

# H3-LISP Draft-Nexagon

Call for Adoption

## Content

### 1. GeoState Network Objects

- H3 Indexed
- EID addressable
- LISP routable

### 2. Updates to draft since 105

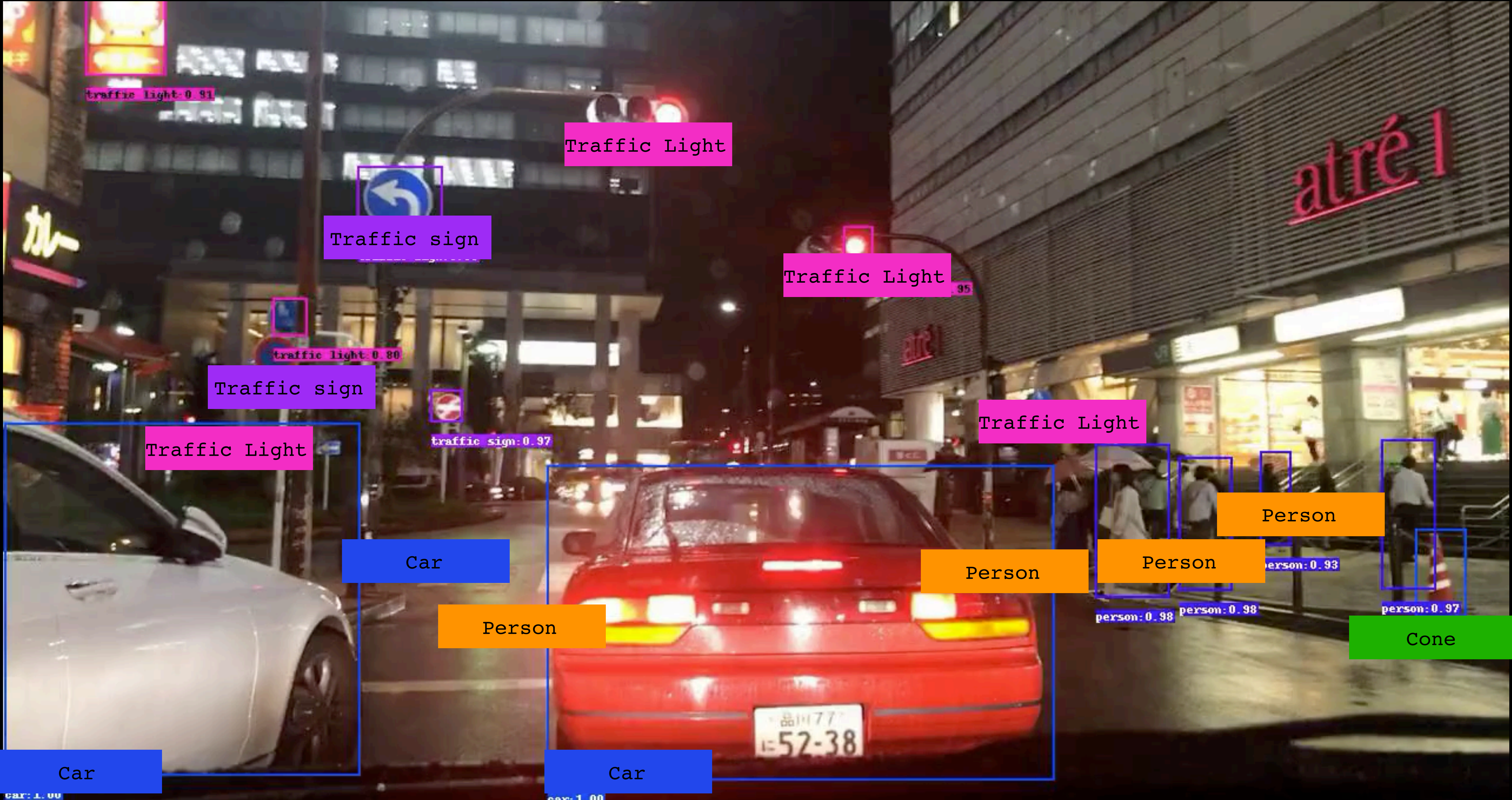
### 3. Value of Mobility LISPEdge



<https://tools.ietf.org/html/draft-barkai-lisp-nexagon-11>



# Fixed / Patrolling < Vision & Sensors > Enumerate Public-Spaces





Traffic Light	Traffic sign	Person	Car
Traffic Light	Traffic sign	Person	Car
Traffic Light	Cone	Person	Car

Snapped  
Indexed  
Addreesed  
  
Formal  
Hierarchical  
GeoState Grid

H3-LISP

H3

Date08/10/2019 | 06:04

Address40 Prince Street, Manhattan, New York, N...

