

# CY350 – Final Project

Phase-Part	Score
I-A	/15
I-B	/35
II-A	/20
II-B	/100
II-C	/60
II-D	/20
Total	/250

The final project is the culminating graded event for CY350. It is a group project that consists of two primary phases: design and implementation. Point distributions for each part are defined in the table on the top right of this document. Specific rubrics for the design presentation and functional tests will be provided prior to their respective due dates. The design phase begins on Lesson 22 with the Project Brief (as shown in the table below) and concludes with the group design presentation on Lesson 27. The implementation/test phase begins on Lesson 27 at the conclusion of your group presentation and concludes with the success of all required functional tests. All group member and IP network assignments are posted under the “Group Assignments” page accessible from the course home page in Canvas. During the project brief lesson, group leaders will be assigned to assign individual tasks and communicate with the instructor on behalf of the group.

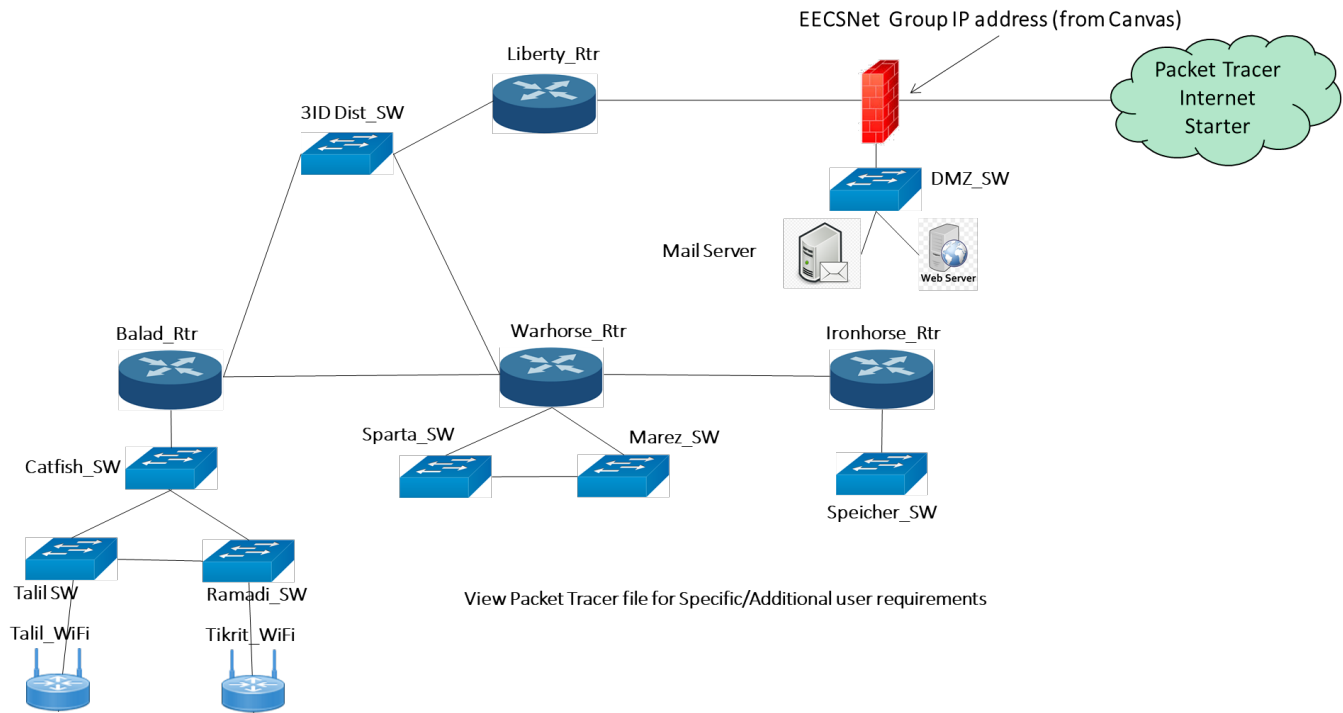
## Lesson Schedule

Lsn#	22	26	27	28	29	30	11 May 1600
Obj.	Project Intro Brief / Begin Implementation	Programmability/ Work period	Design Briefs	IoT Briefs / Work Period	Work Period	REQUIRED Initial Functional Tests for ALL	Final Functional Tests

