GeoNet: Geographic addressing and routing for vehicular communications

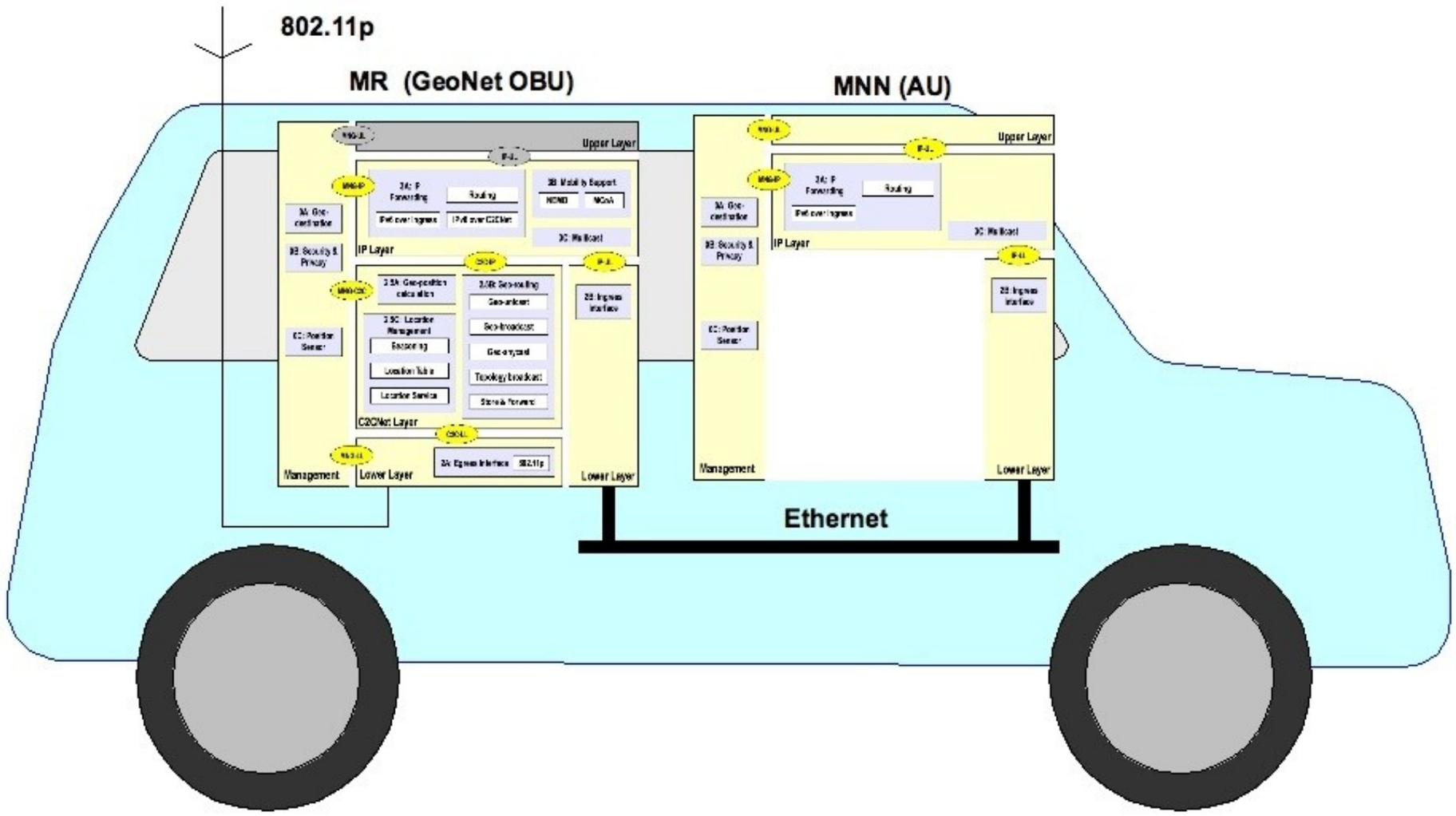
IPv6 GeoNetworking Live Demonstration

