pages, course links)

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4. Task 1 — DoD (TCP/IP) Layers Model vs OSI Model (detailed)

Produce a clearly written section that includes:

4.a) DoD (TCP/IP) Model — Four layers (detailed)

For **each layer**, provide:

- **Name (and short acronym).**
- **Primary responsibilities / functionality** (concise bullets).
- **Typical protocols & services** that belong to that layer.

- **Example real-world operation** (one small scenario sentence showing how it works).

Expectations (what to write):

- **Application Layer (DoD):** Explain that it provides application protocols and user services (HTTP, SMTP, FTP, DNS, SSH, DHCP, SNMP, SMB). Show an example: web browser requesting a webpage (HTTP).
- **Transport Layer (DoD):** Explain TCP and UDP (ports, segmentation, reliability, flow control). List features like sequence numbers, ACKs, retransmission, windowing for TCP. Mention typical ports.
- **Internet Layer (DoD):** Explain logical addressing and routing (IPv4/IPv6, ICMP, ARP interaction note). Show how routers use this layer to forward packets between networks.
- **Network Access / Link Layer (DoD):** Explain framing, MAC addressing, Ethernet protocols, ARP, PPP, Wi-Fi (IEEE 802.11) basics, physical media coupling.

4.b) Compare DoD vs OSI — structural & functional differences

- Provide a clear comparative table showing OSI 7 layers vs DoD 4 layers, and mapping rows (e.g., OSI layers 5–7 → DoD Application).
- Highlight the main conceptual differences: OSI is a teaching model and more granular; DoD/TCP-IP is practical and historically derived from implementation. Discuss implications for troubleshooting and protocol design.

4.c) Inclusions per layer (protocols/services and how they support communication)

- For both models, list key **protocols/services** per layer and briefly explain their role in an end-to-end communication (e.g., DNS at Application resolves names, IP at Internet routes, Ethernet at Link transfers frames).
- Discuss interplay — e.g., how ARP (link layer helper) supports IP addresses resolving to MACs so Ethernet frames can be formed.

4.d) OSI Model in depth (7 layers with real-life examples)

For each OSI layer (Physical → Application) include:

- **Short definition** (1 sentence), **key protocols/devices**, and **a plain real-world example** (e.g., Physical = copper cable carrying electrical signals; Data Link = switch forwarding frames using MAC addresses; Network = router forwarding IP packets; Transport = TCP ensuring reliable file download; Session = creating/tearing down a remote desktop session; Presentation = TLS encryption and JSON/ASCII conversion; Application = browser rendering HTML).

- Where appropriate show **one small diagram** or a short sequence illustrating how data moves down the stack on the sender and up the stack on the receiver.

Length guidance: ~2 pages for Task 1 (dense, with a table, diagrams optional).

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5. Task 2 — TCP vs UDP (detailed)

Create a well-structured section addressing:

5.a) Transmission Control Protocol (TCP)

- Explain connection setup (three-way handshake), sequence numbers, ACKs, retransmission, flow control (sliding window), congestion control (slow start overview), and ordered in-sequence delivery.
- Provide at least **two real examples** of applications that require TCP (web browsing/HTTPS, SMTP, FTP) and explain *why* TCP is appropriate.

5.b) User Datagram Protocol (UDP)

- Explain connectionless nature, minimal overhead, no retransmissions, no flow/congestion control (as part of UDP), use of ports.
- Provide **two real examples** of applications that choose UDP and why (e.g., DNS queries, real-tim streaming, VoIP, gaming). Explain tradeoffs.

5.c) Compare & contrast (table + commentary)

- Create a side-by-side table: reliability, ordering, overhead, latency, typical use cases, handshake, error correction mechanisms.
- Include short advice: how to choose between TCP and UDP for a given service — e.g., choose UDP when low latency is paramount and application handles errors; choose TCP for reliable file transfer.

Length guidance: ~1–1.5 pages with a clear table and examples.

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6. Task 3 — Reflection on Networking Basics Course Modules (17 modules)

You must provide a module-by-module reflection. Below is a recommended list of 17 modules — **use this exact list** for your submission. For **each module**, write **a summary (100–200 words)** that includes: (a) core concepts; (b) what you experimented or observed; (c) a real-world relevance/example; (d) one question or improvement idea you noted during your experiments.

Recommended 17 Modules (use these headings in your report)

1. Communication in a Connected World
2. Network Components, Types, and Connections
3. Wireless and Mobile Networks
4. Build a Home Network
5. Communication Principles
6. Network Media
7. The Access Layer
8. The Intemet Protocol
9. IPv4 and Network Segmentation
10. IPv6 Addressing Formats and Rules
11. Dynamic Addressing with DHCP
12. Gateways to Other Networks
13. The ARP Process
14. Routing Between Networks
15. TCP and UDP
16. Application Layer Services
17. Network Testing Utilities

For each module include:

- **Key takeaways (bulleted).**
- **Two experiment or observation**
- **Real world example** (where this is used in practice).
- **Reflection / improvement idea** (what you would change or investigate deeper in class).

