

DAFTAR PUSTAKA

- Badan Pusat Statistik. 2022. Jumlah Kecelakaan, Korban Mati, Luka Berat, Luka Ringan, dan Kerugian Materi 2017-2019. Diakses 22 November 2022 dari <https://www.bps.go.id/indicator/17/513/1/jumlah-kecelakaan-korban-mati-luka-berat-luka-ringan-dan-kerugian-materi.html>
- Behrisch, M., Krajzewicz, D., (eds.), M.W., 2014. Simulation of Urban Mobility: First International Conference, SUMO 2013, Berlin, Germany, May 15 -17, 2013. Revised Selected Papers, 1st ed, Lecture Notes in Computer Science 8594 Information Systems and Applications, incl. Internet/ Web, and HCI. Springer-Verlag Berlin Heidelberg.
- ETSI, (1999). *Telecommunication and Internet Protocol Harmonization Over Networks (TIPHON): General aspects of Quality of Service (QoS)*. France: European Telecommunication Standards Institute
- Gadkari, M.Y., & Sambre, N.B. (2012). VANET: Routing Protocols, Security Issue and Simulation Tools. *IOSR Journal of Computer Engineering (IOSRJCE)*, 28-38.
- Lavi, Banoth, dkk.2018. Stochastic Network Optimization of Data Dissemination for Multi-hop Routing in VANETs. Department of Electronics Engineering, Indian Institute of Technology (ISM): India.
- L. Qin and T. Kunz, 'Survey on Mobile Ad Hoc Network Routing Protocols and Cross-Layer Design', p. 27, 2004.
- Pradnyana, I Putu, 2016. 'Implementasi Velocity Aware AOMDV Menggunakan NS-2 Pada Lingkungan VANET'. Fakultas Teknologi Informasi Institut Teknologi Sepuluh November.
- Ramm, F., Topf, J., 2010. OpenStreet Map: Using and Enchancing the Free Map of the World. UIT Cambridge Ltd., Cambridge, England..
- Safrianti, Ery, dkk. 2020. Performance Analysis of DSDV, AOMDV, and ZRP Routing Protocols Applicatopn Simulation in Pekanbaru Vehicular Ad Hoc Network (VANET). Department of Electrical Engineering. Universitas Riau
- Saini, D., & Saini, G.L. (2017). Art20173387, 6(5), 1216-1222.

Suman, M. (2019) 'A comparative study on routing protocols for VANETs'.

Triwinarko, Andy, dkk. 2021. A PHY/ MAC cross-layer design with transmit antenna selection and power adaption for receiver blockingproblem in dense VANETs. Institut d'Électronique de Microélectronique et de Nanotechnologie

Waseem, R.M., Farrukh Zeeshan Khan¹ and Muneer Ahmad² (2021) 'Performance Evaluation of AOMDV on Realistic and Efficient VANetSimulations'.

Ratnasih, dkk (2018) 'Analisis Kinerja Protokol Routing AOMDV pada VANET dengan Serangan Rushing'

LAMPIRAN

1. Code scenario A 75 node

```

# =====
# Define options
# =====
set val(chan) Channel/WirelessChannel ;# channel
type
set val(prop) Propagation/TwoRayGround ;# radio-
propagation model
set val(netif) Phy/WirelessPhyExt ;# network
interface type
set val(mac) Mac/802_11Ext ;# MAC type
set val(ifq) Queue/DropTail/PriQueue ;# interface
queue type
set val(ll) LL ;# link layer
type
set val(ant) Antenna/OmniAntenna ;# antenna
model
set val(ifqlen) 50 ;# max packet
in ifq
set val(nn) 75 ;# number of
mobilenodes
set val(rp) AOMDV ;# routing
protocol
set opt(x) 1097
set opt(y) 1433

# =====
# Main Program
# =====
set ns_ [new Simulator]
set tracefd [open trace_hasil_simulasi.tr w]
$ns_ trace-all $tracefd

set namf [open animasi.nam w]
$ns_ namtrace-all-wireless $namf $opt(x) $opt(y)

# set up topography object
set topo [new Topography]
$topo load_flatgrid $opt(x) $opt(y)

#konfigurasi node

```

```

create-god

    $val(nn

) # configure node

    $ns_ node-config -adhocRouting $val(rp) \
        -llType $val(ll) \
        -macType $val(mac) \
        -ifqType $val(ifq) \
        -ifqLen $val(ifqlen) \
        -antType $val(ant) \
        -propType $val(prop) \
        -phyType $val(netif) \
        -channelType $val(chan) \
        -topoInstance $topo \
        -agentTrace ON \
        -routerTrace ON \
        -macTrace OFF \
        -movementTrace ON

#802.11p default parameters

Phy/WirelessPhyExt set CStresh_          3.162e-12    ;#-
85 dBm Wireless interface sensitivity (sensitivity defined in the
standard)
Phy/WirelessPhyExt set Pt_              0.001
Phy/WirelessPhyExt set freq_            5.9e+9
Phy/WirelessPhyExt set noise_floor_     1.26e-13    ;#-
99 dBm for 10MHz bandwidth
Phy/WirelessPhyExt set
L_          1.0          ;#default radio
circuit gain/loss
Phy/WirelessPhyExt set PowerMonitorThresh_ 6.310e-14    ;#-
102dBm power monitor sensitivity
Phy/WirelessPhyExt set HeaderDuration_    0.000040    ;#40
us
Phy/WirelessPhyExt set BasicModulationScheme_ 0
Phy/WirelessPhyExt set PreambleCaptureSwitch_ 1
Phy/WirelessPhyExt set DataCaptureSwitch_ 0
Phy/WirelessPhyExt set SINR_PreambleCapture_ 2.5118;    ;# 4
dB
Phy/WirelessPhyExt set SINR_DataCapture_ 100.0;    ;# 10
dB
Phy/WirelessPhyExt set trace_dist_       1e6          ;#
PHY trace until distance of 1 Mio. km ("infinty")
Phy/WirelessPhyExt set PHY_DBG_         0