Today's GeoNet Demo

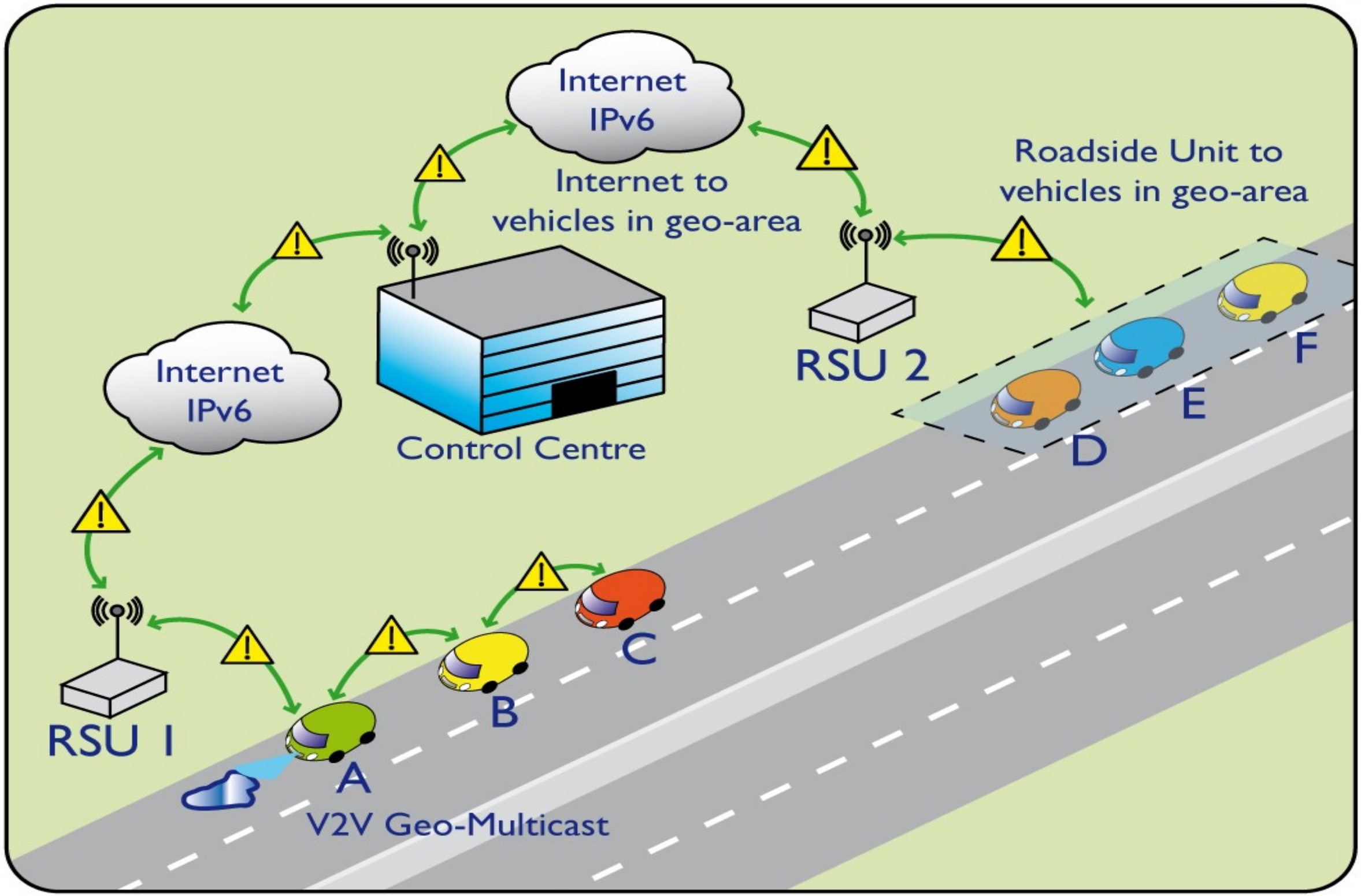
- Network Configuration
- Scenario
- Live traffic hazard reporting

