Protocol Design for Distributed Applications

Routing Protocols for Disaster Zones

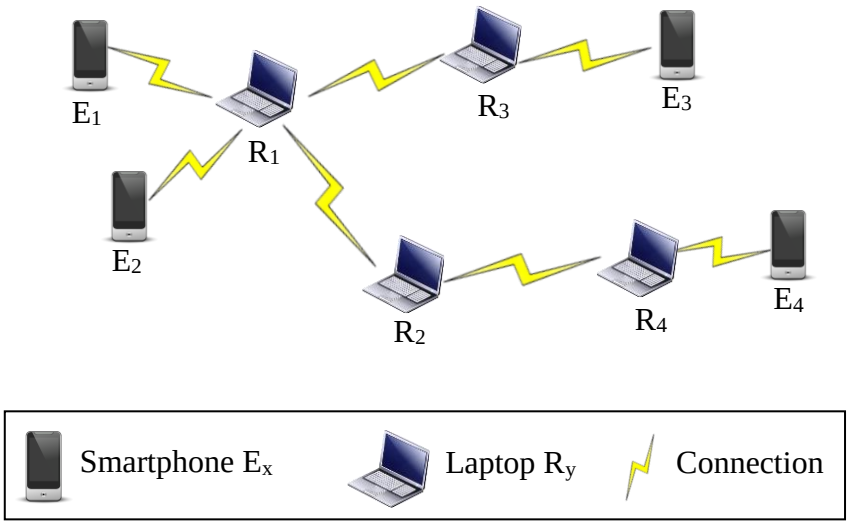

Figure 1: Sample Scenario

Assume your team has arrived in a disaster zone and all network infrastructure has been destroyed in the disaster. The emergency responders have a number of devices including laptops and mobiles phones. The devices can communicate directly with other devices in the coverage area of their wireless transponders. The smartphones, in the example E_1-E_4, can only communicate with a laptop closest to them because of their limited battery power and antennae. Each of the laptops, e.g. R_1-R_4, can communicate with a subset of other laptops and a subset of smartphones.

The task of your team is to develop two routing approaches that allow messages from a smartphone to be directed to another smartphone or laptop. One of the routing approaches should be based on Link State Routing, the other on Distance Vector Routing. The laptops will act as routers in this scenario and the smartphones will act as endpoints for communication. The smartphones will be associated with a laptop in

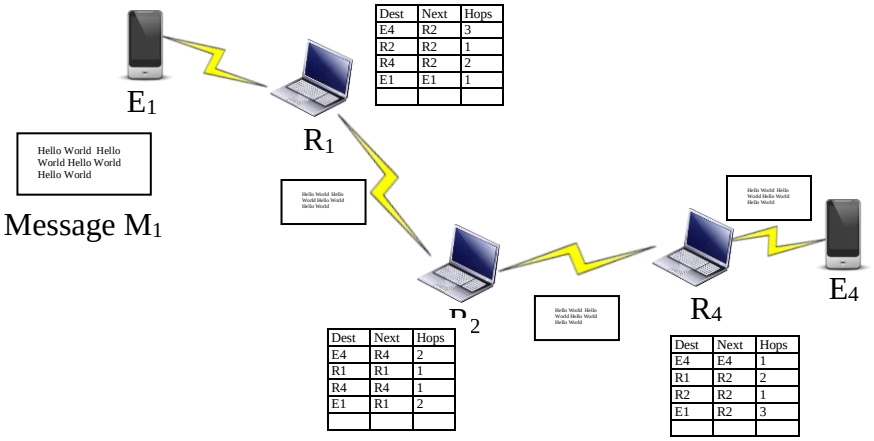

Figure 2: Scenario of a delivery of message M_1 from E_1 to E_4

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a first step and the laptops will have to establish their own individual routing tables in a subsequent step. You can assume that the topology of the network will not change after the initialisation i.e. the routers only have to establish their routing tables once and communication only takes place after the routers have established their routing tables. The form of the identification of the individual devices e.g. by IP addresses, numbers or strings, is your choice.

For development purposes, the routers and endpoints can be represented by individual processes on a single machine and for the exchange of information, the processes can communicate over the local loopback address; however, it is important to maintain that the processes representing endpoints/smartphones can only communicate with a specific process representing a router/laptop and that routers/laptops can only communicate with a subset of other routers/laptops. It would be good experience, to test the implementation with the processes running on a number of different machines. As an extension, it would be good to attempt to run the implementation on smartphones and laptops that are configured to use the ad hoc mode and are given local private IP addresses.

Initially, the communication between two endpoints should only consist of simple messages; for example as shown in figure 2, where a message is delivered from E_1 to E_4 over routers R_1, R_2, and R_4. As an extension, the endpoints should be able to transmit images – possibly taken from cameras on the device – to another device in the network.

The project is a group project. You will need to form a team with 2 of your classmates. The work on the project should be divided equally among the team members. Each team will receive a common mark i.e. all team members will receive the same mark. Send me an email with the name of your team and the name of your team members by 01.12.2015 23:59 with the subject "CS2031 Group:".

The implementation should be accompanied by a report. The report should be at least 2 pages; at most 10 pages. It should provide an abstract explanation of the two routing approaches, a description of the implementation and a discussion of the advantages and disadvantages of the two approaches.

Submission Details

Every team member has to submit a copy of the solution i.e. every team member submits a copy of the report and of the source code that the team prepared. The files that contain the implementation and the report should be submitted through BlackBoard. Every file should contain the name of the authors. The source files of the implementation should be submitted as an archived file e.g. ".zip" or ".tar.gz". The report should be submitted as either word-, pdf-document or plain ascii text file,

The name of the archive file and the report should be include a team name and the name of the author; for example, "TeamFooBar-John-Doe.zip" and "TeamFooBar-report-John-Doe.pdf". The deadline for the submission is given in BlackBoard.

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