

REPORT ON RDT3.0

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Note: In order to compile class files using Java version 1.8 use format:
javac -source 1.8 -target 1.8 Network.java

Abstract

Reliable Data Transfer (RDT 3.0) is a protocol that implements a way to transfer files over a network. It defines the states using FSM(Finite State Machine) for both a Sender and Receiver.

Description

The Sender and Receiver have different FSM's that facilitate data transfer between them. The basic description of the Receiver is that it will wait to receive. Once packet is received, it will acknowledgment receive with information on whether it was good or bad. It will move to the next state only if the received packet is good (using checksum), and send acknowledgment of good receipt.

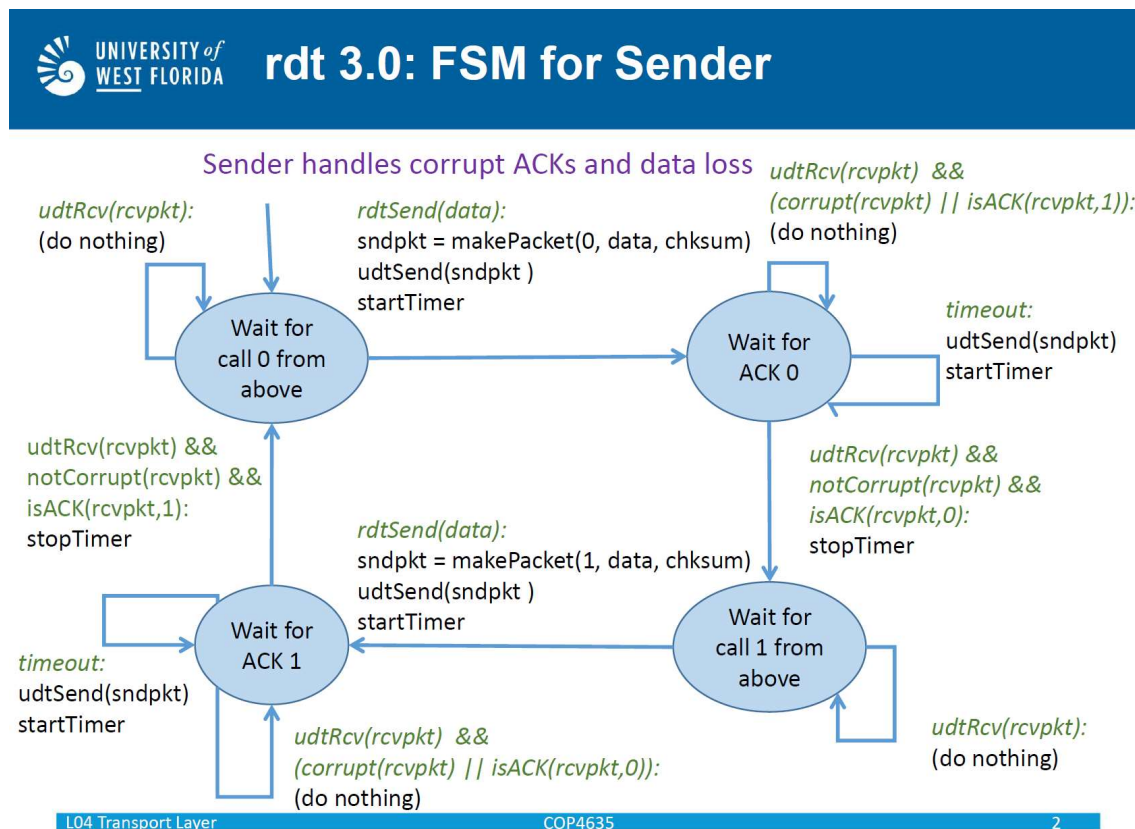


Figure 1: RDT 3.0 Sender FSM diagram (UWF, Reichherzer)