In-vehicle IP network

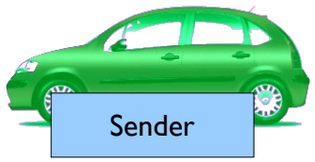
- On-board units (OBU / IPv6 Mobile Router)
  - maintains **Internet access** through RSU (IPv6 Access Router)
- Application Unit (AU / IPv6 Host) HMI **displaying traffic hazards reports**



IPv6 GeoNetworking Scenario



Demo: Scenario

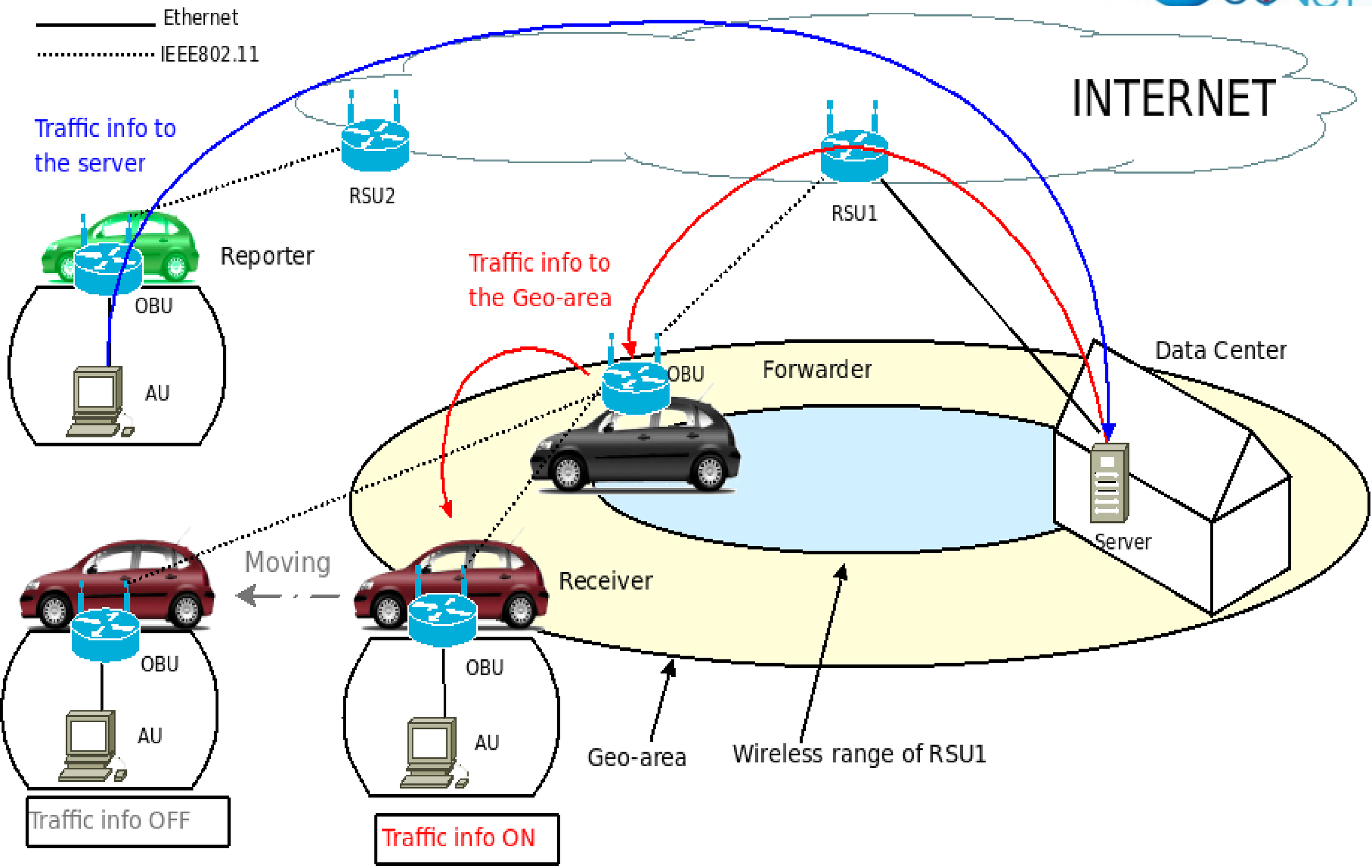
- Green Car 

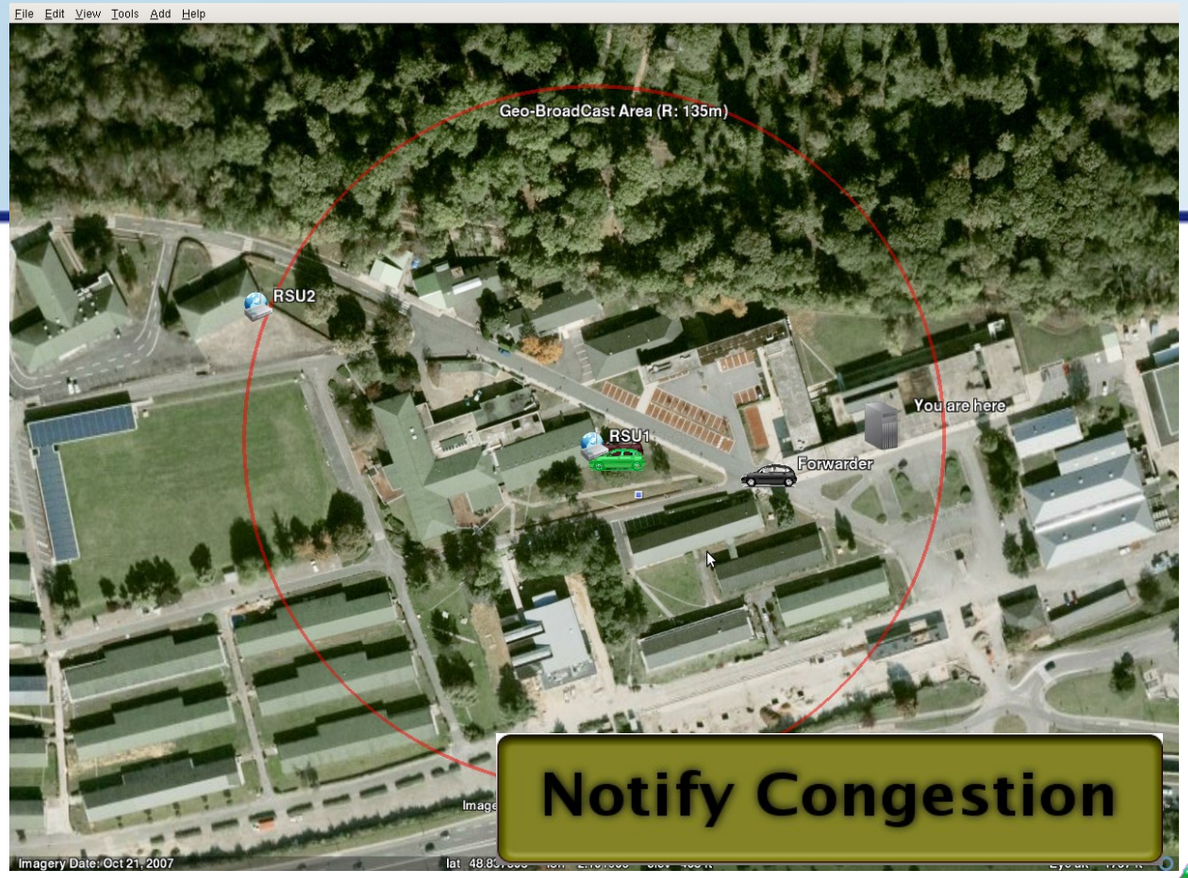
reporting traffic hazard around RSU2
- Traffic center notifies traffic hazard to geographic area around RSU1 &
- Black car