Length guidance: each module 100–200 words → total ~2,000–3,400 words. This fulfils the requirement to be detailed.

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7. Task 4 — Network Topologies (Ring, Bus, Mesh, Star, Hybrid)

For each topology provide:

- **Definition & diagram (simple).**
- **How it operates (key mechanics).**
- **Typical real-world uses and examples.**
- **Advantages & disadvantages (at least 3 each).**
- **Short experiment or observation:** describe a simple lab you performed (Packet Tracer / EVE-NG) and your observations (e.g., single point of failure in star, convergence issues in certain ring setups).
- **Recommendation:** where you would select this topology and why.

Length guidance: ~1.5–2 pages.

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8. Task 5 — Installation of Required Software (detailed steps & evidence)

You must install and provide screenshots for the following software. If you cannot install due to system restrictions, explain clearly and include screenshots of the attempted steps and error messages.

Required software to install (take clear screenshots of successful install pages or application start pages):

- **Packet Tracer** (from Cisco NetAcad — enroll if required). Screenshot of Packet Tracer main window and NetAcad enrollment page (https://www.netacad.com/courses/packet-tracer (https://www.netacad.com/courses/packet-tracer)).
- **VirtualBox** (Oracle) — screenshot of VirtualBox Manager (https://www.virtualbox.org/wiki/Downloads (https://www.virtualbox.org/wiki/Downloads)).
- **EVE-NG (Community Edition)** (https://www.eve-ng.net/index.php/download/ (https://www.eve-ng.net/index.php/download/))— install either on a local VirtualBox/VMware VM or use a hosted instance. Provide screenshots: EVE-NG web console and the running lab list. **Important:** Use legally obtained images and follow vendor license rules.
- **Optional: VMware Workstation Player / Pro** — only if you choose VMware. Screenshot if used.

Virtual devices to provision in EVE-NG (Video tutorials (https://canvas.instructure.com/courses/12757746/pages/00-eve-ng-lab-setup)):

- **Cisco Router and Switch images:** Screenshot the EVE-NG topology showing at least: one Cisco router node and one Cisco switch node.
- **Red Hat Enterprise Linux:** show VM listing and VM console login prompt screenshot.

- **Windows Server:** show VM manager listing or server Desktop screenshot (Server Manager).
- **Windows 10 client**: show VM login/desktop screenshot.

What to include in the Installation Evidence section:

1. For each software/tool, include one screenshot showing successful installation or startup (annotate with short caption).
2. For EVE-NG: brief note how you imported images (mention filenames and legal source), and a screenshot of topology with the devices above connected.
3. Confirm on Canvas: screenshot showing you have enrolled/confirmed participation in the course — include your Canvas profile screenshot (after update) with name and picture (or user initials).

9. Task 6 — Networking Basics Course

You are required to **enroll in and complete** the "**Networking Basics (https://www.netacad.com/courses/networking-basics?courseLang=en-US)** " course (SkillsForAll or other platform as directed). Provide evidence and reflections.

Requirements:

- Enroll and complete all modules and assessments (https://www.netacad.com/courses/networking-basics?courseLang=en-US (https://www.netacad.com/courses/networking-basics?courseLang=en-US)).
- Take screenshot(s) of course completion/grade page.
- Obtain digital badge on Credly (https://www.credly.com/users/sign_in) and include screenshot + direct badge link in the assignment report. Also include LinkedIn (https://www.linkedin.com/) screenshot if you added the badge.
- In your reflection: provide module-by-module, summary (one paragraph each), experiments done and key takeaways.

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10. Task 7 — Agreement & Commitment Plan

Add a signed (typed name is acceptable) agreement including these points:

Template (students must adapt):

- I, **[Full Name — StudentID]**, commit to attend classes, participate actively, follow instructor directions, and complete assignments on time.
- I will maintain academic integrity: submit original work, cite sources, and avoid plagiarism.
- I will avoid distractions in class (like using phone or any unrelated activities).
- I understand consequences for violations (grade penalties, academic review) and accept them.

Include a typed signature/date at the end.

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11. Task 8 — Comprehensive Report & Screenshots (formatting guidance)

- Use clear headings for each task. Use numbered lists and bullets. Keep text readable (font ≥11, 1.15 line spacing).
- **Screenshots:** crop to relevant areas, add a short caption describing the image and date/time. Embed images near the relevant text.
- **References:** list at least 4 credible sources (textbook, vendor docs, NetAcad pages, official docs). Use simple citation format (Author — Title — Year or Link).
- **File size:** keep PDF under 25 MB if possible. Compress images if necessary.

12. Academic integrity & similarity rules

- Submissions with **>20% similarity** will be reviewed and may lead to sanctions. Cite all sources. Paraphrase rather than copy large blocks.
- You must **not** share or publish unauthorized software images or proprietary material.
- Do not capture traffic or perform intrusive scans on networks without explicit permission.

Final reminders

- Follow the deadline **14 Sept 2025 — 05:00 A.M.** exactly. Late uploads will not be accepted.
- Keep a copy of your submission and all screenshots.
- Maintain academic integrity: cite sources and paraphrase.