Nexagon ID622236750707097599

Lon | Lat-73.9954 | 40.7232

Image Without Detections

a minute ago

Blockage

2 minutes ago

Image Without Detections

3 minutes ago

Traffic light

6 minutes ago

Image Without Detections

6 minutes ago

Traffic light

7 minutes ago



# Snap-Pub-Sub: Enums <> EID-Grid

...Blockage, Defect, Breach, Sign...

```
Field 0x: Traffic Direction
0x - null
1x - Lane North
2x - Lane South
3x - Lane East
4x - Lane West
5x - Lane North + 270
6x - Lane North + 300
7x - Lane North + 330
8x - junction
9x - shoulder
Ax - sidewalk
Ex - red now
Fx - red now
}
```

Direction

```
field 1x: Persistent or Stru
0x - null
1x - pothole light
2x - pothole severe
3x - speed bump
4x - speed bump
5x - speed bump
6x - speed bump
7x - speed bump
8x - speed bump
9x - speed bump
Ax - speed bump
Bx - speed bump
Cx - speed bump
Dx - speed bump
Ex - speed bump
Fx - speed bump
}
```

Persistent

```
field 2x: Transient Condition
0x - null
1x - pedestrian
2x - bike scooter
3x - stopped car / truck
4x - moving car / truck
5x - first responder vehicle
6x - sudden stop
7x - light
8x - light
9x - light
Ax - light
Bx - light
Cx - light
Dx - light
Ex - light
Fx - light
}
```

Transient

```
field 3x: Traffic-light Cycle {
0x - null
1x - 1 seconds green
2x - 2 seconds green
3x - 3 seconds green
4x - 4 seconds green
5x - 5 seconds green
6x - 6 seconds green
7x - 7 seconds green
8x - 8 seconds green
9x - 9 seconds green
Ax - 10 seconds or less
Bx - 20 seconds or less
Cx - 30 seconds or less
Dx - 60 seconds or less
Ex - green now
Fx - red now
}
```

Timing

```
field 4x: Impacted tile from ne:
0x - null
1x - epicenter
2x - light yellow
3x - yellow
4x - light orange
5x - orange
6x - light red
7x - red
8x - light red
9x - blue
Ax - green
Bx - light green
}
```

Propagate

```
field 5x: Transient, Cycle, Impa
0x - null
1x - 1sec
2x - 5sec
3x - 10sec
4x - 20sec
5x - 40sec
6x - 60sec
7x - 2min
8x - 3min
9x - 4min
Ax - 5min
Bx - 10min
Cx - 15min
Dx - 30min
Ex - 60min
Fx - 24hours
}
```

Aging

```
field 6x: LaneRightsSigns {
0x - null
1x - yield
2x - speed limit
3x - stop
4x - no left turn
5x - right turn only
6x - no right turn
7x - left turn only
8x - left turn
9x - lefts
Ax - noLeftTurn
Bx - noUTurn
Cx - noLeftU
Dx - bikeLane
Ex - HOVLane
Fx - Stop
}
```

Rights

```
field 7x: MovementSigns {
0x - null
1x - keepRight
2x - keepLeft
3x - stayInLane
4x - doNotEnter
5x - noTruck
6x - noBike
7x - noPed
8x - oneWay
9x - park
Ax - noPark
Bx - noStand
Cx - noPassing
Dx - loadingZone
Ex - railCross
Fx - schoolZone
}
```

Movement

```
field 8x: CurvesIntersectSi
0x - null
1x - turnsLeft
2x - turnsRight
3x - curvesLeft
4x - curvesRight
5x - reverse
6x - reverse
7x - win
8x - hail
9x - pre
Ax - cro
Bx - cro
}
```