around RSU2 acts as a forwarder
- Red car

displays received traffic hazard notifications

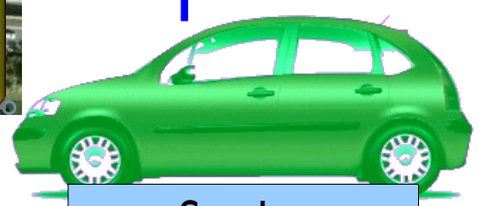
Demo: Network Configuration



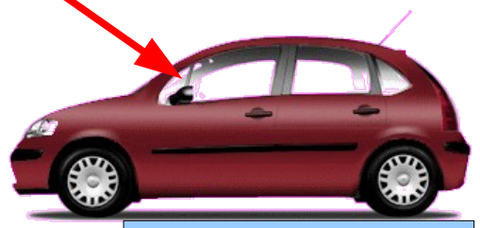


Server

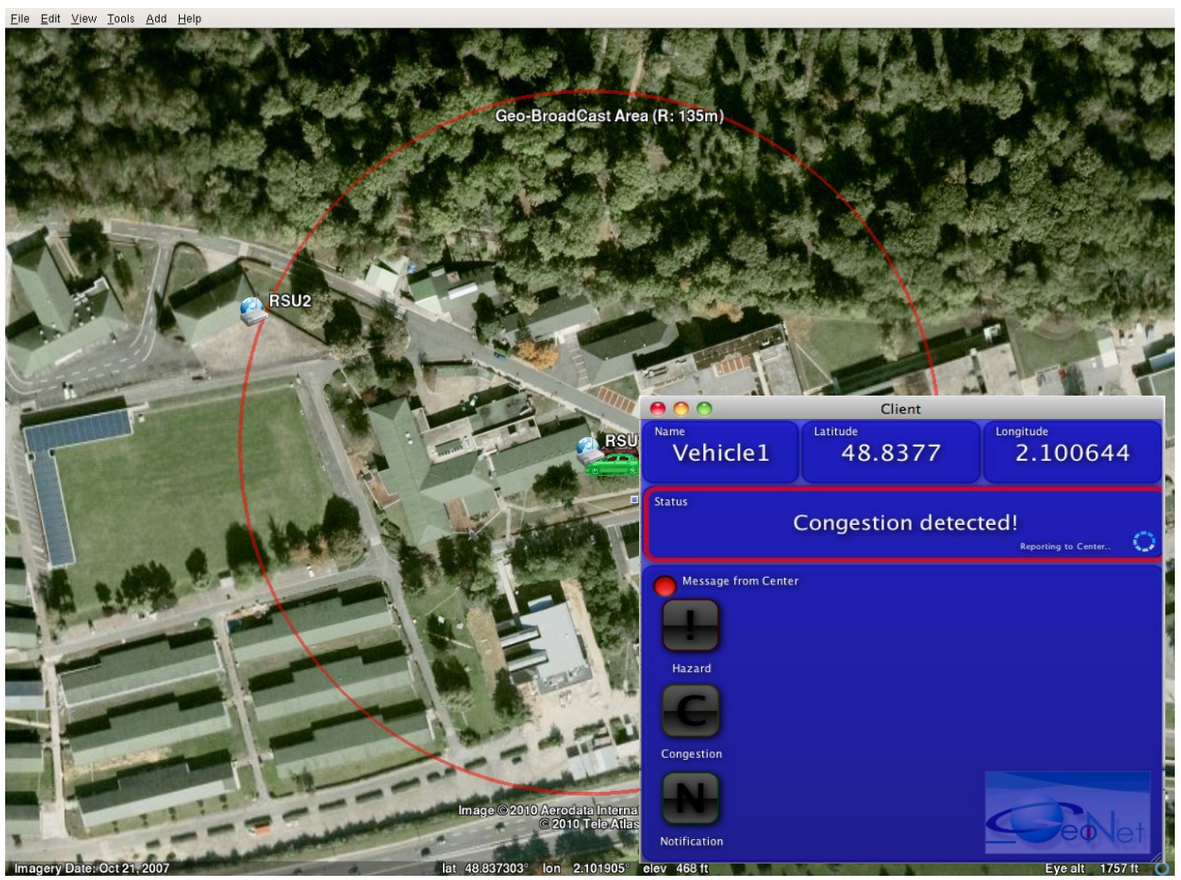
Forwarder



Sender



Receiver



File Edit View Tools Add Help

1) Start
2) Detect Accident and report traffic hazard
3) Detect Ambulance and report traffic hazard
4) (go back to step 1)

1)
2) Receive Accident notification
3) Receive Ambulance notification
4) Send congestion notification
5)
6) Send congestion notification

ast Area (R: 13

RSU2

Sender

2

RSU1

Server

You are here

6

Forwarder

4

1

Receiver

3

1) Start
2) Receive Accident notification
3) Receive Ambulance notification
4) Receive Congestion notification
5) Go out of GeoBroadcast Area
6) Receive nothing

©2010 Tele Atlas
Image ©2010 Aerodata International Surveys
©2009 Google

Imagery Date: Oct 21, 2007 lat 48.837316° lon 2.102070° elev 468 ft Eye alt 1757 ft

File Edit View Tools Add Help

Server Display

Geo-BroadCast Area (R: 135m)

RSU2

Sender

RSU1

Forwarder

You are here

Receiver

© 2010 Tele Atlas

Image © 2010 Aerodata International Surveys

©2009 Google

Imagery Date: Oct 21, 2007 lat 48.837300° lon 2.101852° elev 468 ft Eye alt 1757 ft

File Edit View Tools Add Help

Green Car detects traffic hazard when it is within 15m of the area.

Geo-BroadCast Area (R: 135m)

RSU2

Sender

RSU1

Forwarder

You are here

Receiver

Client

Name: Vehicle1 | Latitude: 48.8377 | Longitude: 2.099944

Status: Fine

Message from Center

Hazard!

