KTN1 - Group 43

2013-03-11

Sequence diagram

Connect:

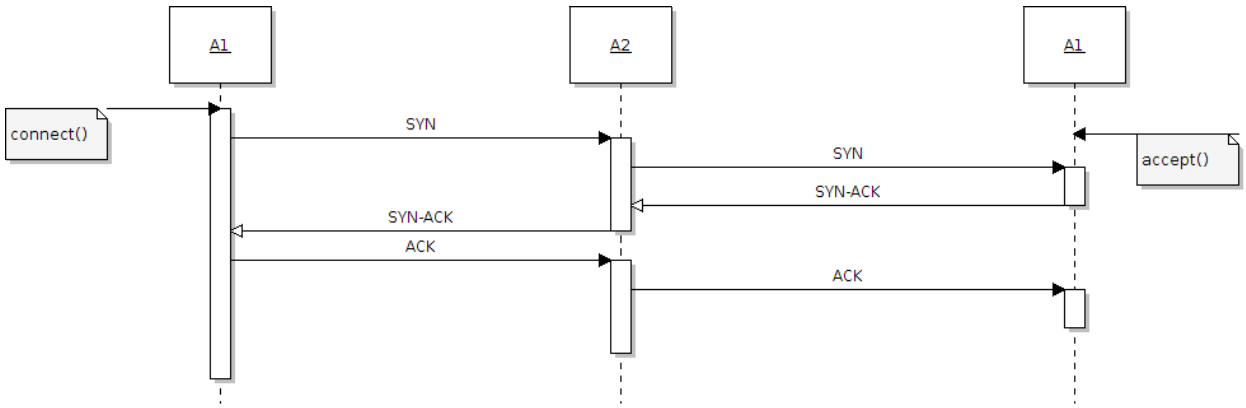

Figure 1: Connect sequence

Send/receive:

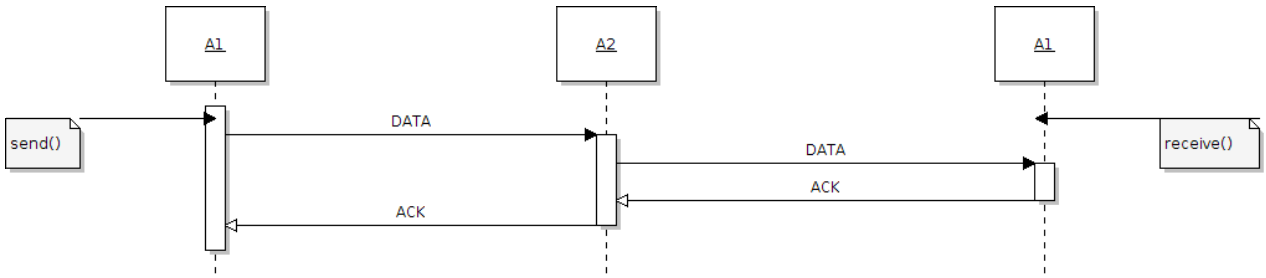

Figure 2: Send/receive sequence

Close:

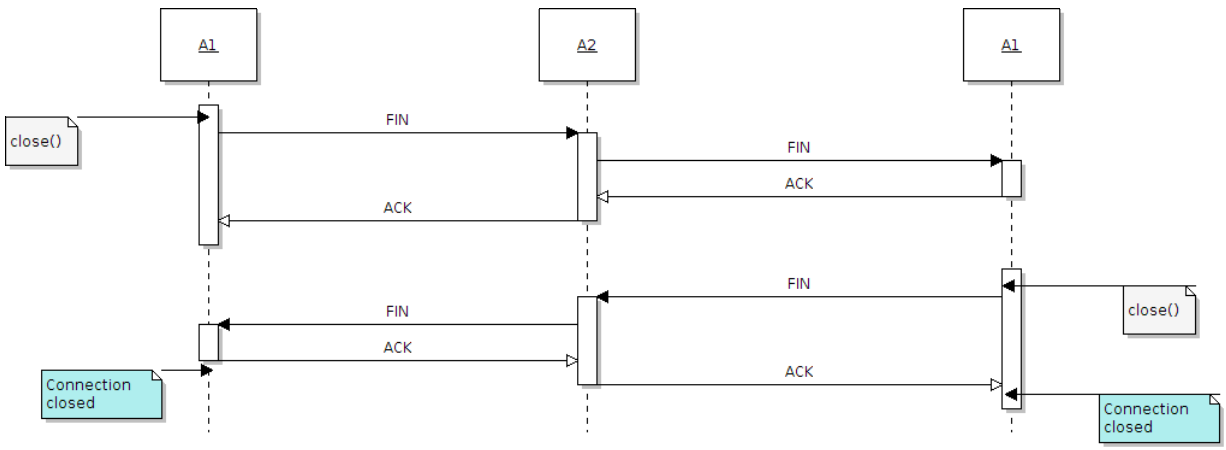

Figure 3: Close connection sequence

State diagram

Client:

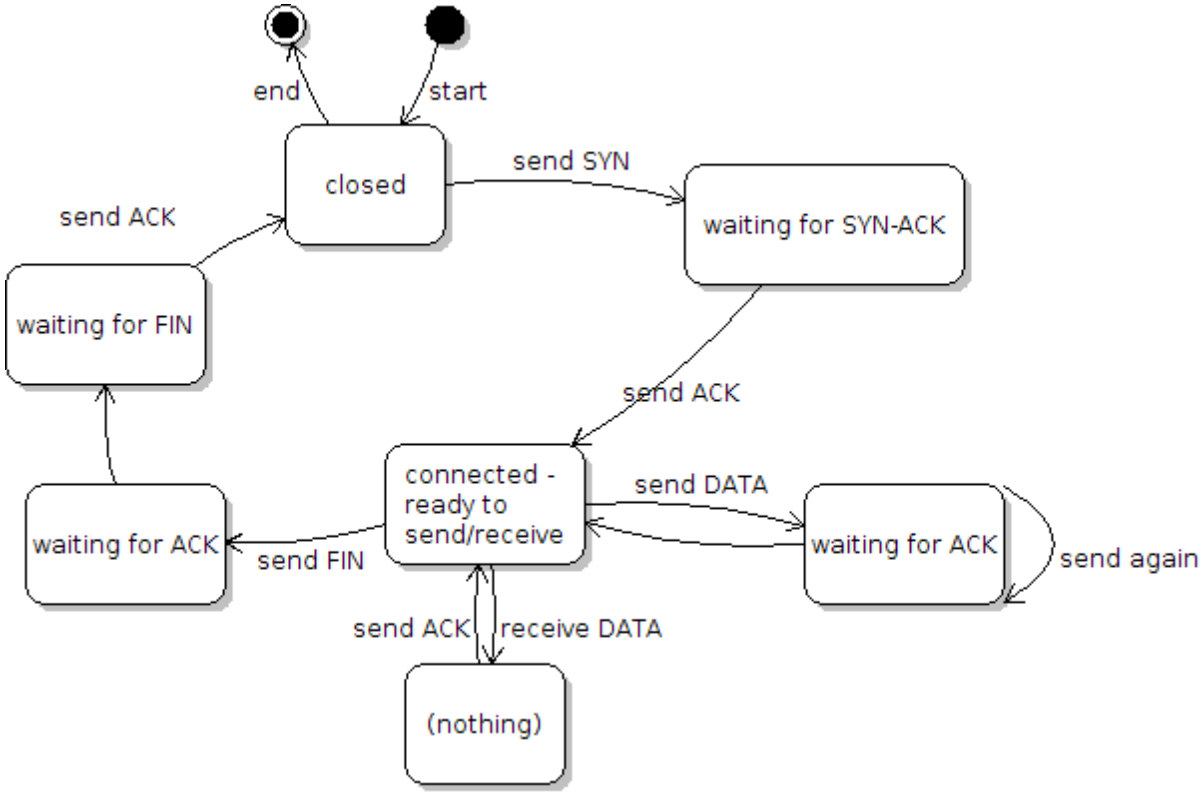

Figure 4: Client sided state diagram

Server:

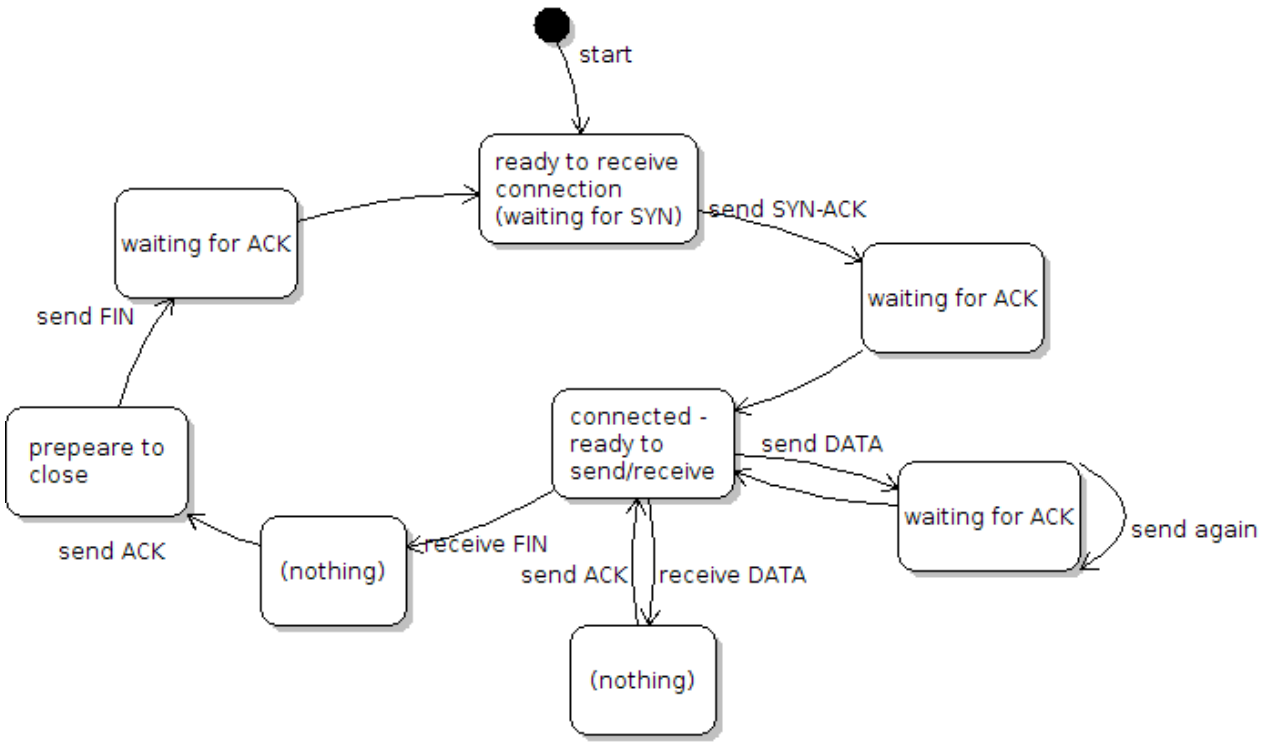

Figure 5: Server sided state diagram

Description

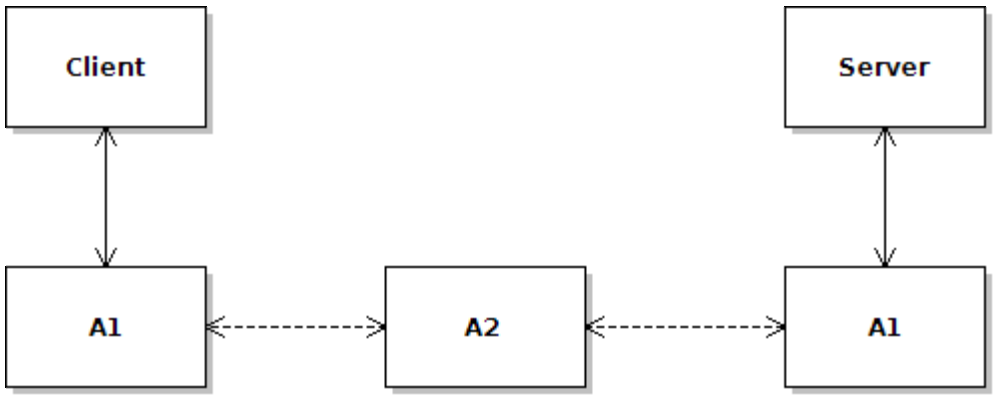

Figure 6: Overview

Client/server
The role of the client and server application is to control the network part, A1, of the program.