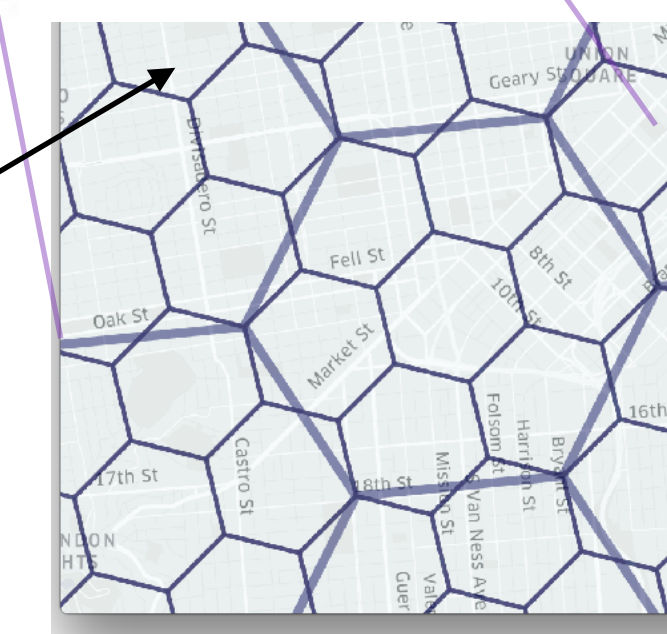
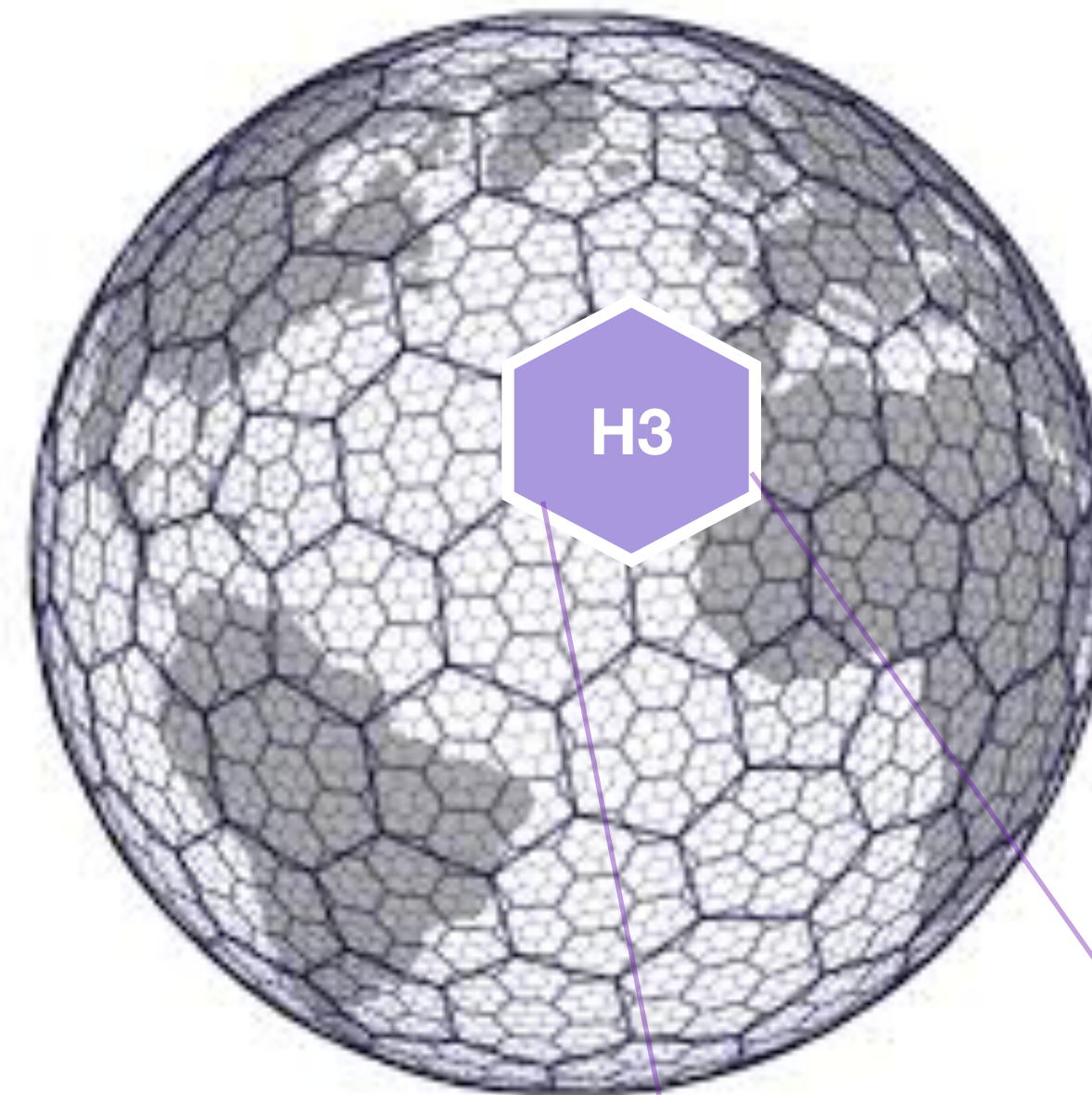
Turns

```
field 9x: Current Tile Speed {
0x - null
1x - < 5kmh
2x - < 10kmh
3x - < 15kmh
4x - < 20kmh
5x - < 30kmh
6x - < 40kmh
7x - < 50kmh
8x - < 60kmh
9x - < 80kmh
Ax - < 100kmh
Bx - < 120kmh
Cx - < 140kmh
Dx - < 160kmh
Ex - > 160kmh
Fx - queuedTraffic
}
```

Speed

```
field Ax: Vehicle / Pedestrian Traffic {
0x - null
1x - probability of vehicle on tile <
2x - 95%
3x - 90%
4x - 85%
5x - 80%
6x - 70%
7x - 60%
8x - 50%
9x - 40%
Ax - 30%
Bx - 20%
Cx - 15%
Dx - 10%
Ex - 5%
Fx - probability of ped/vehicle on tile <
}
```

Density



-0-	-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-A-	-B-	-C-	-D-	-E-	-F-
H3 Hexagon ID Key															
-0-	-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-	-A-	-B-	-C-	-D-	-E-	-F-
H3 Hexagon State-Value															



# EID Addressable – LISP Routable Publish Ucast – Subscribe Mcast

```
-0-|-1-|-2-|-3-|-4-|-5-|-6-|-7-|-8-|-9-|-A-|-B-|-C-|-D-|-E-|-F-|  
H3 Hexagon ID Key  
-0-|-1-|-2-|-3-|-4-|-5-|-6-|-7-|-8-|-9-|-A-|-B-|-C-|-D-|-E-|-F-|  
H3 Hexagon State-Value
```

...Blockage, Defect, Breach, Sign..