```

```

Mac/802_11Ext set CWMin_ 15
Mac/802_11Ext set CWMax_ 1023
Mac/802_11Ext set SlotTime_ 0.000013
Mac/802_11Ext set SIFS_ 0.000032
Mac/802_11Ext set ShortRetryLimit_ 7
Mac/802_11Ext set LongRetryLimit_ 4
Mac/802_11Ext set HeaderDuration_ 0.000040
Mac/802_11Ext set SymbolDuration_ 0.000008
Mac/802_11Ext set BasicModulationScheme_ 0
Mac/802_11Ext set use_802_11a_flag_ true
Mac/802_11Ext set RTSThreshold_ 2346
Mac/802_11Ext set MAC_DBG 0

    for {set i 0} {$i < $val(nn)} {incr i} { set
        node_($i) [$ns_ node]
        $node_($i) random-motion 0 ;
    }

source mobility100.tcl

#konfigurasi UDP dan CBR

set udp [new Agent/UDP]
$ns_ attach-agent $node_(5) $udp
$ns_ attach-agent $node_(10) $udp

set null [new Agent/Null]
$ns_ attach-agent $node_(15) $null
$ns_ attach-agent $node_(25) $null

set cbr [new Application/Traffic/CBR]
$cbr set packetSize_ 256
$cbr set random_ false
$cbr set rate_ 1mb
$cbr attach-agent $udp
$ns_ connect $udp $null

#
# Tell nodes when the simulation ends #
for {set i 0} {$i < $val(nn)} {incr i} {
    $ns_ at 80.0 "$node_($i) reset";
}

```

```

$ns_ at 0.0 "$cbr start"
$ns_ at 80.0 "$cbr stop"
$ns_ at 80.0 "stop"
$ns_ at 80.01 "puts \"NS EXITING...\" ; $ns_ halt"
proc stop {} {
    global ns_ tracefd
    $ns_ flush-trace
    close $tracefd
}

puts "Starting Simulation..."
$ns_ run

```

2. Code scenario A 100 node

```

# =====
# Define options
# =====
set val(chan) Channel/WirelessChannel ;# channel
type
set val(prop) Propagation/TwoRayGround ;# radio-
propagation model
set val(netif) Phy/WirelessPhyExt ;# network
interface type
set val(mac) Mac/802_11Ext ;# MAC type
set val(ifq) Queue/DropTail/PriQueue ;# interface
queue type
set val(ll) LL ;# link layer
type
set val(ant) Antenna/OmniAntenna ;# antenna
model
set val(ifqlen) 50 ;# max packet
in ifq
set val(nn) 100 ;# number of
mobilenodes
set val(rp) AOMDV ;# routing
protocol
set opt(x) 1097
set opt(y) 1433

# =====
# Main Program
# =====
set ns_ [new Simulator]

```

```

set tracefd [open trace_hasil_simulasi.tr w]
$ns_ trace-all $tracefd

set namf [open animasi.nam w]
$ns_ namtrace-all-wireless $namf $opt(x) $opt(y)

# set up topography object
set topo [new Topography]
$topo load_flatgrid $opt(x) $opt(y)

#konfigurasi node
create-god $val(nn)

# configure node

    $ns_ node-config -adhocRouting $val(rp) \
        -llType $val(ll) \
        -macType $val(mac) \
        -ifqType $val(ifq) \
        -ifqLen $val(ifqlen) \
        -antType $val(ant) \
        -propType $val(prop) \
        -phyType $val(netif) \
        -channelType $val(chan) \
        -topoInstance $topo \
        -agentTrace ON \
        -routerTrace ON \
        -macTrace OFF \
        -movementTrace ON

#802.11p default parameters

Phy/WirelessPhyExt set CStresh_ 3.162e-12 ;#-85
dBm Wireless interface sensitivity (sensitivity defined in the
standard)
Phy/WirelessPhyExt set Pt_ 0.001
Phy/WirelessPhyExt set freq_ 5.9e+9
Phy/WirelessPhyExt set noise_floor_ 1.26e-13 ;#-99
dBm for 10MHz bandwidth
Phy/WirelessPhyExt set
L_ 1.0 ;#default radio circuit
gain/loss
Phy/WirelessPhyExt set PowerMonitorThresh_ 6.310e-14 ;#-
102dBm power monitor sensitivity

```

```

Phy/WirelessPhyExt set HeaderDuration_ 0.000040 ;#40
us
Phy/WirelessPhyExt set BasicModulationScheme_ 0
Phy/WirelessPhyExt set PreambleCaptureSwitch_ 1
Phy/WirelessPhyExt set DataCaptureSwitch_ 0
Phy/WirelessPhyExt set SINR_PreambleCapture_ 2.5118; ;# 4
dB
Phy/WirelessPhyExt set SINR_DataCapture_ 100.0; ;# 10
dB
Phy/WirelessPhyExt set trace_dist_ 1e6 ;#
PHY trace until distance of 1 Mio. km ("infinty")
Phy/WirelessPhyExt set PHY_DBG_ 0

Mac/802_11Ext set CWMin_ 15
Mac/802_11Ext set CWMax_ 1023
Mac/802_11Ext set SlotTime_ 0.000013
Mac/802_11Ext set SIFS_ 0.000032
Mac/802_11Ext set ShortRetryLimit_ 7
Mac/802_11Ext set LongRetryLimit_ 4
Mac/802_11Ext set HeaderDuration_ 0.000040
Mac/802_11Ext set SymbolDuration_ 0.000008
Mac/802_11Ext set BasicModulationScheme_ 0
Mac/802_11Ext set use_802_11a_flag_ true
Mac/802_11Ext set RTSThreshold_ 2346
Mac/802_11Ext set MAC_DBG 0

    for {set i 0} {$i < $val(nn) } {incr i} {
        set node_($i) [$ns_ node]
        $node_($i) random-motion 0 ;
    }

source mobility100.tcl

#konfigurasi UDP dan CBR

set udp [new Agent/UDP]
$ns_ attach-agent $node_(5) $udp
$ns_ attach-agent $node_(10) $udp

set null [new Agent/Null]
$ns_ attach-agent $node_(15) $null
$ns_ attach-agent $node_(25) $null

set cbr [new Application/Traffic/CBR]
$cbr set packetSize_ 256

