Computer Networks
Assignment 2

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Assignment

In this assignment, you implement a backwards-learning algorithm to be used in network switches that use the ALP protocol described in assignment 1.

The core task of a switch is to forward incoming frames on the correct links. To make the use of switches practical, they are in charge of their own setup. That is, the switch will figure out on which links to forward frames without the user having to configure it.

1. Exploration

In this part of the assignment you answer a number of questions about switches, how they configure themselves, and what to do with the frames they receive. Answering these questions simplifies the programming assignment is the next section.

1. Which fields from the ALP frame can the switch use to build a topological map of the network?

Answer:
The switch shall use the `dest` and `src` field of the ALP frame to build a topological map of the network.

2. What happens with the frames addressed to a machine x, if this machine never transmits any frames itself?

Answer:
These frames will be flooded until the target machine (x) sends a frame it self. Because the

location (the port) of the target machine is still unknown.

3. What happens with the frames addressed to a machine x, if this machine is disconnected from the switch and then reconnected on a different link?

Answer:
The frames will still reach the machine. Because the bridge has a process that scans the hash table and purges all entries more than a few minutes old. Hence the frames reach the machine when the machine is plugged in again.

4. Describe how a switch could reconfigure itself to solve this problem.

Answer:
The switch uses flooding algorithm to flood all machines. Then only those that are meant to receive the frames, in this case, only machine x, will send back a response and hence the address hash table is re-established.

5. If a hub is used in the network, it is possible that machines x and y share a single link on the switch. Once the switch knows that x and y are connected on the same link, what should it do with frames that are sent by x and are addressed to y?

Answer:
It discards the frames, meaning it will not forward the frame back out the same port which received the frame. This is called filtering.

6. The frames received by the switch contain a 4-byte checksum. Is checking for data errors on the switch a good idea? Give both an advantage and a disadvantage of doing error detection on the switch.

Answer:
Advantages: More reliable data transmission and save the bandwidth: when the errors are detected on the switch, the frame is immediately sent back, rather than going through and getting sent back when it reaches the (wrong) target machine.
Disadvantges: Increases delay as the switch is already handling multiple frames, increases overhead.

2. Implementation

See .py file.