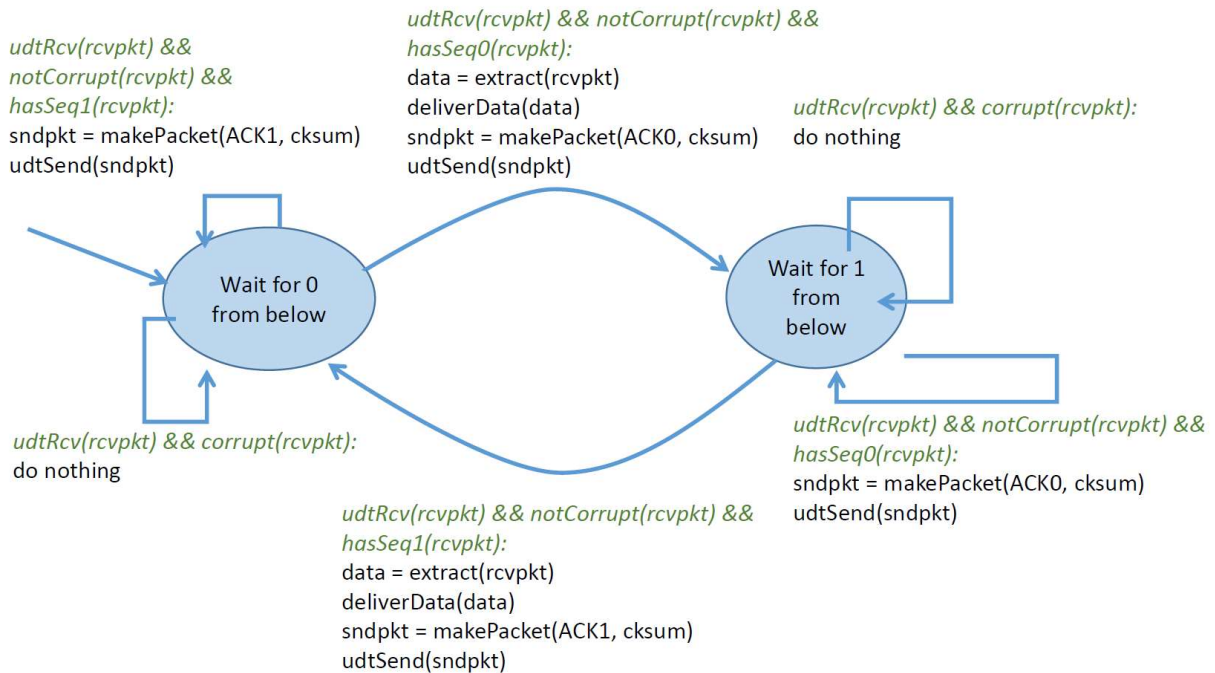


Figure 2: RDT 3.0 Receiver FSM diagram (UWF, Reichherzer)

The basic description of the Sender is that the sender will send a packet, and wait for acknowledgment before sending the next sequence packet. If the acknowledgment show fault or does not arrive in time, then the Sender will send the same packet again, and not change sequence. Once received acknowledgment comes back good, the sender will send the next sequence packet and await good receive acknowledgment again.

Usage

The user must first compile the java files before running using commands below (Windows).

```

javac Network.java
javac Receiver.java
javac Sender.java

```

The format of arguments for shell / bash are as follows.

network: <port> <lostPercent> <delayedPercent> <errorPercent>
receiver: <port>
sender: <port> <rcvHost> <rcvPort> <networkHost> <networkPort>

For ease of use, please copy from below:

```
java Network 60086 20 20 20  
java Receiver 60038  
java Sender 60042 127.0.0.1 60038 127.0.0.1 60086
```

The Timeout is set for 500ms and 300ms for Network and Sender respectively so recommend using error corrupt lost percentages less than 20.

To get the full message from Receiver, type "shutdown" as input in Sender.

Appendix is attached with this report to show the sample logs generated by Server, Receiver and Network.

Please note that, the ports are chosen to support UWF user accessible ports, but **will not compile on the UWF servers** due to Java memory limits set. The user will have to compile and run the files using their local machine instead.

Conclusion

RDT3.0 is a basic and functional way to send data packets over network while handling network loss, delay, and corruption. That said, the efficiency is poor and is much slower than the modern protocols that we use today.