```



```

$cbr set random_ false
$cbr set rate_ 1mb
$cbr attach-agent $udp
$ns_ connect $udp $null

#
# Tell nodes when the simulation ends
#
for {set i 0} {$i < $val(nn) } {incr i} {
    $ns_ at 80.0 "$node_($i) reset";
}

$ns_ at 0.0 "$cbr start"
$ns_ at 80.0 "$cbr stop"
$ns_ at 80.0 "stop"
$ns_ at 80.01 "puts \"NS EXITING...\" ; $ns_ halt"
proc stop {} {
    global ns_ tracefd
    $ns_ flush-trace
    close $tracefd
}

puts "Starting Simulation..."
$ns_ run

```

3. Code scenario A 125 node

```

# =====
# Define options
# =====
set val(chan)          Channel/WirelessChannel      ;# channel
type
set val(prop)          Propagation/TwoRayGround     ;# radio-
propagation model
set val(netif)        Phy/WirelessPhyExt           ;# network
interface type
set val(mac)          Mac/802_11Ext                ;# MAC type
set val(ifq)          Queue/DropTail/PriQueue      ;# interface
queue type
set val(ll)           LL                            ;# link layer
type
set val(ant)          Antenna/OmniAntenna          ;# antenna
model

```

```

set val(ifqlen)          50                ;# max packet
in ifq
set val(nn)              125              ;# number of
mobilenodes
set val(rp)              AOMDV            ;# routing
protocol
set opt(x) 1097
set opt(y) 1433

# =====
# Main Program
# =====
set ns_ [new Simulator]
set tracefd [open trace_hasil_simulasi.tr w]
$ns_ trace-all $tracefd

set namf [open animasi.nam w]
$ns_ namtrace-all-wireless $namf $opt(x) $opt(y)

# set up topography object
set topo [new Topography]
$topo load_flatgrid $opt(x) $opt(y)

#konfigurasi node
create-god $val(nn)

# configure node

    $ns_ node-config -adhocRouting $val(rp) \
        -llType $val(ll) \
        -macType $val(mac) \
        -ifqType $val(ifq) \
        -ifqLen $val(ifqlen) \
        -antType $val(ant) \
        -propType $val(prop) \
        -phyType $val(netif) \
        -channelType $val(chan) \
        -topoInstance $topo \
        -agentTrace ON \
        -routerTrace ON \
        -macTrace OFF \
        -movementTrace ON

#802.11p default parameters

```

```

Phy/WirelessPhyExt set CStresh_                3.162e-12    ;#-
85 dBm Wireless interface sensitivity (sensitivity defined in the
standard)
Phy/WirelessPhyExt set Pt_                    0.001
Phy/WirelessPhyExt set freq_                 5.9e+9
Phy/WirelessPhyExt set noise_floor_         1.26e-13    ;#-
99 dBm for 10MHz bandwidth
Phy/WirelessPhyExt set
L_                1.0                ;#default radio
circuit gain/loss
Phy/WirelessPhyExt set PowerMonitorThresh_   6.310e-14   ;#-
102dBm power monitor sensitivity
Phy/WirelessPhyExt set HeaderDuration_       0.000040    ;#40
us
Phy/WirelessPhyExt set BasicModulationScheme_ 0
Phy/WirelessPhyExt set PreambleCaptureSwitch_ 1
Phy/WirelessPhyExt set DataCaptureSwitch_    0
Phy/WirelessPhyExt set SINR_PreambleCapture_ 2.5118;      ;# 4
dB
Phy/WirelessPhyExt set SINR_DataCapture_     100.0;      ;# 10
dB
Phy/WirelessPhyExt set trace_dist_          1e6         ;#
PHY trace until distance of 1 Mio. km ("infinty")
Phy/WirelessPhyExt set PHY_DBG_             0

Mac/802_11Ext set CWMin_                    15
Mac/802_11Ext set CWMax_                    1023
Mac/802_11Ext set SlotTime_                 0.000013
Mac/802_11Ext set SIFS_                     0.000032
Mac/802_11Ext set ShortRetryLimit_          7
Mac/802_11Ext set LongRetryLimit_           4
Mac/802_11Ext set HeaderDuration_           0.000040
Mac/802_11Ext set SymbolDuration_           0.000008
Mac/802_11Ext set BasicModulationScheme_    0
Mac/802_11Ext set use_802_11a_flag_         true
Mac/802_11Ext set RTSThreshold_             2346
Mac/802_11Ext set MAC_DBG                   0

    for {set i 0} {$i < $val(nn)} {incr i} {
        set node_($i) [$ns_ node]
        $node_($i) random-motion 0          ;
    }

source mobility100.tcl

```

```

#konfigurasi UDP dan CBR

set udp [new Agent/UDP]
$ns_ attach-agent $node_(5) $udp
$ns_ attach-agent $node_(10) $udp

set null [new Agent/Null]
$ns_ attach-agent $node_(15) $null
$ns_ attach-agent $node_(25) $null

set cbr [new Application/Traffic/CBR]
$cbr set packetSize_ 256
$cbr set random_ false
$cbr set rate_ 1mb
$cbr attach-agent $udp
$ns_ connect $udp $null

#
# Tell nodes when the simulation ends
#
for {set i 0} {$i < $val(nn) } {incr i} {
    $ns_ at 80.0 "$node_($i) reset";
}

$ns_ at 0.0 "$cbr start"
$ns_ at 80.0 "$cbr stop"
$ns_ at 80.0 "stop"
$ns_ at 80.01 "puts \"NS EXITING...\" ; $ns_ halt"
proc stop {} {
    global ns_ tracefd
    $ns_ flush-trace
    close $tracefd
}

puts "Starting Simulation..."
$ns_ run

