**Appendix**

**Usage of the Software**

1. The final software(SW)s in MATLAB are main10MHz20MHznooberloaded.m,

main10MHzonlysecondoverloaded.m, main10MHzbothoverloaded.m, main20MHz.m.

1. Setting Parameters with a certain transmitter, other parameters have shown in the

paper.

1. First hop:
2. Mapping vehicle to the highway

(vehiclemapped.m)

2) Selecting all vehicles in the transmission range of the transmitter

(vehicles\_in\_transrange.m)

3) Selecting the vehicles in the right and the left of the transmitter

(vehicles\_in\_transrange\_left.m) ( vehicles\_in\_transrange\_right.m)

4) Deciding the first hop transmission efficiency

(efficiencydecision.m)

5) Selecting two side relays

(relaylocation.m)

6) Calculating successful transmissionratio

(successtransratio.m)

7) Calculating the relay transmission range

(v2vdistance.m)

1. Second hop
2. Mapping vehicle to the highway

(vehiclemapped.m)

2) Selecting the vehicles in the right relay and left relay

(vehicles\_in\_transrange\_left.m) ( vehicles\_in\_transrange\_right.m)

3) Generating the random vehicle using the same resource under another base station (randsrc.m)

4) Deciding the second hop transmission efficiency

(efficiencydecision.m)

5) Calculating the right side and left side BLER

. ....... (secondblercalculation.m secondblercalculation.m)

6) Calculating successful transmissionratio

. (successtransratio.m)

7) Calculating total successful transmission ratio