A1
A1 is the transport layer of the system. It will do the low-level control of the network communication.

When the client want to connect to the server, it will call the connect() method. The connect() method's parameters are the remote address and the remote port. The A1 will then initiate the connect sequence by sending a SYN package to the remote address, see [connectseq].

When the client or server want to send a data, it will call the send() method. The send() method's parameter is the message in string data type. The A1 will then initiate the sending sequence, see [sendreceiveseq]

When the client or server is waiting to receive data, it will call receive(). The receive() method will listen for packages from the source it is connected to, see [sendreceiveseq].

When the client going to close the connection, it will call the close() method. The close() method will initiate the close sequence, see [closeseq].

All the packages contains source IP, source port, remote IP, remote port, sequence number, acknowledge number, checksum, flags and the data. Packages sent will have a sequence number and the sender won't send the next package before it receives the

acknowledge number for the next sequence number.

A2
The A2 is a module to test that the A1 is fail-safe. It can be configured through a administration package to generate errors in the network.

Error handling

Error 1 – package loss

Problem:
The sender sends a package, but the receiver does not get it.

Solution:
Every time a receiver gets a package, it will send an acknowledge package requesting the next sequence number. If the sender does not receive the acknowledge package, it means that either the receiver didn't receive the package in the first place, or the acknowledge package was lost on the way back. What happened does not matter. If the sender does not receive the acknowledge package after a wait time, it will resend the previous package. If no acknowledge packages are received in 30 seconds, it will close the connection and notify the application of a connection timeout.

Error 2 – package delayed

Problem:
The sender sends a package. The receiver gets the package and sends an acknowledge package. However, the sender does not get the acknowledge package, and therefore resends the previous package, resulting in the same package appearing twice.

Solution:
The receiver will discard the double package received because it does not have the sequence number it expects. It will still send an acknowledge package with the expected sequence number. When the sender gets the acknowledge package with the sequence number of the next package it will send the next package. The sender will discard the previous acknowledge package and wait for the next acknowledge package.

Error 3 – wrong checksum

Problem:
A received package's checksum does not match the checksum of the package.

Solution:
If the receiver gets a package with wrong checksum, it will discard the package and

send a acknowledge package with the expected sequence number. If the sender gets a package with wrong checksum, it will discard the package and act as if the package never get there.

Error 4 – ghost package

Problem:

The package received is not sent from the outside the current connection session.

Solution:

If the sequence number or acknowledge number or the checksum is wrong, the package will be discarded.

Tests

The tests will run with two testprograms connected through the network A2. Every test consist of connecting, data transfer and disconnecting.

TestID	A100
Description	No errors
Purpose	This test will check if A1 works on a reliable network
settings.xml	<errors>false</errors> <loss>0.0</loss> <delay>0.0</delay> <ghost>0.0</ghost> <payload>0.0</payload> <header>0.0</header> <onlydata>true</onlydata>

TestID	A101
Description	10 % packet loss
Purpose	This test will check if A1 is able to send data through a network with medium high packet loss
settings.xml	<errors>true</errors> <loss>0.1</loss> <delay>0.0</delay> <ghost>0.0</ghost> <payload>0.0</payload> <header>0.0</header>

	<onlydata>true</onlydata>

TestID	A102
Description	50 % packet loss
Purpose	This test will check if A1 is able to send data through a network with high packet loss
settings.xml	<errors>true</errors> <loss>0.5</loss> <delay>0.0</delay> <ghost>0.0</ghost> <payload>0.0</payload> <header>0.0</header> <onlydata>true</onlydata>

TestID	A103
Description	10 % delayed packages
Purpose	This test will check if A1 is able to handle delay on some packages without cancelling or stop the transfer
settings.xml	<errors>true</errors> <loss>0.0</loss> <delay>0.1</delay> <ghost>0.0</ghost> <payload>0.0</payload> <header>0.0</header> <onlydata>true</onlydata>