```

4. Code scenario A 150 node

```

# =====
# Define options
# =====
Set val (chan) Channel/WirelessChannel

```

```

set val(prop)          Propagation/TwoRayGround      ;# radio-
propagation model
set val(netif)         Phy/WirelessPhyExt           ;# network
interface type
set val(mac)           Mac/802_11Ext                ;# MAC type
set val(ifq)           Queue/DropTail/PriQueue      ;# interface
queue type
set val(ll)            LL                           ;# link layer
type
set val(ant)           Antenna/OmniAntenna          ;# antenna
model
set val(ifqlen)        50                           ;# max packet
in ifq
set val(nn)            150                           ;# number of
mobilenodes
set val(rp)            AOMDV                         ;# routing
protocol
set opt(x) 1097
set opt(y) 1433

# =====
# Main Program
# =====
set ns_ [new Simulator]
set tracefd [open trace_hasil_simulasi.tr w]
$ns_ trace-all $tracefd

set namf [open animasi.nam w]
$ns_ namtrace-all-wireless $namf $opt(x) $opt(y)

# set up topography object
set topo [new Topography]
$topo load_flatgrid $opt(x) $opt(y)

#konfigurasi node
create-god $val(nn)

# configure node

    $ns_ node-config -adhocRouting $val(rp) \
        -llType $val(ll) \
        -macType $val(mac) \
        -ifqType $val(ifq) \
        -ifqLen $val(ifqlen) \
        -antType $val(ant) \

```

```

        -propType $val(prop) \
        -phyType $val(netif) \
        -channelType $val(chan) \
        -topoInstance $topo \
        -agentTrace ON \
        -routerTrace ON \
        -macTrace OFF \
        -movementTrace ON

#802.11p default parameters

Phy/WirelessPhyExt set CStresh_                3.162e-12      ;#-
85 dBm Wireless interface sensitivity (sensitivity defined in the
standard)
Phy/WirelessPhyExt set Pt_                    0.001
Phy/WirelessPhyExt set freq_                 5.9e+9
Phy/WirelessPhyExt set noise_floor_         1.26e-13      ;#-
99 dBm for 10MHz bandwidth
Phy/WirelessPhyExt set
L_                1.0                ;#default radio
circuit gain/loss
Phy/WirelessPhyExt set PowerMonitorThresh_    6.310e-14     ;#-
102dBm power monitor sensitivity
Phy/WirelessPhyExt set HeaderDuration_        0.000040     ;#40
us
Phy/WirelessPhyExt set BasicModulationScheme_ 0
Phy/WirelessPhyExt set PreambleCaptureSwitch_ 1
Phy/WirelessPhyExt set DataCaptureSwitch_    0
Phy/WirelessPhyExt set SINR_PreambleCapture_ 2.5118;      ;# 4
dB
Phy/WirelessPhyExt set SINR_DataCapture_      100.0;      ;# 10
dB
Phy/WirelessPhyExt set trace_dist_           1e6          ;#
PHY trace until distance of 1 Mio. km ("infinty")
Phy/WirelessPhyExt set PHY_DBG_              0

Mac/802_11Ext set CWMin_                     15
Mac/802_11Ext set CWMax_                     1023
Mac/802_11Ext set SlotTime_                  0.000013
Mac/802_11Ext set SIFS_                      0.000032
Mac/802_11Ext set ShortRetryLimit_           7
Mac/802_11Ext set LongRetryLimit_            4
Mac/802_11Ext set HeaderDuration_            0.000040
Mac/802_11Ext set SymbolDuration_            0.000008
Mac/802_11Ext set BasicModulationScheme_     0

```

```

Mac/802_11Ext set use_802_11a_flag_ true
Mac/802_11Ext set RTSThreshold_ 2346
Mac/802_11Ext set MAC_DBG 0

    for {set i 0} {$i < $val(nn) } {incr i} {
        set node_($i) [$ns_ node]
        $node_($i) random-motion 0 ;
    }

source mobility100.tcl

#konfigurasi UDP dan CBR

set udp [new Agent/UDP]
$ns_ attach-agent $node_(5) $udp
$ns_ attach-agent $node_(10) $udp

set null [new Agent/Null]
$ns_ attach-agent $node_(15) $null
$ns_ attach-agent $node_(25) $null

set cbr [new Application/Traffic/CBR]
$cbr set packetSize_ 256
$cbr set random_ false
$cbr set rate_ 1mb
$cbr attach-agent $udp
$ns_ connect $udp $null

#
# Tell nodes when the simulation ends
#
for {set i 0} {$i < $val(nn) } {incr i} {
    $ns_ at 80.0 "$node_($i) reset";
}

$ns_ at 0.0 "$cbr start"
$ns_ at 80.0 "$cbr stop"
$ns_ at 80.0 "stop"
$ns_ at 80.01 "puts \"NS EXITING...\" ; $ns_ halt"
proc stop {} {
    global ns_ tracefd
    $ns_ flush-trace
    close $tracefd
}