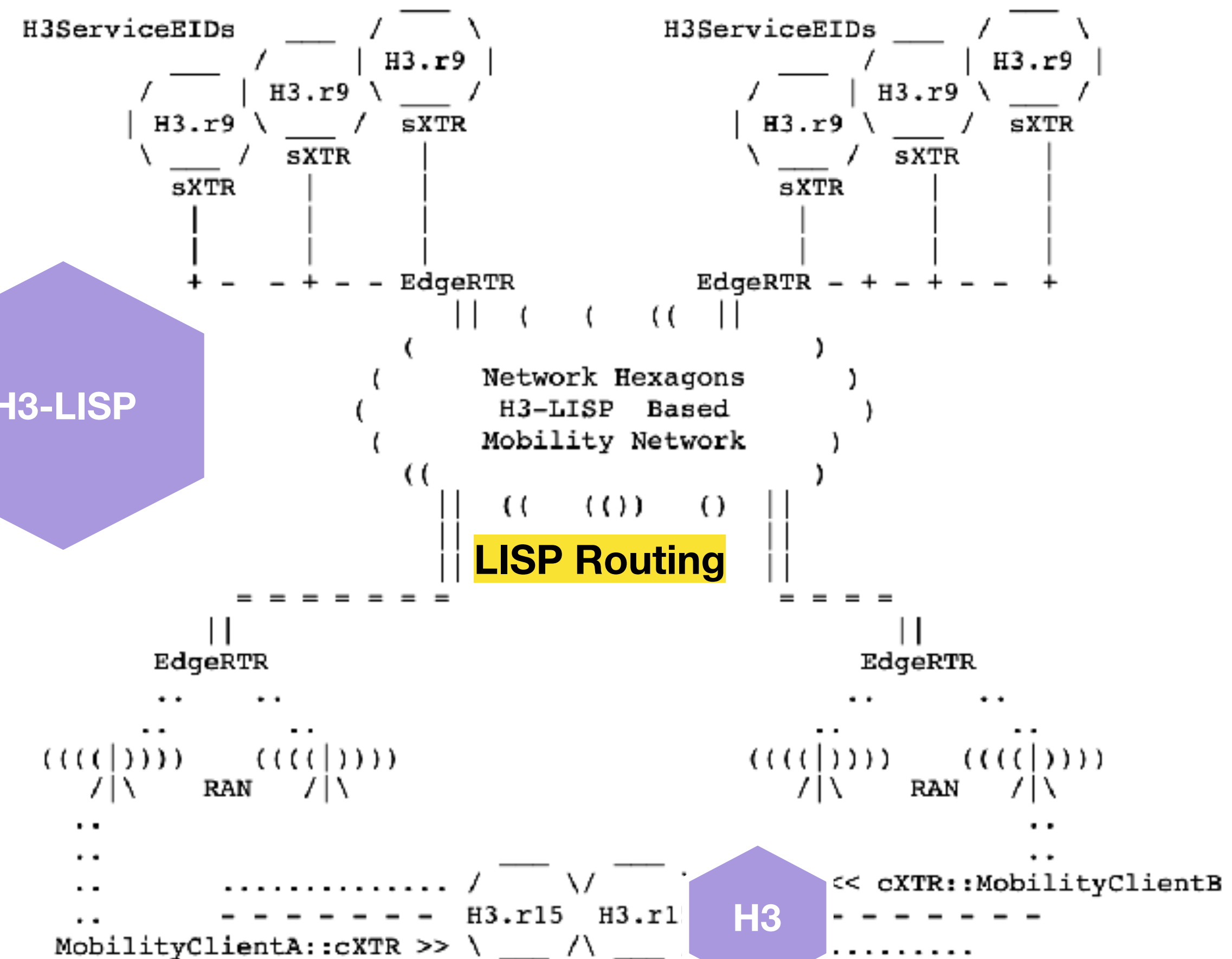
```
5456 78CD334656 90EF  
3278 4565543489 00AE  
5489 3454344590 90EF  
4543 00A8345434 45FA  
5443 01B3345344 4565  
3454 23DE543454 23DE
```

