ITS 323 – PROTOCOL ARCHITECTURES EXAMPLES

1 Example Protocol

This is an example of a protocol between two peer entities, A and B. (It doesn't really matter what the purpose is, or whether A and B are humans or computers).

A and B are peer protocol entities. There are two types of messages used in this protocol: "How are you?" and "I am fine".

The service provided by this protocol to the user can be defined by the set of messages sent between protocol and user: StartGreeting, GreetingSuccessful, GreetingFailed, GreetingReceived.

The protocol rules should describe the actions that the protocol entities should take when certain events occur. In our example, the rules could be described as:

```
If ReceiveFromUser ("StartGreeting") Then
     SendToPeer ("How are you?")
     StartTimer (waitForResponse)
     SetTimerThreshold (waitForResponse, 2 seconds)
Else If ReceiveFromPeer ("I am fine") Then
     StopTimer (waitForResponse)
     SendToUser ("GreetingSuccessful")
Else If TimerReachesThreshold (waitForResponse) Then
     StopTimer (waitForResponse)
     SendToUser ("GreetingFailed")
Else If ReceiveFromPeer ("How are you?") Then
     SendToPeer ("I am fine")
     SendToUser ("GreetingReceived")
End
```

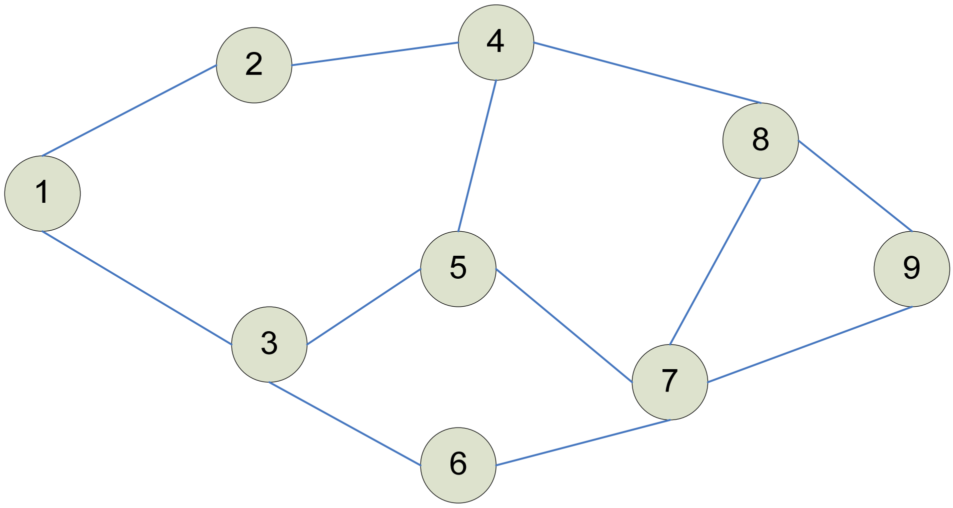
The above conditional statements indicate the actions a protocol entity takes, given some event. Note that we have included the event/actions for both protocol entities (A and B) together.

You should be able to work out what the protocol does, including what events are and are not possible. Also, what happens if there is an error and a message is not received (e.g. A sends the "How are you?" message, but it is not received by B).