```

```
puts "Starting Simulation..."
$ns_ run
```

5. Code scenario B 75 node

```
# ===== =
# Define options
# ===== =
set val(chan)          Channel/WirelessChannel      ;# channel
type
set val(prop)          Propagation/TwoRayGround      ;# radio-
propagation model
set val(netif)         Phy/WirelessPhyExt           ;# network
interface type
set val(mac)           Mac/802_11Ext                ;# MAC type
set val(ifq)           Queue/DropTail/PriQueue      ;# interface
queue type
set val(ll)            LL                           ;# link layer
type
set val(ant)           Antenna/OmniAntenna          ;# antenna
model
set val(ifqlen)        50                           ;# max packet
in ifq
set val(nn)            75                           ;# number of
mobilenodes
set val(rp)            DumbAgent                    ;#
routing protocol
set opt(x) 1097
set opt(y) 1433

# ===== =
# Main Program
# ===== =
set ns_ [new Simulator]
set tracefd [open trace_hasil_simulasi.tr w]
$ns_ trace-all $tracefd

set namf [open animasi.nam w]
$ns_ namtrace-all-wireless $namf $opt(x) $opt(y)

# set up topography object
set topo [new Topography]
$topo load_flatgrid $opt(x) $opt(y)
```



```

#konfigurasi node
create-god $val(nn)

# configure node

    $ns_ node-config -adhocRouting $val(rp) \
        -llType $val(ll) \
        -macType $val(mac) \
        -ifqType $val(ifq) \
        -ifqLen $val(ifqlen) \
        -antType $val(ant) \
        -propType $val(prop) \
        -phyType $val(netif) \
        -channelType $val(chan) \
        -topoInstance $topo \
        -agentTrace ON \
        -routerTrace ON \
        -macTrace OFF \
        -movementTrace ON

#802.11p default parameters

Phy/WirelessPhyExt set CStresh_                3.162e-12    ;#-
85 dBm Wireless interface sensitivity (sensitivity defined in the
standard)
Phy/WirelessPhyExt set Pt_                      0.001
Phy/WirelessPhyExt set freq_                    5.9e+9
Phy/WirelessPhyExt set noise_floor_            1.26e-13    ;#-
99 dBm for 10MHz bandwidth
Phy/WirelessPhyExt set
L_                1.0                ;#default radio
circuit gain/loss
Phy/WirelessPhyExt set PowerMonitorThresh_    6.310e-14    ;#-
102dBm power monitor sensitivity
Phy/WirelessPhyExt set HeaderDuration_        0.000040    ;#40
us
Phy/WirelessPhyExt set BasicModulationScheme_ 0
Phy/WirelessPhyExt set PreambleCaptureSwitch_ 1
Phy/WirelessPhyExt set DataCaptureSwitch_    0
Phy/WirelessPhyExt set SINR_PreambleCapture_ 2.5118;      ;# 4
dB
Phy/WirelessPhyExt set SINR_DataCapture_      100.0;      ;# 10
dB
Phy/WirelessPhyExt set trace_dist_            1e6         ;#
PHY trace until distance of 1 Mio. km ("infinty")

```

```

Phy/WirelessPhyExt set PHY_DBG_ 0

Mac/802_11Ext set CWMin_ 15
Mac/802_11Ext set CWMax_ 1023
Mac/802_11Ext set SlotTime_ 0.000013
Mac/802_11Ext set SIFS_ 0.000032
Mac/802_11Ext set ShortRetryLimit_ 7
Mac/802_11Ext set LongRetryLimit_ 4
Mac/802_11Ext set HeaderDuration_ 0.000040
Mac/802_11Ext set SymbolDuration_ 0.000008
Mac/802_11Ext set BasicModulationScheme_ 0
Mac/802_11Ext set use_802_11a_flag_ true
Mac/802_11Ext set RTSThreshold_ 2346
Mac/802_11Ext set MAC_DBG 0

    for {set i 0} {$i < $val(nn)} {incr i} { set
        node_($i) [$ns_ node]
            $node_($i) random-motion 0 ;
    }

source mobility100.tcl

#konfigurasi UDP dan CBR

set udp [new Agent/UDP]
$ns_ attach-agent $node_(5) $udp
$ns_ attach-agent $node_(10) $udp

set null [new Agent/Null]
$ns_ attach-agent $node_(15) $null
$ns_ attach-agent $node_(25) $null

set cbr [new Application/Traffic/CBR]
$cbr set packetSize_ 256
$cbr set random_ false
$cbr set rate_ 1mb
$cbr attach-agent $udp
$ns_ connect $udp $null

#
# Tell nodes when the simulation ends #
for {set i 0} {$i < $val(nn)} {incr i} {
    $ns_ at 80.0 "$node_($i) reset";
}

```

```

}

$ns_ at 0.0 "$cbr start"
$ns_ at 80.0 "$cbr stop"
$ns_ at 80.0 "stop"
$ns_ at 80.01 "puts \"NS EXITING...\" ; $ns_ halt"
proc stop {} {
    global ns_ tracefd
    $ns_ flush-trace
    close $tracefd
}

puts "Starting Simulation..."
$ns_ run

```

6. code scenario B 100 node

```

# ===== =
# Define options
# ===== =

set val(chan) Channel/WirelessChannel ;# channel
type
set val(prop) Propagation/TwoRayGround ;# radio-
propagation model
set val(netif) Phy/WirelessPhyExt ;# network
interface type
set val(mac) Mac/802_11Ext ;# MAC type
set val(ifq) Queue/DropTail/PriQueue ;# interface
queue type
set val(ll) LL ;# link layer
type
set val(ant) Antenna/OmniAntenna ;# antenna
model
set val(ifqlen) 50 ;# max packet
in ifq
set val(nn) 100 ;# number of
mobilenodes
set val(rp) DumbAgent ;#
routing protocol
set opt(x) 1097
set opt(y) 1433

# =====
# Main Program
# =====

```

```

set ns_ [new Simulator]
set tracefd [open trace_hasil_simulasi.tr w]
$ns_ trace-all $tracefd

set namf [open animasi.nam w]
$ns_ namtrace-all-wireless $namf $opt(x) $opt(y)

# set up topography object
set topo [new Topography]
$topo load_flatgrid $opt(x) $opt(y)

#konfigurasi node
create-god $val(nn)

# configure node

    $ns_ node-config -adhocRouting $val(rp) \
        -llType $val(ll) \
        -macType $val(mac) \
        -ifqType $val(ifq) \
        -ifqLen $val(ifqlen) \
        -antType $val(ant) \
        -propType $val(prop) \
        -phyType $val(netif) \
        -channelType $val(chan) \
        -topoInstance $topo \
        -agentTrace ON \
        -routerTrace ON \
        -macTrace OFF \
        -movementTrace ON

#802.11p default parameters

Phy/WirelessPhyExt set CStresh_ 3.162e-12 ;#-85
dBm Wireless interface sensitivity (sensitivity defined in the
standard)
Phy/WirelessPhyExt set Pt_ 0.001
Phy/WirelessPhyExt set freq_ 5.9e+9
Phy/WirelessPhyExt set noise_floor_ 1.26e-13 ;#-99
dBm for 10MHz bandwidth
Phy/WirelessPhyExt set
L_ 1.0 ;#default radio circuit
gain/loss
Phy/WirelessPhyExt set PowerMonitorThresh_ 6.310e-14 ;#-
102dBm power monitor sensitivity