Hazard

Congestion

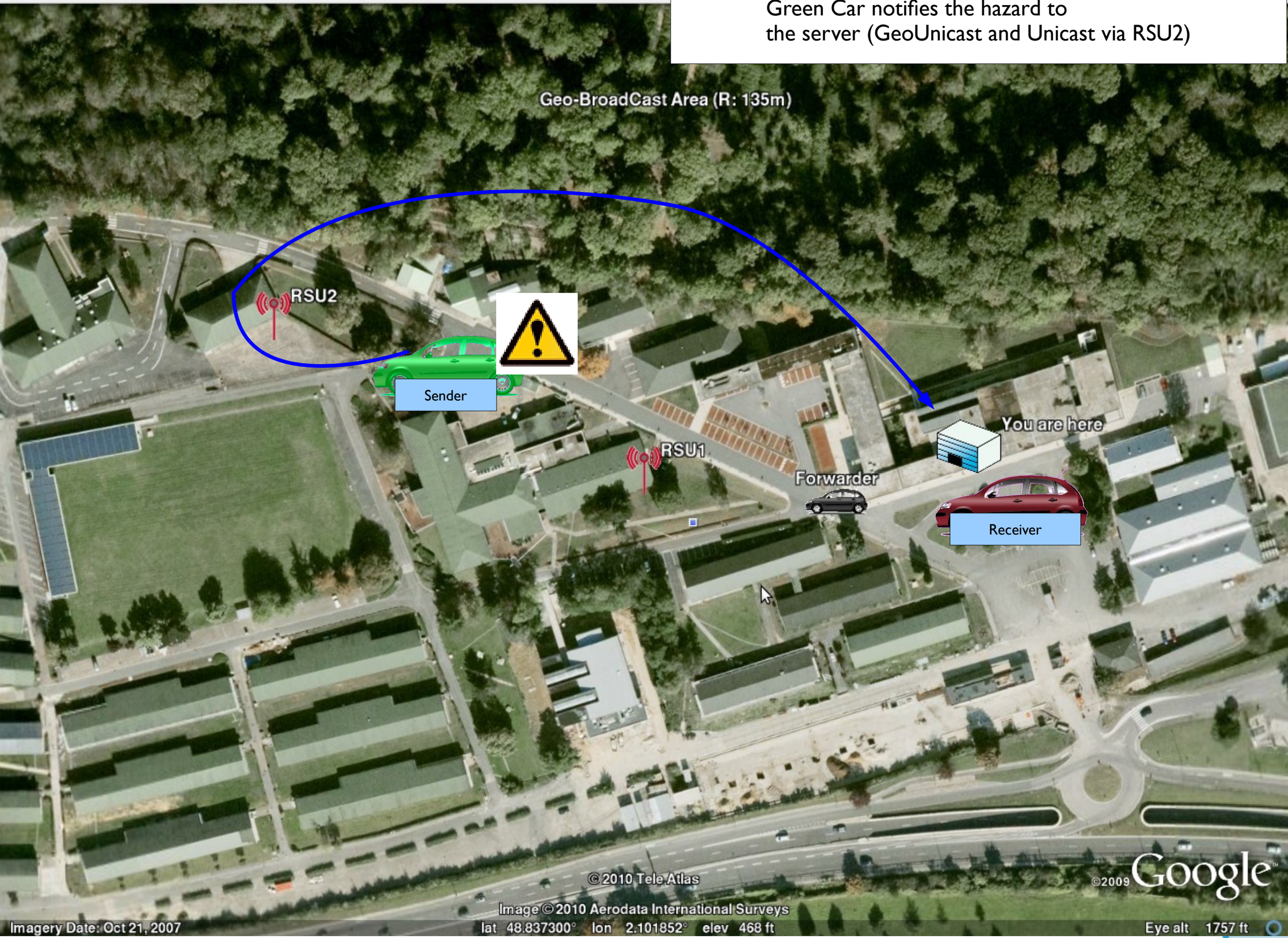
Notification

GeoNet

© 2010 Tele Atlas
Image © 2010 Aerodata International Surveys
©2009 Google

Imagery Date: Oct 21, 2007 lat 48.837300° lon 2.101852° elev 468 ft Eye alt 1757 ft

Green Car notifies the hazard to
the server (GeoUnicast and Unicast via RSU2)



File Edit View Tools Add Help

Server receives the hazard report and
sends to RSU1 (Tunneled Multicast & GeoBroadcast)

Geo-BroadCast Area (R: 135m)

RSU2

Sender

RSU1

You are here

Forwarder

Receiver

Client

Name
Vehicle1

Latitude
48.8377

Longitude
2.099944

Status
Fine

Message from Center

Hazard!

Hazard

Congestion

Notification

© 2010 Tele Atlas

Image © 2010 Aerodata International Surveys

Imagery Date: Oct 21, 2007 lat 48.837316° lon 2.102070° elev 468 ft

File Edit View Tools Add Help

Green Car continues driving....

Geo-BroadCast Area (R: 135m)

RSU2

Hazard message is kept for 30 sec
At all the nodes (sender, server, receiver)

RSU1

You are here

Forwarder

Receiver

Sender

© 2010 Tele Atlas

Image © 2010 Aerodata International Surveys

©2009 Google

Imagery Date: Oct 21, 2007 lat 48.837300° lon 2.101852° elev 468 ft Eye alt 1757 ft

File Edit View Tools Add Help

Green Car detects ambulance when it is within 15m of the area

Geo-BroadCast Area (R: 135m)

RSU2

RSU1

Forwarder

You are here

Receiver

Sender

Client

Name: Vehicle1

Latitude: 48.8377

Longitude: 2.099944

Status: Fine

Message from Center

Hazard!