Appendix

Network Sample Log

 Command Prompt

```
D:\Github\COP5518-Group11-Project2-New\rdt3.0\src>java Network 60086 20 20 20
Network running at port # 60086
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: false
Forwarding packet from port: 60042 to 60038
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: false
Forwarding packet from port: 60038 to 60042
Network waiting to receive packet.
Delayed: false Corrupted: true Lost: false
Forwarding packet from port: 60042 to 60038
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: false
Forwarding packet from port: 60042 to 60038
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: true
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: false
Forwarding packet from port: 60042 to 60038
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: false
Forwarding packet from port: 60038 to 60042
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: false
Forwarding packet from port: 60042 to 60038
Network waiting to receive packet.
Delayed: false Corrupted: true Lost: false
Forwarding packet from port: 60038 to 60042
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: false
Forwarding packet from port: 60042 to 60038
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: false
Forwarding packet from port: 60038 to 60042
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: false
Forwarding packet from port: 60042 to 60038
Network waiting to receive packet.
Delayed: false Corrupted: true Lost: false
Forwarding packet from port: 60038 to 60042
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: false
Forwarding packet from port: 60042 to 60038
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: false
Forwarding packet from port: 60038 to 60042
Network waiting to receive packet.
Delayed: false Corrupted: true Lost: false
Forwarding packet from port: 60042 to 60038
Network waiting to receive packet.
Delayed: true Corrupted: false Lost: false
Forwarding packet from port: 60042 to 60038
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: true
Network waiting to receive packet.
```



```
Delayed: false Corrupted: false Lost: false
Forwarding packet from port: 60038 to 60042
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: false
Forwarding packet from port: 60042 to 60038
Network waiting to receive packet.
Delayed: true Corrupted: false Lost: false
Forwarding packet from port: 60038 to 60042
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: false
Forwarding packet from port: 60042 to 60038
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: true
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: true
Network waiting to receive packet.
Delayed: true Corrupted: false Lost: false
Forwarding packet from port: 60042 to 60038
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: false
Forwarding packet from port: 60042 to 60038
Network waiting to receive packet.
Delayed: true Corrupted: false Lost: false
Forwarding packet from port: 60038 to 60042
Network waiting to receive packet.
Delayed: false Corrupted: true Lost: false
Forwarding packet from port: 60038 to 60042
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: false
Forwarding packet from port: 60042 to 60038
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: false
Forwarding packet from port: 60042 to 60038
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: false
Forwarding packet from port: 60038 to 60042
Network waiting to receive packet.
Delayed: false Corrupted: false Lost: false
Forwarding packet from port: 60038 to 60042
Network waiting to receive packet.
```

```
D:\Github\COP5518-Group11-Project2-New\rdt3.0\src>
```

Receiver log Sample

```
CA Command Prompt
D:\Github\COP5518-Group11-Project2-New\rdt3.0\src>java Receiver 60038
Receiver running at port # 60038
Receiver waiting to receive packet.
Received message with ACK0 Corrupted: 0
rdt state(0) - Received packet content : This is
Receiver waiting to receive packet.
Received message with ACK1 Corrupted: 1
Receiver waiting to receive packet.
Received message with ACK1 Corrupted: 0
rdt state(1) - Received packet content : a test s
Receiver waiting to receive packet.
Received message with ACK1 Corrupted: 0
Receiver waiting to receive packet.
Received message with ACK0 Corrupted: 0
rdt state(0) - Received packet content : tring se
Receiver waiting to receive packet.
Received message with ACK0 Corrupted: 0
Receiver waiting to receive packet.
Received message with ACK1 Corrupted: 0
rdt state(1) - Received packet content : nding fr
Receiver waiting to receive packet.
Received message with ACK1 Corrupted: 0
Receiver waiting to receive packet.
Received message with ACK1 Corrupted: 0
Receiver waiting to receive packet.
Received message with ACK0 Corrupted: 1
Receiver waiting to receive packet.
Received message with ACK0 Corrupted: 0
rdt state(0) - Received packet content : om Sende
Receiver waiting to receive packet.
Received message with ACK1 Corrupted: 0
rdt state(1) - Received packet content : r to rec
Receiver waiting to receive packet.
Received message with ACK1 Corrupted: 0
Receiver waiting to receive packet.
Received message with ACK0 Corrupted: 0
rdt state(0) - Received packet content : eiver
Receiver waiting to receive packet.
Received message with ACK0 Corrupted: 0
Receiver waiting to receive packet.
Received message with ACK0 Corrupted: 0
Receiver waiting to receive packet.
Received message with ACK0 Corrupted: 0
Receiver waiting to receive packet.
This is a test string sending from Sender to receiver
Shutting Down.
Received message with ACK0 Corrupted: 0
Message accumulated : This is a test string sending from Sender to receiver
D:\Github\COP5518-Group11-Project2-New\rdt3.0\src>
```