```

```

Phy/WirelessPhyExt set HeaderDuration_ 0.000040 ;#40
us
Phy/WirelessPhyExt set BasicModulationScheme_ 0
Phy/WirelessPhyExt set PreambleCaptureSwitch_ 1
Phy/WirelessPhyExt set DataCaptureSwitch_ 0
Phy/WirelessPhyExt set SINR_PreambleCapture_ 2.5118; ;# 4
dB
Phy/WirelessPhyExt set SINR_DataCapture_ 100.0; ;# 10
dB
Phy/WirelessPhyExt set trace_dist_ 1e6 ;#
PHY trace until distance of 1 Mio. km ("infinty")
Phy/WirelessPhyExt set PHY_DBG_ 0

Mac/802_11Ext set CWMin 15
Mac/802_11Ext set CWMax 1023
Mac/802_11Ext set SlotTime_ 0.000013
Mac/802_11Ext set SIFS_ 0.000032
Mac/802_11Ext set ShortRetryLimit_ 7
Mac/802_11Ext set LongRetryLimit_ 4
Mac/802_11Ext set HeaderDuration_ 0.000040
Mac/802_11Ext set SymbolDuration_ 0.000008
Mac/802_11Ext set BasicModulationScheme_ 0
Mac/802_11Ext set use_802_11a_flag_ true
Mac/802_11Ext set RTSThreshold_ 2346
Mac/802_11Ext set MAC_DBG 0

    for {set i 0} {$i < $val(nn)} {incr i} {
        set node_($i) [$ns_ node]
        $node_($i) random-motion 0 ;
    }

source mobility100.tcl

#konfigurasi UDP dan CBR

set udp [new Agent/UDP]
$ns_ attach-agent $node_(5) $udp
$ns_ attach-agent $node_(10) $udp

set null [new Agent/Null]
$ns_ attach-agent $node_(15) $null
$ns_ attach-agent $node_(25) $null

set cbr [new Application/Traffic/CBR]
$cbr set packetSize_ 256

```

```

$cbr set random_ false
$cbr set rate_ 1mb
$cbr attach-agent $udp
$ns_ connect $udp $null

#
# Tell nodes when the simulation ends
#
for {set i 0} {$i < $val(nn) } {incr i} {
    $ns_ at 80.0 "$node_($i) reset";
}

$ns_ at 0.0 "$cbr start"
$ns_ at 80.0 "$cbr stop"
$ns_ at 80.0 "stop"
$ns_ at 80.01 "puts \"NS EXITING...\" ; $ns_ halt"
proc stop {} {
    global ns_ tracefd
    $ns_ flush-trace
    close $tracefd
}

puts "Starting Simulation..."
$ns_ run

```

7. code scenario B 125 node

```

# ===== =
# Define options
# ===== =
set val(chan) Channel/WirelessChannel ;# channel
type
set val(prop) Propagation/TwoRayGround ;# radio-
propagation model
set val(netif) Phy/WirelessPhyExt ;# network
interface type
set val(mac) Mac/802_11Ext ;# MAC type
set val(ifq) Queue/DropTail/PriQueue ;# interface
queue type
set val(ll) LL ;# link layer
type
set val(ant) Antenna/OmniAntenna ;# antenna
model

```

```

set val(ifqlen)          50                      ;# max packet
in ifq
set val(nn)              125                    ;# number of
mobilenodes
set val(rp)              DumbAgent              ;#
routing protocol
set opt(x) 1097
set opt(y) 1433

# =====
# Main Program
# =====
set ns_ [new Simulator]
set tracefd [open trace_hasil_simulasi.tr w]
$ns_ trace-all $tracefd

set namf [open animasi.nam w]
$ns_ namtrace-al -wireless $namf $opt(x) $opt(y)

# set up topography object
set topo [new Topography]
$topo load_flatgrid $opt(x) $opt(y)

#konfigurasi node
create-god $val(nn)

# configure node

$ns_ node-config -adhocRouting $val(rp) \
    -llType $val(ll) \
    -macType $val(mac) \
    -ifqType $val(ifq) \
    -ifqLen $val(ifqlen) \
    -antType $val(ant) \
    -propType $val(prop) \
    -phyType $val(netif) \
    -channelType $val(chan) \
    -topoInstance $topo \
    -agentTrace ON \
    -routerTrace ON \
    -macTrace OFF \
    -movementTrace ON

#802.11p default parameters

