Adhoc Geographical area

Broadcast, Geocast, Routing (find a Path, to know your neighbours)

OSPF, link State Routing

Mobility ⇒ Topologie of Routing change ⇒ increase Hello

Proactive keep the state of Routing — ... ✗ not good for the mobility (Fast ⇒ must repaire the path)

Reactive build the path (Route) when it need it. (Latency) / extra delay for the first paquet / because we must know the Source/Dest path

To decide what is the best path we must do the metrics (Georouting)

OLSR (when we choose metrics it must be stable, because the problem (flipflop) makes the path not stable) ⇒ Reactive don't work well.

Georouting (Destination identified by a location)

- Recovery Mode: (you want to send a paquet and you are in the end (front of a wall) you must come back and resend the paquets to the destination) this routing is blind.

Interference → Impact on other systems.

Collision → Impact on other users

Contention → Impact on other Applications

Broadcast is a good one for Safety

The retolerant Network ?! — There are moment that you are connected and in other moments to are not so ... ?!

Flooding + X (X = Direction)

in the Highways how is going in the same direction or against this direction and what is the speed.

TO-GO (City) (location + Direction) ...

→ Scalability (144) the problem is to go from the border nodes there is just one node common.

if we can say that the link is stable (source routing is good) for an road because the route rarely change

Reactive vs proactive

hop-by-hop vs Source routing → (if the link goes down we must come back to source to know the path).

each node makes the decision what is the right path.

Avg I can know what is the nodes that are More trusted.

Avg if the link goes down, the next nodes knows ...?! ... you know the optimal path

just back the next hoop.

- Distance vs link-state → cost (optimize the path). ⇒ why link-state not use because space of paquet

Geo-routing. 2 modes (Griding ⇒ next closer to destination. Perimeter ⇒ (go back ...))

← Fragmentation (DV-cast) ?

Geo-routing (like proactive)

Flooding (Broadcast)

we don't use 3G because of latency, Broadcast is good for safety

Main Takeaways:

In the past : → Sent via FM

Now → GPS ⇒ gives speed, position, direction, Take some cars have an average speed: <avg ⇒ congestion >avg nobody

⇒ integrate it in the navigator

Sensor GPS

Client (Navigator)

cloud (BD), Algo (this algo it's not easy) Google gives the path that are congestion or not (... for exp we use the same path, ...)

if there is no cloud ⇒ information stored locally (so we want to know the info from another a car which have the info).

⇒ how to find this info (Peer to peer communication) ⇒ hash Table ⇒ prob of speed because location change so we must update every time.

⇒ the asumption behind the system is there is always connection (not necessary to have a high (debit) because GPS data are very small).

Cours: Privacy.

(Mobile) ① Privacy of location. ② (using Target for advertising) ③

Since we use diff devices and some of this devise as public.

Using Pseudonymity:

Knowing the master key of CA so ⇒ ? (bye Anonyma).

at every paquet. (at every time) the ID of car change ⇒ so attacker cannot spoof or knowing about the path or other information extracted from the Beacon.

* There is No Privacy

Using the hello beacon with the same MAC@.

Internet of things in Vehicle:

~~We can use the car for~~ : Data Analytics, all of this ⇒ needs connectivity ①

② trying to understand things in the car why not send for exp a video from a car's camera to the cloud? ⇒ because of latency ⇒ that's why we did it in the car.

← Edge computing ②

Machine learning. ③

Renault & Angleg.

Head Unit Update ⇒ for expl when the phone tel you update me

high cost

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Beaconing TIS: Traffic Information Systems. (will be never implemented!)

Goals: (Main ones) Reduce or avoid traffic (jams) → Bouchon

Reduce Emission ? (CO_2, Noise ...)

Motivation Prob of TIS: low data rate (because they use FM)?!

low reliability

~~Course~~ Typical requirement: 0% of the communication is really cost.

V2V communication: (use the car as a sensor especially GPS ⇒ Broadcast the info to any neighbor) ⇒ if it done well the online navigator change the route (…

if there is a big delay it propose (?!) to you the path).

GPS receiver. ? ?.

Data:

PeerTIS proposal: each car monitor its GPS speed

use 3G to send information (few bytes of data) → Benefit 3G exist

(I need to know the @IP of each neighbor (ID))

Pool approach is better?! → I need to know which car in the road has the …

(not push)

(how)

Index (ID road, all cars were there)

hash table (hash correspond to each place …) … of …

that key is orderable and monotonly increasing.

The prob of a Direct ~~on~~ Map wish ~~too~~ have a lot of info, we try to keep the table ... ?!

logical ~~nbr~~ neighbor not a real neighbor ?! a little …

DHT allow to get or to make you know wish car have the info.

CAN: use geographi to distribute info

PeerTIS allows (NG?) ⇒ for exp if I ask for street 1 I will probably ask for

optimization street 2 because I'm moving ahead …

Peer to Peer (high price) ⇒ Scalability (useful when scalability got higher)

efficient, scalable

Prob ⇒ cost to build it is high

Peer2Peer ⇒ ~~you~~ you download what you want ~~and~~ and you leave (it's a little bit like mobile).

SOTIS: wireless channel + mobility of car.

Prob: - works more in the highway

- we ~~have~~ must have a mechanism to update.

Priority of the Voice (VO)

~~For Data~~ Good bad

LTE Range Latency

(I'm asleep)

Plain, Signed (Emergency, msg of accident) Encrypted (79) Paying in the high way with a credit card.

(82) Security

802.11 Recap (~~Rasu~~ Summary)

802.11p for car to car communication

why we can't use ad-hoc also mode .. (access point = cost)

we must every time decide the channel ..

Protocols (Based on 802.11a plus extensions)

- (10) wildcard BSS = cars are peer, don't spent time to connect ...
- (12) If you are AP you wait for DIFS.

The waiting time is Random (specialy if they have the same priority, same time to transmit ..).

- DIFS different ~~pa~~ depend on priority.

IEEE 1609. U.S 7 channels (1 is dedicated to the CCH)

→ - They all listen to the CCH channel (Brodcast info ?!) then after 50ms they switch to one of 6 channel (they pick one) to transmitt what the want in this channel

(Figure detail in 19)

1) - Throughput (Débit) the problem with (|——|//// 50ms)
2) - Other problem is the lantency ↗ (increase) wait (50ms to send a paquet) + Backoff time. in the worst time
3) - Collision → packet loss.

→ Europe standards

If we want to have this protocol we must have multiple network interface. (at least 2)

DCC = shape the Traffic (Façonner)

(26) CAM if the ~~car~~ in the car there is an update geographic ..

DENM ~~tells~~ tels car that there is a problem.

DCC (28) based on Network condition = interval betwen Packet for the same service.

- there is a modes ~~relaxed~~ ⇆

relaxed ⇆ active ⇆ restrictive

if you want to switch you need to check the load of a channel.