Introduction to Computer Networks

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1 Introduction

A network is a "bunch of connected entities". What constitutes an entity or the connection really depends on the context in which you are looking at the network.

In the context of network theory, the entities are typically referred to as **nodes** and the connections are referred to as **links**.

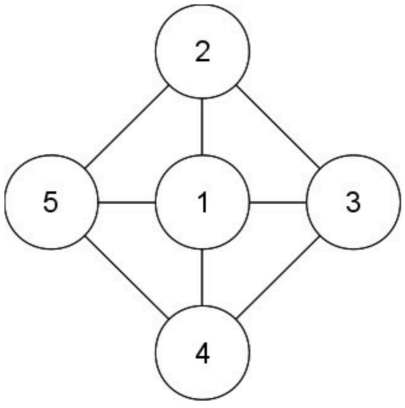

Figure 1: A basic network

In the context of the internet (or any computer network), the nodes are typically computers, and the links are the multiple ways that computers can be connected to each other e.g. wirelessly, ethernet cables, etc.

2 Routing

The main use of a computer network is to facilitate the transfer of messages between two nodes. The term *routing* is the process of sending a message along a path. We shall discuss a very basic example of what this process could look like in a more realistic network.

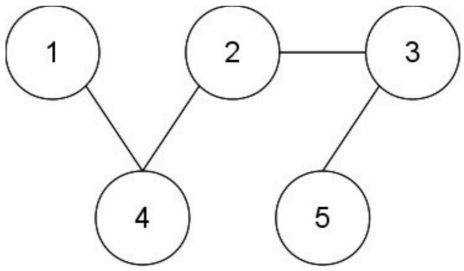

Figure 2: Routing a message through a network

Assume that I had to send a message from Node 1 to Node 5. - Node 1 is connected only to Node 4. Therefore, the message goes to Node 4 - Node 4's routing table shows the best way to get a message to Node 5 is to send it to Node 2. Therefore, the message goes to Node 2 - Node 2's routing table shows the best way to get a message to Node 5 is to send it to Node 3. Therefore, the message goes to Node 3 - Node 3's routing table shows it is directly connected to the destination. Therefore, the message goes to Node 5.

Note that no single node in the network has knowledge of every other node in the network. All they have is a direct connection to another node that they believe will get the message closer to the target node.

3 IP Addresses

In the previous examples, we used numbers for the nodes. In reality, each node in a computer network has a unique number that can be used to identify it out of all the computers in the network.

3.1 IPv4