```

```

Phy/WirelessPhyExt set CStresh_                3.162e-12    ;#-
85 dBm Wireless interface sensitivity (sensitivity defined in the
standard)
Phy/WirelessPhyExt set Pt_                      0.001
Phy/WirelessPhyExt set freq_                    5.9e+9
Phy/WirelessPhyExt set noise_floor_            1.26e-13    ;#-
99 dBm for 10MHz bandwidth
Phy/WirelessPhyExt set
L_                1.0                ;#default radio
circuit gain/loss
Phy/WirelessPhyExt set PowerMonitorThresh_      6.310e-14    ;#-
102dBm power monitor sensitivity
Phy/WirelessPhyExt set HeaderDuration_          0.000040    ;#40
us
Phy/WirelessPhyExt set BasicModulationScheme_  0
Phy/WirelessPhyExt set PreambleCaptureSwitch_  1
Phy/WirelessPhyExt set DataCaptureSwitch_      0
Phy/WirelessPhyExt set SINR_PreambleCapture_   2.5118;      ;# 4
dB
Phy/WirelessPhyExt set SINR_DataCapture_        100.0;      ;# 10
dB
Phy/WirelessPhyExt set trace_dist_              1e6          ;#
PHY trace until distance of 1 Mio. km ("infinty")
Phy/WirelessPhyExt set PHY_DBG_                 0

Mac/802_11Ext set CWMin_                        15
Mac/802_11Ext set CWMax_                        1023
Mac/802_11Ext set SlotTime_                     0.000013
Mac/802_11Ext set SIFS_                         0.000032
Mac/802_11Ext set ShortRetryLimit_              7
Mac/802_11Ext set LongRetryLimit_              4
Mac/802_11Ext set HeaderDuration_              0.000040
Mac/802_11Ext set SymbolDuration_              0.000008
Mac/802_11Ext set BasicModulationScheme_        0
Mac/802_11Ext set use_802_11a_flag_            true
Mac/802_11Ext set RTSThreshold_                2346
Mac/802_11Ext set MAC_DBG_                      0

    for {set i 0} {$i < $val(nn)} {incr i} {
        set node_($i) [$ns_ node]
        $node_($i) random-motion 0          ;
    }

source mobility100.tcl

```



```

#konfigurasi UDP dan CBR

set udp [new Agent/UDP]
$ns_ attach-agent $node_(5) $udp
$ns_ attach-agent $node_(10) $udp

set null [new Agent/Null]
$ns_ attach-agent $node_(15) $null
$ns_ attach-agent $node_(25) $null

set cbr [new Application/Traffic/CBR]
$cbr set packetSize_ 256
$cbr set random_ false
$cbr set rate_ 1mb
$cbr attach-agent $udp
$ns_ connect $udp $null

#
# Tell nodes when the simulation ends
#
for {set i 0} {$i < $val(nn) } {incr i} {
    $ns_ at 80.0 "$node_($i) reset";
}

$ns_ at 0.0 "$cbr start"
$ns_ at 80.0 "$cbr stop"
$ns_ at 80.0 "stop"
$ns_ at 80.01 "puts \"NS EXITING...\" ; $ns_ halt"
proc stop {} {
    global ns_ tracefd
    $ns_ flush-trace
    close $tracefd
}

puts "Starting Simulation..."
$ns_ run

```

8. code scenario B 150 node

```

# =====
# Define options
# =====
set val(chan) Channel/WirelessChannel ;# channel
type

```

```

set val(prop)          Propagation/TwoRayGround      ;# radio-
propagation model
set val(netif)         Phy/WirelessPhyExt           ;# network
interface type
set val(mac)           Mac/802_11Ext                ;# MAC type
set val(ifq)           Queue/DropTail/PriQueue      ;# interface
queue type
set val(ll)           LL                            ;# link layer
type
set val(ant)           Antenna/OmniAntenna          ;# antenna
model
set val(ifqlen)        50                           ;# max packet
in ifq
set val(nn)            150                           ;# number of
mobilenodes
set val(rp)            DumbAgent                     ;#
routing protocol
set opt(x) 1097
set opt(y) 1433

# =====
# Main Program
# =====
set ns_ [new Simulator]
set tracefd [open trace_hasil_simulasi.tr w]
$ns_ trace-all $tracefd

set namf [open animasi.nam w]
$ns_ namtrace-all-wireless $namf $opt(x) $opt(y)

# set up topography object
set topo [new Topography]
$topo load_flatgrid $opt(x) $opt(y)

#konfigurasi node
create-god $val(nn)

# configure node

    $ns_ node-config -adhocRouting $val(rp) \
        -llType $val(ll) \
        -macType $val(mac) \
        -ifqType $val(ifq) \
        -ifqLen $val(ifqlen) \
        -antType $val(ant) \

```

```

        -propType $val(prop) \
        -phyType $val(netif) \
        -channelType $val(chan) \
        -topoInstance $topo \
        -agentTrace ON \
        -routerTrace ON \
        -macTrace OFF \
        -movementTrace ON

#802.11p default parameters

Phy/WirelessPhyExt set CStresh_                3.162e-12    ;#-
85 dBm Wireless interface sensitivity (sensitivity defined in the
standard)
Phy/WirelessPhyExt set Pt_                    0.001
Phy/WirelessPhyExt set freq_                 5.9e+9
Phy/WirelessPhyExt set noise_floor_         1.26e-13    ;#-
99 dBm for 10MHz bandwidth
Phy/WirelessPhyExt set
L_                1.0                ;#default radio circuit
gain/loss
Phy/WirelessPhyExt set PowerMonitorThresh_   6.310e-14   ;#-
102dBm power monitor sensitivity
Phy/WirelessPhyExt set HeaderDuration_      0.000040   ;#40
us
Phy/WirelessPhyExt set BasicModulationScheme_ 0
Phy/WirelessPhyExt set PreambleCaptureSwitch_ 1
Phy/WirelessPhyExt set DataCaptureSwitch_   0
Phy/WirelessPhyExt set SINR_PreambleCapture_ 2.5118;    ;# 4
dB
Phy/WirelessPhyExt set SINR_DataCapture_    100.0;     ;# 10
dB
Phy/WirelessPhyExt set trace_dist_         1e6        ;#
PHY trace until distance of 1 Mio. km ("infinty")
Phy/WirelessPhyExt set PHY_DBG_            0

Mac/802_11Ext set CWMin_                   15
Mac/802_11Ext set CWMax_                   1023
Mac/802_11Ext set SlotTime_               0.000013
Mac/802_11Ext set SIFS_                   0.000032
Mac/802_11Ext set ShortRetryLimit_        7
Mac/802_11Ext set LongRetryLimit_         4
Mac/802_11Ext set HeaderDuration_         0.000040
Mac/802_11Ext set SymbolDuration_         0.000008
Mac/802_11Ext set BasicModulationScheme_  0