**Phase I: Design (50 points):** You are the S-6 of a Brigade Combat Team (BCT) and have been notified by division that your brigade is deploying to northern Iraq. Your job is to provide all network transport and security features at ten different physical sites such that they satisfy all policies dictated from the division. The purpose of the design phase is for your group to discuss and formulate a suitable and comprehensive solution that satisfies all project requirements. Your initial task is to design the subnetting/IP plan according to the table below for the diagram depicted on the next page. The following list of design requirements represent specific functionality that your network should provide, any number of which will be thoroughly tested upon completion of the implementation phase.

## IP Requirements

Location	VLAN Name	User Req.	Notes
Balad / Catfish Users	LOC Users	50	
Balad / Catfish Users	OPS Users	25	
Balad / Talil WiFi Users	75th Ranger Bat.	52	PAT Address
Balad / Ramadi Users	Marines Users	6	
Balad / Tikrit WiFi Users	Air Force Users	70	PAT Address
Balad Management	MGMT	8	
Warhorse / Sparta Users	Sparta Data	23	
Warhorse / Sparta Users	Sparta Voice	10	
Warhorse / Marez Users	Marez Data	11	* users will need access to Sparta AO
Warhorse / Marez Users	Army Users	27	
Warhorse Management	Warhorse IMO	4	
Ironhorse / Speicher Users	Speicher Voice	3	
Ironhorse / Speicher Users	Speicher Data	3	
Ironhorse / Speicher Users	SOF	46	Must be NAT'ed



### Design Requirements:

- 1) As in all previous labs, the Liberty\_Rtr contains a single default route to the Internet – **no other routers should contain static routes.**
- 2) At all sites containing a router, each group of users (per the IP requirements chart on Page 1) should be in separate broadcast domains.
- 3) Balad RTR, Warhorse RTR, and Liberty RTR will use an open-source link-state dynamic routing protocol to exchange routes.
- 4) Ironhorse RTR is only able to employ a formerly Cisco-proprietary routing protocol to exchange routes with Warhorse RTR.
- 5) **Due to geographic proximity, Warhorse and Balad must have a direct, redundant physical link between them to ensure that all Voice traffic between Warhorse and Balad does not traverse Dist\_SW at 3ID HQ and converges via EIGRP for all voice networks.**
- 6) All VLANs created and modified on Catfish\_SW **automatically** populate to the other switches.
- 7) The Data network for SOF at Ironhorse\_Rtr must use Dynamic NAT.
- 8) Only required VLANs are allowed across all trunks
- 9) Route redistribution is performed on the Warhorse\_Rtr.
- 10) The following traffic is allowed into the brigade's network from the Internet:
  - a. Ping replies
  - b. Web/secure web responses
  - c. DNS responses

- 11) Only the Mgmt/IMO network at each site has SSH access to their respective network devices, with the exception that the Dist\_SW at 3ID and the Ironhorse\_Rtr SSH capability is accessible from the Balad S6 Management Network.
- 12) All Data networks are only allowed to send web/secure web requests and DNS queries.
- 13) Mgmt hosts at all sites can ping hosts in all Data and Voice networks (except for those behind NAT), but not hosts in other Mgmt networks.
- 14) Data and Voice networks are **not** allowed to ping outside of their LAN. They can ping within their own vlan and to the Internet, but not into other vlans.
- 15) All Data and Voice will use DHCP; Management networks will be static IPs.
- 16) All Wifi access will be via PAT at FOB Sparta, as depicted in the diagram.
- 17) Warhorse and Speicher Voice networks must have at least 3 actual phones fully configured / operational.
- 18) Warhorse and Speicher Voice networks must be able to communicate to each other.
- 19) Employ spanning tree in all areas with greater than one switch.
- 20) Disable all unused ports in all routers and switches.