2018-10-05 13:49:32

Snap-Pub-Sub to Grid

H3-LISP

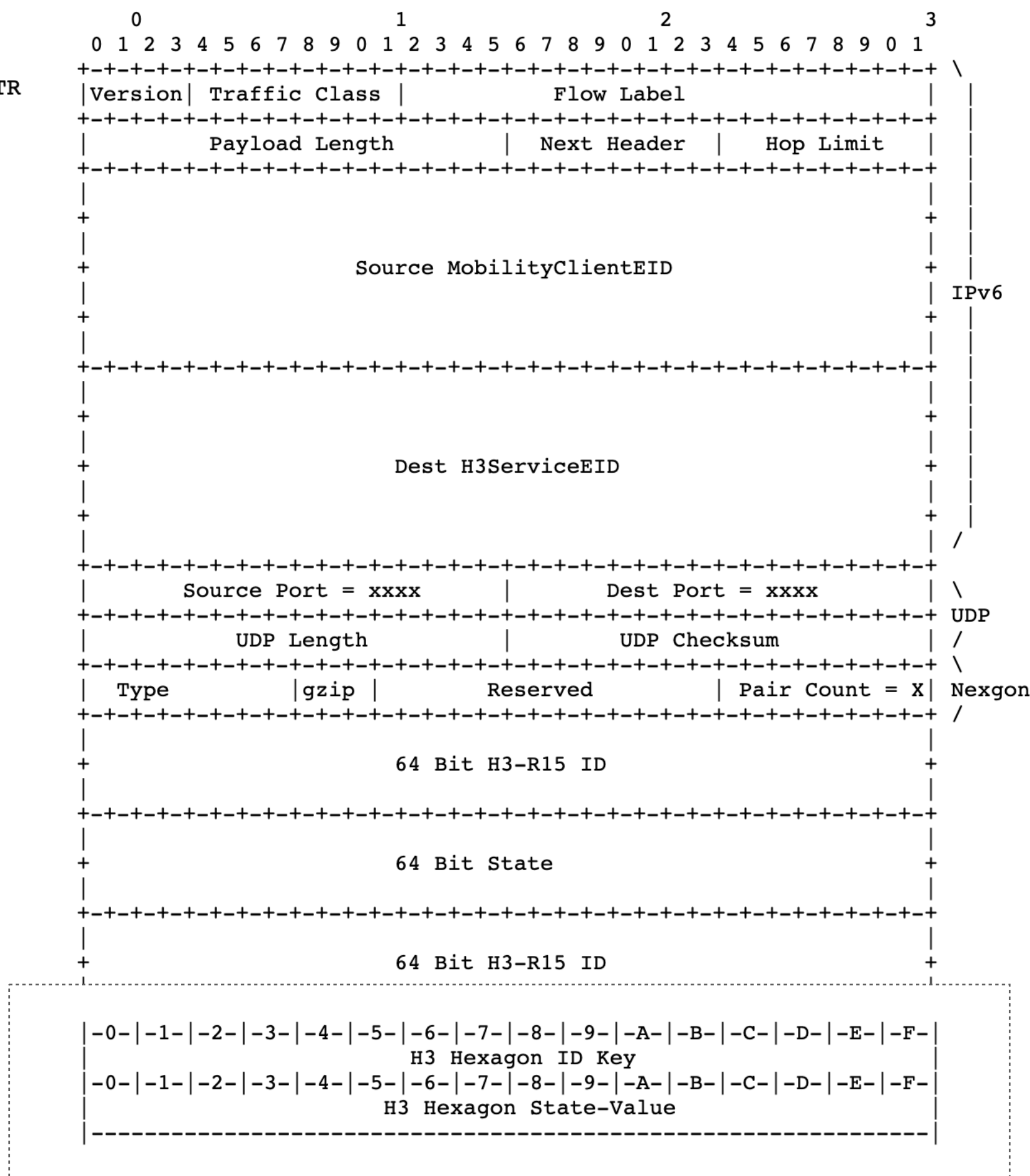
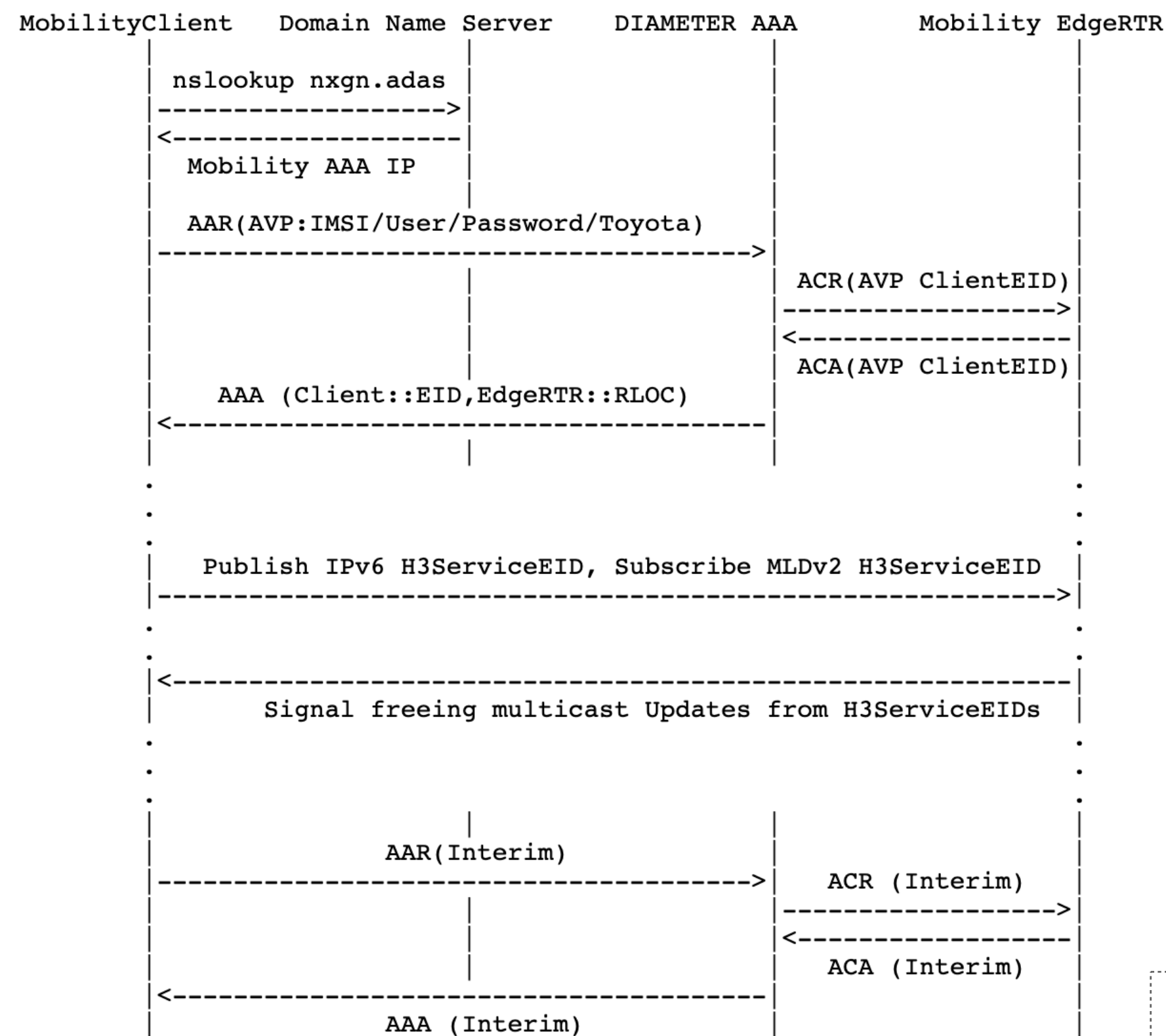
MobilityEIDObjects