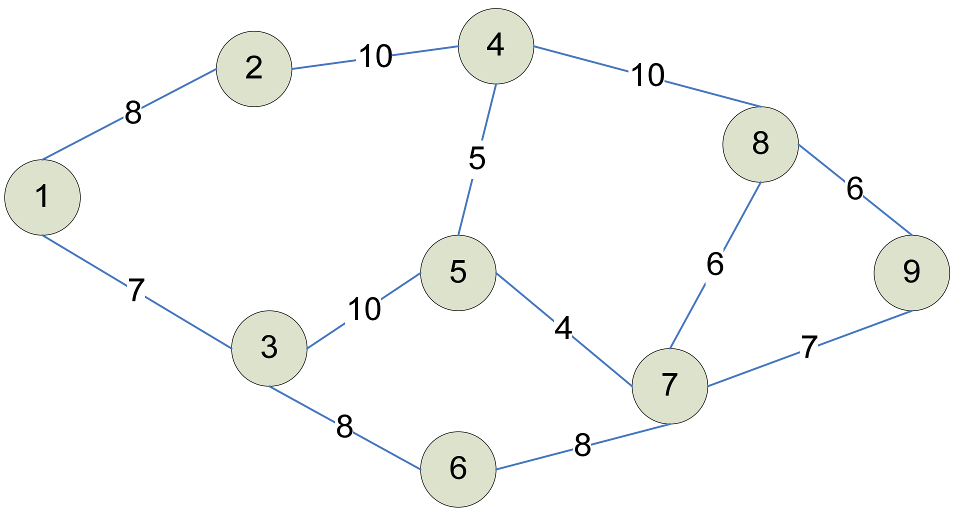
2 Role of Networking Layer

One role of the networking layer in a communications model is to find a path from one computer (source) to another (destination). This is called *routing* and in later lectures we will introduce routing and routing algorithms in detail. But here is a very simple example explaining routing.

The network below consists of 9 nodes (computers), and node 1 wants to communicate with node 9. The lines show physical links (e.g. cables) between the nodes. Obviously, node 1 does not have a direct link to node 9, and so a path needs to be found through the network.

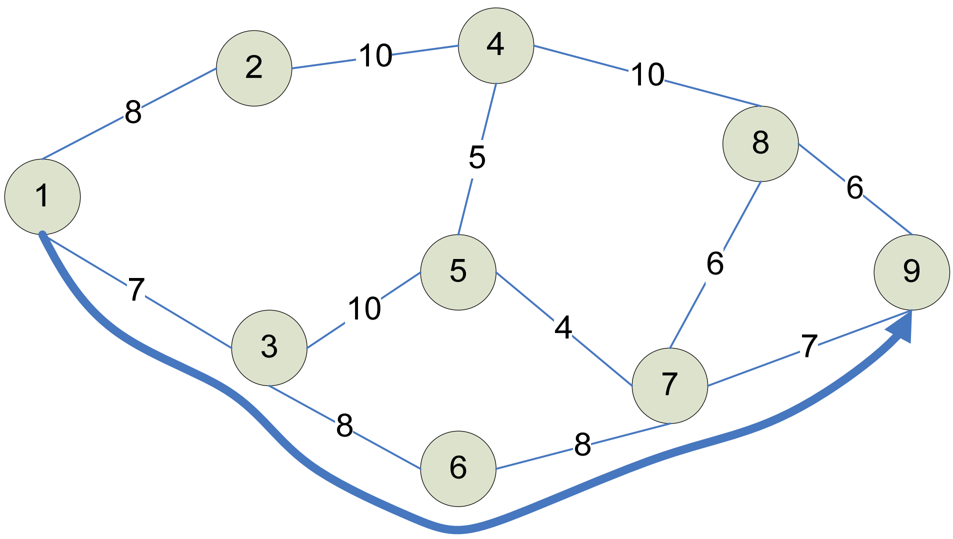


As an example of choosing a path, assume each link has a capacity in Mb/s. The capacity is shown in the figure below. That is, the maximum amount of traffic that can be carried from node 1 to node 2 is 8Mb/s.



Now if the criteria for selecting a path (or route) is based entirely on the maximum capacity, then what path would be selected? In other words, what path should be based to allow for the highest amount of traffic to be sent from node 1 to node 9?

The answer? Nodes 1 to 3 to 6 to 7 to 9. See below:



Why this path? Because using this path we could potentially maintain a data rate of up to 7Mb/s. The minimum link capacity along the path is 7Mb/s (the maximum is 8Mb/s). The minimum link capacity determines the maximum path capacity.

If you consider the path from 1 to 2 to 4 to 8 to 9, then although two links have a capacity of 10Mb/s, the final link only has a capacity of 6Mb/s. If we used this path, then the maximum data rate we could obtain from node 1 to node 9 would be 6Mb/s.

This is a very simple (and unrealistic) example of selecting a path. Better algorithms and criteria will be introduced in the routing lecture.