### Design phase deliverables:

- A) **15 points** of each individual team member's score for the design phase consists of evaluating another group's design and presentation. The evaluating team will have access to the presenting team's full presentation in order to analyze it and give constructive feedback according to specific questions and a rubric defined at a later date. This evaluation will be completed in Canvas and is due at **2359 the day of the presentation**.
- B) **35 points** of each individual team member's score for the design phase consists of their contribution to the presentation documents and the presentation itself. Each group member must brief for approximately the same time during the presentation, for a total presentation time of about **10 minutes**. The group presentation will be scored according to a subsequent rubric, but should generally contain:
  1. A Layer 3 network diagram with all labeled interfaces, network/IP addresses/subnet masks, routing domains, redistribution points.
  2. A Layer 2 diagram with all labeled applicable ports, virtual & subinterfaces, trunk/access ports w/ VLAN assignments, VTP domains.
  3. A security diagram depicting NAT functionality, ACLs at each location, port security.
  4. Additional slides to explain in further detail all features listed above if diagrams become congested.
  5. Discussion of implementation, group collaboration, testing, and **packet tracer file sharing strategy**.

Once the group presentation and sister group evaluations have been submitted to Canvas, the group can proceed to the implementation phase, consisting of building the network topology in packet tracer, troubleshooting, and conducting initial functional tests.

## **Phase II: Implementation and Functional Testing (120 points):**

This phase begins with the conclusion of the design phase. It ends when the group has passed all final functional tests, all device configurations and peer evaluations have been submitted to canvas, and e-acknowledgements have been submitted in CIS.

- A) **Administrative Configuration (20 points):** These points are awarded as a result of the group's adherence to best practices, naming conventions, etc. with respect to the following areas that do not necessarily affect the functionality of the network. All passwords should be configured as **cisco** to avoid the need to wipe equipment. Switches and routers have their own unique requirements as you've learned in previous labs. The following features are required:
1. Proper hostnames
  2. Only an enable *secret* (no enable passwords)
  3. All passwords are encrypted
  4. Telnet is disabled
  5. Descriptions on all employed interfaces/ports, including all subinterfaces, loopbacks, and SVIs
  6. Port security on all applicable ports – dynamically learn a maximum of two MACs
  7. MOTD Banner for all devices
  8. Console password configured
  9. Routing protocol running between the three main FOBs uses md5 authentication.
  10. No routing updates should be sent out stub interfaces.
  11. All switches are configured with routable IPs
  12. All router loopbacks are configured with routable IPs (added to routing processes)
  13. **Bonus Opportunity (+20 points)! Make practical use of the DMZ ASA creating a custom mail and web server.**
- B) **Functional Testing (100 points):** This part of Phase II checks whether the group has properly implemented all features that satisfy functional requirements detailed in Phase I. All groups are required to schedule an initial functional test with their instructor NLT 4 May at 1200. It will benefit the group if the functional test is scheduled on 2 or 3 May in order to allow additional time for troubleshooting should the group fail one of the tests. **All final functional tests will be complete in the afternoon on 11 MAY with no exceptions.** If a group has still not passed all functional tests by this date, it will receive a maximum score of 50 points on this part of the implementation score. A rubric of all required functional tests will be distributed to groups once the implementation phase has begun.
- Scoring note:** If a group passes all functional tests on the first iteration, it will receive 100/100 points. However, if a group fails one or more tests on the first iteration but passes the 2<sup>nd</sup> iteration, it will receive a 90/100. This trend continues until the group can receive no more than 50/100 points.

- C) **Peer evaluations (20 points):** Each group member will complete a peer evaluation covering the entire project's scope. This peer evaluation will afford each group member a private forum to communicate to their instructor an assessment of all group members' perceived contributions to the project, including themselves. For example, if a group has five members, there are 300 total peer evaluation points. The student must allocate all 300 points across the five people according to their subjective assessment of contribution. The evaluation will also be completed in Canvas once the group has completed the final functional tests.
- D) **Reflection (20 points):** Each group member will submit a personal reflection detailing what they learned, experienced difficulties, **areas where the entire course can be improved**, recommendation for changes, etc. approximately a page in length. Specific questions to guide responses will be viewable in Canvas.

**Implementation phase deliverables:**

- A) **20 points:** Running configurations of all network devices submitted to Canvas: four routers and four switches as **a single .pdf** file as in previous assignments.
- B) **100 points:** Final functional test complete by 11 MAY (w/ rubric/test sheet).
- C) **60 points (according to peer scoring):** Submitted peer evaluation in Canvas.
- D) **20 points:** Submitted reflection in Canvas.