MobilityEIDClients



# Since 105



**AAA Procedure: Get (MobilityClient EID, EdgeRTR RLOC)**  
**Ucast/Mcast:[EID Source:Dest (S,G), Flags, Count, KV,KV,KV..]**

# Also Since 105

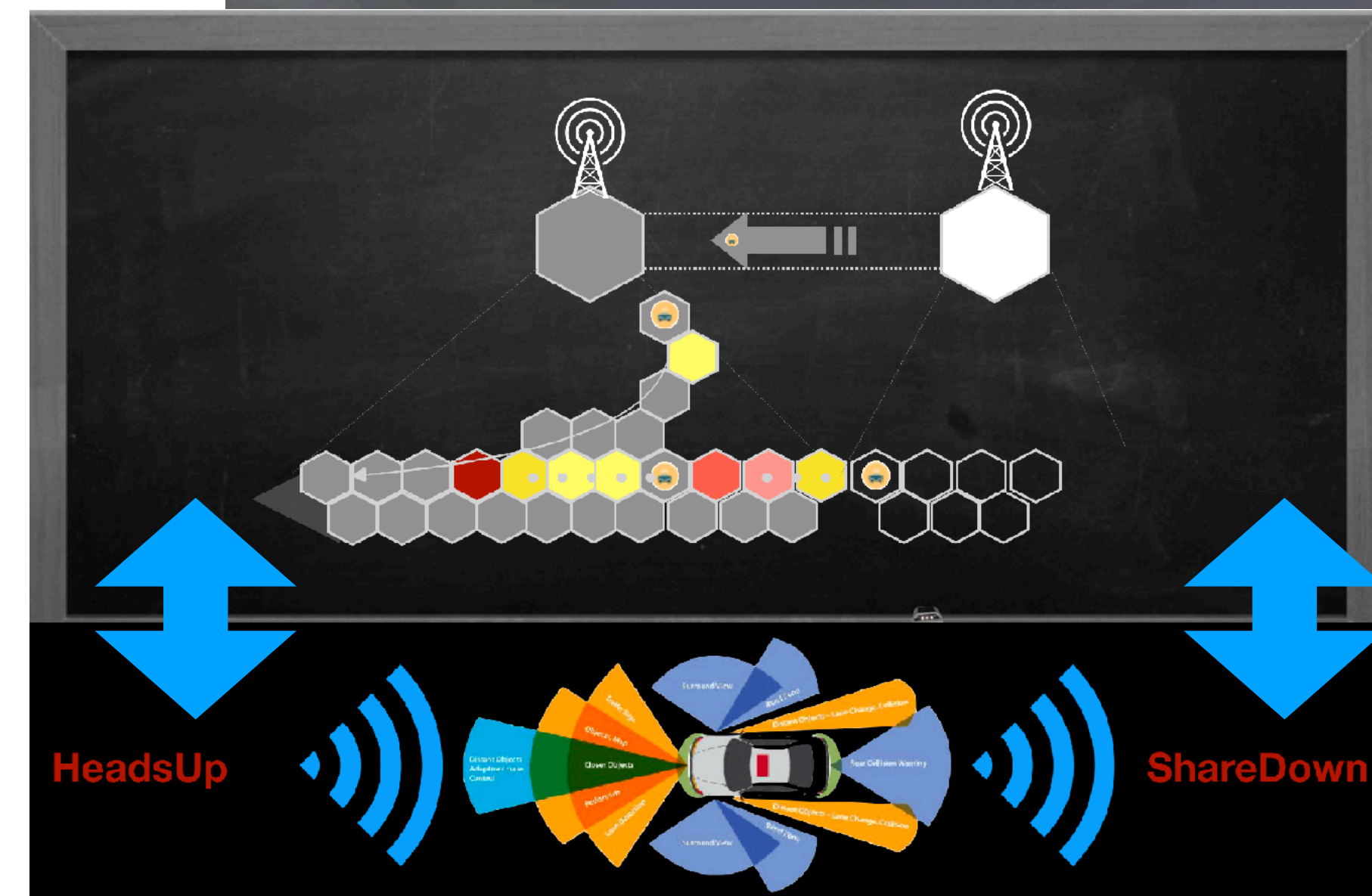
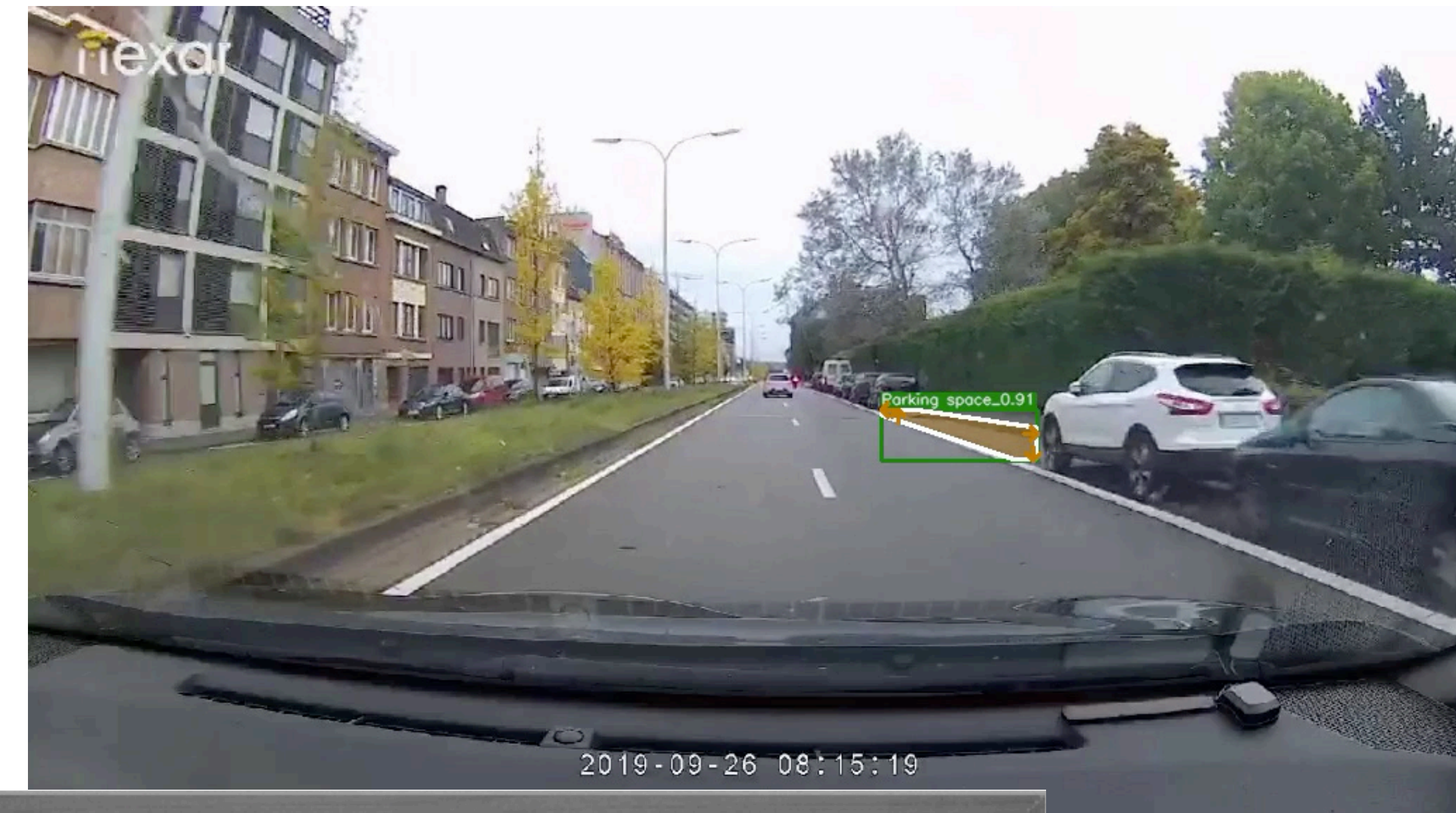
README.md	
<h2>nexagons-go</h2>	
<p>nexagons-go contains a basic server and client implementation of the in progress IETF RFC draft for a H3-LISP based Mobility Network (<a href="https://datatracker.ietf.org/doc/draft-barkai-lisp-nexagon/">https://datatracker.ietf.org/doc/draft-barkai-lisp-nexagon/</a>)</p>	
<h3>whats inside</h3>	
package	description
<a href="#">bundle</a>	an all-in-one server binary (including AAA server, EdgeRTR and H3Server)
<a href="#">client</a>	nexagon MobilityClient SDK code
edgertr	nexagon EdgeRTR library code
internal	internal helper libraries
networking	networking libraries
nexagons	libraries for reading and writing nexagon packets
<a href="#">stress</a>	a binary for stress-testing a nexagon setup

