Name:	Anthony Pieper	**Date:**	10/4/2017
Unit:	The Internet	**Grade:**	9
Lesson Topic:	The Need for Addressing *(Developmental lesson)*	**Time Allotted:**	85 minutes (1 class period)

Context for Learning:
This lesson is the second lesson in the second unit of the class, which discusses the Internet and related technologies. In the first unit, students had several lessons and activities where they practiced developing and working with simple protocols for communicating information amongst themselves, however those previous activities only required communication between 2 people. The activities in this lesson will require students to work in groups of 3 or 4, and students will have to successfully communicate between all group members in order to play a game called **Broadcast Battleship**, which is a modified version of the classic board game.

Curriculum Standards:
CSTA K-12 Computer Science Standards (2011)

- **CD.L2:6**   **Describe the major components and functions of computer systems and networks.**

- **CD.L3A:9**   **Describe how the Internet facilitates global communication.**

- **CL.L2:3**   **Collaborate with peers, experts and others using collaborative practices such as pair programming, working in project teams and participating in group active learning activities.**

Objectives:
- Students will recognize that browsing the Internet requires computers sending requests, and data being provided in response to those requests

- Students will be able to demonstrate why messages that traverse the Internet need sender and recipient address information

- Students will create an informal addressing protocol that simulates communication through the Internet

Materials:
- Everyone will require a computer with Internet access
    - Code.org Internet Simulator (studio.code.org)
- Worksheets for students
    - Broadcast Battleship Rules (*classwork*)
    - Broadcast Battleship Game Board (*classwork*)
    - Invent a Binary Protocol for Battleship (*classwork*)
    - IP/DNS Worksheet (*homework*)
- Student Notebooks
- Whiteboard with dry erase markers (*at least 4 different colors*)

Procedures:

- **Warm-up** (*5-10 minutes*)

  o *Pre-bell:* Teacher will write the vocabulary list on the white board: **IP Address, Packets, Protocol.**

    ▪ Only the words will be written, not the actual definitions.

  o *Post-bell:* Students will be asked to write down the definitions in their notebooks. The teacher will remind students that these terms were discussed in previous lessons, so they should be very familiar. *After 3-5 minutes, the teacher will call on 3 students to provide the definitions.* The teacher will ask if there are any different definitions that students came up with, and then discuss possible reasons for the differences.

    ▪ These terms may not have been explicitly defined in previous lessons, so there may be some variety in student responses.

    ▪ Asking students to provide examples (*i.e. IP Addresses*) could be a good way to stimulate some discussion. *"Where have you seen these before?"*

- **Motivator/Bridge** (*10-20 minutes*) – Broadcast Battleship (*unplugged*)

  o Students will receive two (2) worksheets for Broadcast Battleship (a rules sheet and a game board sheet). Students will be broken into groups of 3 or 4 students depending on their seating arrangement in class.

    ▪ The teacher will ask if anyone remembers the old board game called Battleship, and explain that the following activity is a variant on that game, designed to show them the practical use of the vocabulary terms.

    ▪ To model the activity, the teacher will draw 2 large game boards on the whiteboard, and call 2 students up to model the activity. The students will stand back-to-back, and call out numbers until one of the battleships is sunk.

  o Groups will play Broadcast Battleship for 10 to 15 minutes, which should give the students enough time to play 2 or 3 games. This should hopefully give students enough time to get a feel for the rules and gameplay, which will help them when they work on their communications protocol.

    ▪ At the end of the activity, the teacher will signal students that it is time to transition over to the computers to make the game really challenging.

- **Group Task 1** (*10-20 minutes*) – Broadcast Battleship (*silent*)

  o Students will log into the Code.org Studio and open up the Internet Simulator for Lesson 9. Groups will be directed to continue playing Broadcast Battleship, but instead

of calling out moves, the must use the Internet Simulator to send moves to one another (i.e. no talking).

- The teacher will explain that it's up to each group to determine how they will communicate. The only rule is "no talking." Most likely, the students will use ASCII text to send words to each other, which will still allow the students to use their names when communicating.

- **Group Task 2** (15-25 minutes) – <u>Build a Binary Protocol</u>

  o The teacher will pass out the Binary Protocol for Battleship worksheet, and students will be directed to stop playing Broadcast Battleship so that they can refine their communications protocol. Directing them toward the worksheet that was just passed out, the teacher will explain that this time, the requirement is that they can only communicate in binary numbers when using the Internet Simulator.

    - The teacher can provide assistance to students, pointing out that because there are only 4 students max, 2 bits should be sufficient to identify every student in the group.

  o After students have completed their binary protocol, each group will play Broadcast Battleship for 5 to 10 minutes using the binary protocol they created.

- **Summary / Closure** (*5-10 minutes*)

  o The teacher will show students an example of a binary protocol that Code.org recommended as a possible solution (Exemplar solution), and ask students how close their protocols came to matching this recommended solution.

    - The teacher will point out that, even though the student solutions may not match the recommended Exemplar solution, that doesn't mean that their protocols were bad. If the requirements were met, and the protocol works, then their solution is good.

  o The teacher will pass out the *IP/DNS Worksheets* and instruct students to view the corresponding video on Code.org as homework. The teacher will then mention that the binary protocol that the students created today will serve as a precursor to helping the students learn about IP Addresses in the next lesson.

  o The teacher will collect the Binary Protocol for Battleship worksheets prior to the students leaving the classroom.

Assessments:
The Binary Protocol for Battleship worksheet has a rubric that students will use to self-assess their protocols. The outcome of this worksheet will function as a **Minor Summative Assessment**, and be used for grading the students' performance during the lesson.

There will also be **formative assessments** done throughout the lesson, as the teacher will walk about the room, checking student performance during each of the activities.

Extension Activities:
The primary activity for this lesson is Broadcast Battleship, so if time runs short, students can either continue to play Broadcast Battleship, or possibly refine their binary communications protocol.

Most likely the binary communications protocol developed by the students will be rather simplistic. If students finish early, or don't wish to play Broadcast Battleship, the teacher can direct students to think about the flaws inherent in their simplistic protocols (i.e. spoofing attacks and eavesdropping), and how they may remediate those flaws.

Review / Reinforcement:
- Homework
    - **IP/DNS Worksheet** – Code.org has a video introducing IP Addressing and DNS, so students will be asked to watch the video and fill out the corresponding worksheet as homework. This will provide groundwork for the following lesson, as well as help reinforce some of the concepts the students learned about in this lesson.