Hazard

Congestion

Notification

GeoNet

©2009 Google

Image © 2010 Aerodata International Surveys

Imagery Date: Oct 21, 2007 lat 48.837300° lon 2.101852° elev 468 ft Eye alt 1757 ft

File Edit View Tools Add Help

Green Car notifies ambulance hazard to
the server (GeoUnicast and Unicast via RSU2)

Geo-BroadCast Area (R: 135m)

RSU2

RSU1

Forwarder

You are here

Receiver

Sender

© 2010 Tele Atlas

Image © 2010 Aerodata International Surveys

©2009 Google

Imagery Date: Oct 21, 2007 lat 48.837300° lon 2.101852° elev 468 ft Eye alt 1757 ft

File Edit View Tools Add Help

Server notifies the ambulance hazard to GeoBroadcast area

Geo-BroadCast Area (R: 135m)

RSU2

RSU1

You are here

Forwarder

Receiver

Sender

Client

Name: Vehicle1

Latitude: 48.8377

Longitude: 2.099944

Status: Fine

Message from Center

Hazard!

Hazard

Congestion

Notification

GeoNet

© 2010 Tele Atlas

Image © 2010 Aerodata International Surveys

Imagery Date: Oct 21, 2007 lat 48.837316° lon 2.102070° elev 468 ft

File Edit View Tools Add Help

Green Car continues driving.....

Geo-BroadCast Area (R: 135m)

RSU2

RSU1

Forwarder

You are here

Receiver

Sender

Ambulance notification is kept for 30 sec
at all the nodes (sender, server, receiver)

© 2010 Tele Atlas

Image © 2010 Aerodata International Surveys

©2009 Google

Imagery Date: Oct 21, 2007 lat 48.837300° lon 2.101852° elev 468 ft Eye alt 1757 ft

File Edit View Tools Add Help

Now, Operator sends Traffic jam report
by pushing the button on the server display

Geo-BroadCast Area (R: 135m)

RSU2

RSU1

Notify Congestion

You are here

Forwarder

Receiver

Sender

© 2010 Tele Atlas

Image © 2010 Aerodata International Surveys

©2009 Google

Imagery Date: Oct 21, 2007 lat 48.837300° lon 2.101852° elev 468 ft Eye alt 1757 ft

File Edit View Tools Add Help

Red Car receives traffic jam notification

Geo-BroadCast Area (R: 135m)

RSU2

RSU1

You are here

Forwarder

Receiver

Sender

Client

Name
Vehicle1

Latitude
48.8377

Longitude
2.100644

Status
Congestion detected!
Reporting to Center..

Message from Center

Hazard

Congestion

Notification

© 2010 Tele Atlas

Image © 2010 Aerodata International Surveys

Imagery Date: Oct 21, 2007 lat 48.837316° lon 2.102070° elev 468 ft

File Edit View Tools Add Help

Red Car doesn't receive anything when it is out of the GeoBroadcast area

Geo-BroadCast Area (R: 135m)

RSU2

RSU1

You are here

Forwarder

.....

Sender

Receiver

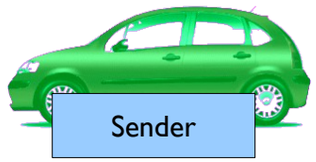
© 2010 Tele Atlas

Image © 2010 Aerodata International Surveys

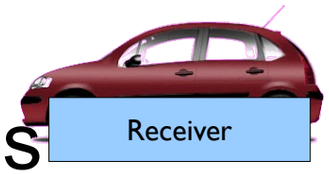
©2009 Google

Imagery Date: Oct 21, 2007 lat 48.837316° lon 2.102070° elev 468 ft Eye alt 1757 ft

Demo: Tour

- Now, you can take a tour:
  - In Green Car 

reporting traffic hazard around RSU2
  - At the Traffic center notifying traffic hazards to geographic area around RSU1 , &
  - Around Black Car

around RSU2 acts as a forwarder
  - In Red car 

displaying received traffic hazard notifications