```

```

Mac/802_11Ext set use_802_11a_flag_ true
Mac/802_11Ext set RTSThreshold_ 2346
Mac/802_11Ext set MAC_DBG 0

    for {set i 0} {$i < $val(nn)} {incr i} {
        set node_($i) [$ns_ node]
        $node_($i) random-motion 0 ;
    }

source mobility100.tcl

#konfigurasi UDP dan CBR

set udp [new Agent/UDP]
$ns_ attach-agent $node_(5) $udp
$ns_ attach-agent $node_(10) $udp

set null [new Agent/Null]
$ns_ attach-agent $node_(15) $null
$ns_ attach-agent $node_(25) $null

set cbr [new Application/Traffic/CBR]
$cbr set packetSize_ 256
$cbr set random_ false
$cbr set rate_ 1mb
$cbr attach-agent $udp
$ns_ connect $udp $null

#
# Tell nodes when the simulation ends
#
for {set i 0} {$i < $val(nn)} {incr i} {
    $ns_ at 80.0 "$node_($i) reset";
}

$ns_ at 0.0 "$cbr start"
$ns_ at 80.0 "$cbr stop"
$ns_ at 80.0 "stop"
$ns_ at 80.01 "puts \"NS EXITING...\" ; $ns_ halt"
proc stop {} {
    global ns_ tracefd
    $ns_ flush-trace
    close $tracefd
}

```

```
puts "Starting Simulation..."
$ns_run
```

9. code throughput_pdr.awk

```
#!/bin/awk -f
{
  event = $1
  time = 0 + $2 # Make sure that "time" has a numeric
  type.
  node_id = $3
  pkt_size = 0 + $8
  level = $4
  if (level == "AGT" && event == "s" && $7 == "cbr")
  {

    sent++
    if (!startTime || (time < startTime))
    {
      $startTime = time
    }

    if (level == "AGT" && event == "r" && $7 == "cbr")

    receive++
    if (time > stopTime) {
      $stopTime = time
    }

    $rcvdSize += pkt_size
  }

  END {
    printf("start Time = %f, stopTime = %f\n",
    startTime, stopTime)
    printf("sent_packets\t %d\n", sent)
    printf("received_packets %d\n", receive)
    printf("PDR %.2f%%\n", (receive/sent)*100);
    printf("Average Throughput[kbps] =
    %.2f\tstartTime=%.2f\tstopTime = %.2f\n",
    ($rcvdSize)/(stopTime-startTime), startTime, stopTime);
  }
}
```

```
10. code delay.awk
BEGIN {
  seqno = -1;
  # droppedPackets = 0;
  # receivedPackets = 0;
  count = 0;
```

```

}
{
    if($4 == "AGT" && $1 == "s" && seqno < $6) {
        seqno = $6;
    }
#else if(($4 == "AGT") && ($1 == "r")) {
# receivedPackets++;
# } else if ($1 == "D" && $7 == "tcp" && $8 > 512){
#   droppedPackets++;
# }

#end-to-end delay
if($4 == "AGT" && $1 == "s") {
    start_time[$6] = $2;
} else if(($7 == "cbr") && ($1 == "r")) {
    end_time[$6] = $2;

} else if($1 == "D" && $7 == "cbr") {
} end_time[$6] = -1;

END {
    for(i=0; i<=seqno; i++) {
        if(end_time[i] > 0) {
            delay[i] = end_time[i] -
start_time[i];
            count++;
        }
        else
        {
            delay[i] = -1;
        }
    }

    for(i=0; i<=seqno; i++) {
        if(delay[i] > 0) {
            n_to_n_delay = n_to_n_delay + delay[i];
        }
    }

    n_to_n_delay = n_to_n_delay/count;
    print "\n";
    # print "GeneratedPackets = " seqno+1;
    # print "ReceivedPackets = " receivedPackets;
    # print "Packet Delivery Ratio = "
    receivedPackets/(seqno+1)*100
    #"%";
    # print "Total Dropped Packets = " droppedPackets;

    print "Average End-to-End Delay = " n_to_n_delay *
    1000 " ms";

```

```
print "\n";  
}
```

DAFTAR PERBAIKAN

Richard Christopher Suwandi – D121181504

Analisi Efektivitas Routing Protocol AOMDV Terhadap Blocking Problem Pada VANET

Keterangan	Halaman
Penambahan penjelasan perbedaan hasil scenario A dan scenario B	Halaman 32-35
Penghapusan sistematika penulisan pada daftar isi dan bab 1	Halaman vi
Gambar Map Jalan Sultan Alauddin di perbesar	Halaman 16

LEMBAR PERBAIKAN SKRIPSI

"Analisis Efektivitas Routing Protocol AOMDV terhadap Blocking Problem pada VANET"



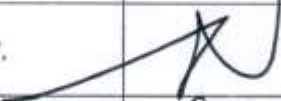
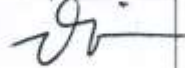
OLEH:

Richard Christopher Suwandi
D121181504


Skripsi ini telah dipertahankan pada Ujian Akhir Sarjana tanggal 15 Maret 2023.

Telah dilakukan perbaikan penulisan dan isi skripsi berdasarkan usulan dari penguji dan pembimbing skripsi.

Persetujuan perbaikan oleh tim penguji:

	Nama	Tanda Tangan
Ketua	Prof. Dr. Indrabayu, S.T., M.T., M.Bus.Sys., IPM., ASEAN Eng	
Sekretaris	Dr. Eng. Ir. Intan Sari Areni, S.T., M.T.	
Anggota	Prof. Dr. Ir. Andani, M.T.	
	Dr.Eng.Ir. Dewiani, M.T.	

Persetujuan Perbaikan oleh pembimbing:

Pembimbing	Nama	Tanda Tangan
I	Prof. Dr. Indrabayu, S.T., M.T., M.Bus.Sys., IPM., ASEAN Eng	
II	Dr. Eng. Ir. Intan Sari Areni, S.T., M.T.	