TestID	A104
Description	50 % delayed packages
Purpose	This test will check if A1 is able to handle delay on many packages without cancelling or stop the transfer
settings.xml	<errors>true</errors> <loss>0.0</loss> <delay>0.5</delay> <ghost>0.0</ghost>

	<payload>0.0</payload> <header>0.0</header> <onlydata>true</onlydata>

TestID	A105
Description	10 % ghost packages
Purpose	This test will check if A1 is able to detect and drop ghost packages
settings.xml	<errors>true</errors> <loss>0.0</loss> <delay>0.0</delay> <ghost>0.1</ghost> <payload>0.0</payload> <header>0.0</header> <onlydata>true</onlydata>

TestID	A106
Description	50 % ghost packages
Purpose	This test will check if A1 is able to detect and drop a lot of ghost packages
settings.xml	<errors>true</errors> <loss>0.0</loss> <delay>0.0</delay> <ghost>0.5</ghost> <payload>0.0</payload> <header>0.0</header> <onlydata>true</onlydata>

TestID	A107
Description	10 % payload error
Purpose	This test will check if A1 detects and request new package when the data section of the package is corrupted
settings.xml	<errors>true</errors> <loss>0.0</loss>

	<delay>0.0</delay> <ghost>0.0</ghost> <payload>0.1</payload> <header>0.0</header> <onlydata>true</onlydata>

TestID	A108
Description	50 % payload error
Purpose	This test will check if A1 detects and request new package if the data section of the package is corrupted when there are a lot of those packages
settings.xml	<errors>true</errors> <loss>0.0</loss> <delay>0.0</delay> <ghost>0.0</ghost> <payload>0.5</payload> <header>0.0</header> <onlydata>true</onlydata>

TestID	A109
Description	10 % header error
Purpose	This test will check if A1 drops packages and eventually request new ones if the package header is corrupted
settings.xml	<errors>true</errors> <loss>0.0</loss> <delay>0.0</delay> <ghost>0.0</ghost> <payload>0.0</payload> <header>0.1</header> <onlydata>true</onlydata>

TestID	A110
Description	50 % header error
Purpose	This test will check if A1 drops packages and eventually request new ones if the package header is corrupted when

	there are a lot of packages with corrupted header
settings.xml	<errors>true</errors> <loss>0.0</loss> <delay>0.0</delay> <ghost>0.0</ghost> <payload>0.0</payload> <header>0.5</header> <onlydata>true</onlydata>

TestID	A111
Description	Packet loss and delay
Purpose	This test will check if A1 is able to transfer data even if it is a high packet loss and delays once in a while. This will test if there are problems in A1 related to wait times. Packet loss and delays are problems that may occur even to a stable and reliable network if it is under heavy traffic.
settings.xml	<errors>true</errors> <loss>0.3</loss> <delay>0.3</delay> <ghost>0.0</ghost> <payload>0.0</payload> <header>0.0</header> <onlydata>true</onlydata>

TestID	A112
Description	Packet spoofing
Purpose	This test will check if A1 can detect packets that are being sent with false information. If someone is trying to illegally insert packages, there will be a lot of ghost packages and checksum errors on incoming packages.
settings.xml	<errors>true</errors> <loss>0.0</loss> <delay>0.0</delay> <ghost>0.4</ghost> <payload>0.2</payload> <header>0.1</header> <onlydata>true</onlydata>

TestID	A113
Description	100 % packet loss
Purpose	This test will check if A1 will trigger connection timeout when no packages are received. It is important that a connection timeout is triggered correctly in case the connection is terminated without the default close routine.
settings.xml	<errors>true</errors> <loss>1.0</loss> <delay>0.0</delay> <ghost>0.0</ghost> <payload>0.0</payload> <header>0.0</header> <onlydata>true</onlydata>

TestID	A114
Description	Terrible network
Purpose	This test will check if A1 is able to transer data even if there are a lot of problems on the network. This test is an overall test that will test many sides of A1.
settings.xml	<errors>true</errors> <loss>0.09</loss> <delay>0.15</delay> <ghost>0.06</ghost> <payload>0.06</payload> <header>0.06</header> <onlydata>false</onlydata>