Server log Sample

```
Command Prompt
D:\Github\COP5518-Group11-Project2-New\rdt3.0\src>java Sender 60042 127.0.0.1 60038 127.0.0.1 60086
Sender running at port # 60042
Please input message to send out (shutdown to end):
This is a test string sending from Sender to receiver
Sending: 0
Waiting on Receiver ACK0 reply
ACK0 received SEQ:0 Corruption: 0
Sending: 1
Waiting on Receiver ACK1 reply
Timeout: No Ack Received
Sender socket timed out case 3, resending packet
Waiting on Receiver ACK1 reply
Timeout: No Ack Received
Sender socket timed out case 3, resending packet
Waiting on Receiver ACK1 reply
ACK1 received SEQ:1 Corruption: 0
Sending: 2
Waiting on Receiver ACK0 reply
ACK0 received SEQ:0 Corruption: 1
Waiting on Receiver ACK0 reply
Timeout: No Ack Received
Sender socket timed out case 1, resending packet
Waiting on Receiver ACK0 reply
ACK0 received SEQ:0 Corruption: 0
Sending: 3
Waiting on Receiver ACK1 reply
ACK1 received SEQ:1 Corruption: 1
Waiting on Receiver ACK1 reply
Timeout: No Ack Received
Sender socket timed out case 3, resending packet
Waiting on Receiver ACK1 reply
ACK1 received SEQ:1 Corruption: 1
Waiting on Receiver ACK1 reply
Timeout: No Ack Received
Sender socket timed out case 3, resending packet
Waiting on Receiver ACK1 reply
ACK1 received SEQ:1 Corruption: 0
Sending: 4
Waiting on Receiver ACK0 reply
Timeout: No Ack Received
Sender socket timed out case 1, resending packet
Waiting on Receiver ACK0 reply
Timeout: No Ack Received
Sender socket timed out case 1, resending packet
Waiting on Receiver ACK0 reply
ACK0 received SEQ:0 Corruption: 0
Sending: 5
Waiting on Receiver ACK1 reply
Timeout: No Ack Received
Sender socket timed out case 3, resending packet
Waiting on Receiver ACK1 reply
ACK1 received SEQ:1 Corruption: 0
Sending: 6
Waiting on Receiver ACK0 reply
Timeout: No Ack Received
Sender socket timed out case 1, resending packet
Waiting on Receiver ACK0 reply
Timeout: No Ack Received
Sender socket timed out case 1, resending packet
Waiting on Receiver ACK0 reply
Timeout: No Ack Received
```

```
Sending: 6
Waiting on Receiver ACK0 reply
Timeout: No Ack Received
Sender socket timed out case 1, resending packet
Waiting on Receiver ACK0 reply
Timeout: No Ack Received
Sender socket timed out case 1, resending packet
Waiting on Receiver ACK0 reply
Timeout: No Ack Received
Sender socket timed out case 1, resending packet
Waiting on Receiver ACK0 reply
Timeout: No Ack Received
Sender socket timed out case 1, resending packet
Waiting on Receiver ACK0 reply
ACK0 received SEQ:0 Corruption: 0
Please input message to send out (shutdown to end):
shutdown

D:\Github\COP5518-Group11-Project2-New\rdt3.0\src>
```