OpenSource Client SDK Based On Diameter, H3, LISP, GZIP,  
OpenSource Stacks + All In One Edge for Client Debug



# Value to Customers

- Muni-DoT: cheaper-fresher surveys of signs, lights, marks, rails, holes, stopped vehicles, construction, ...
- OEM-Drivers: park-assist, blockages, slow-downs, hard-breaks, sharp-turns.. beyond line-of-site
- Enterprise: curb-side conditions, track-routes, ped-vehicle traffic, store-fronts, cams-complied..



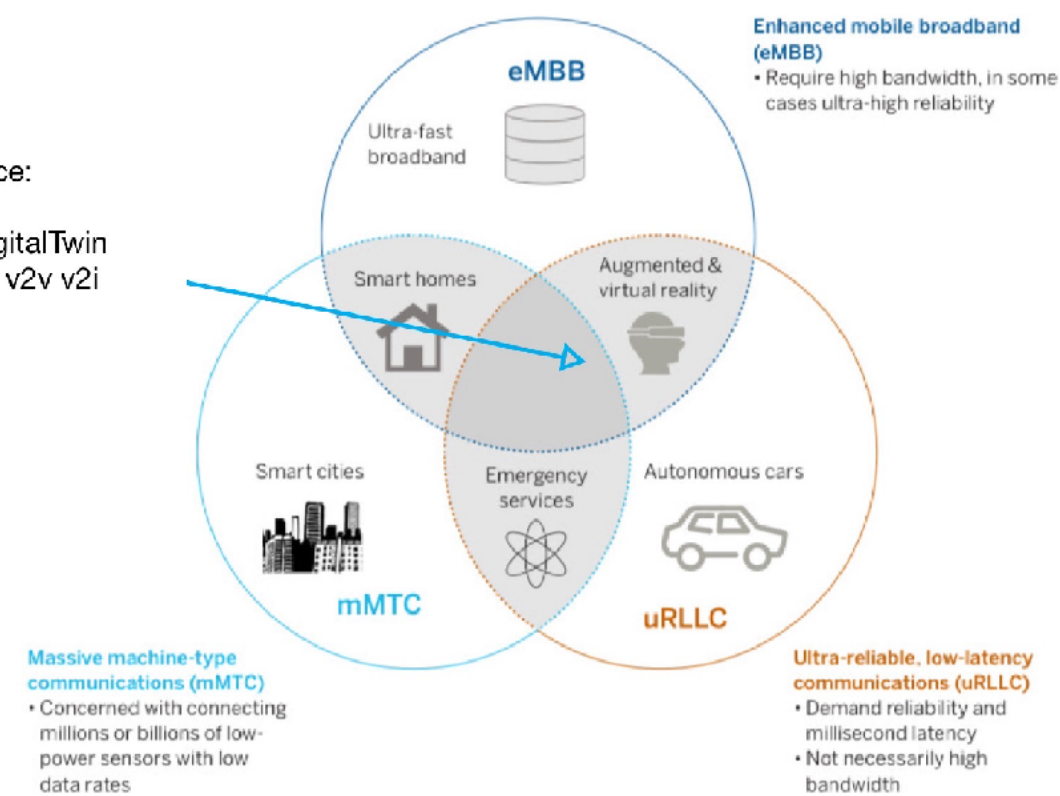


# Value To The Edge

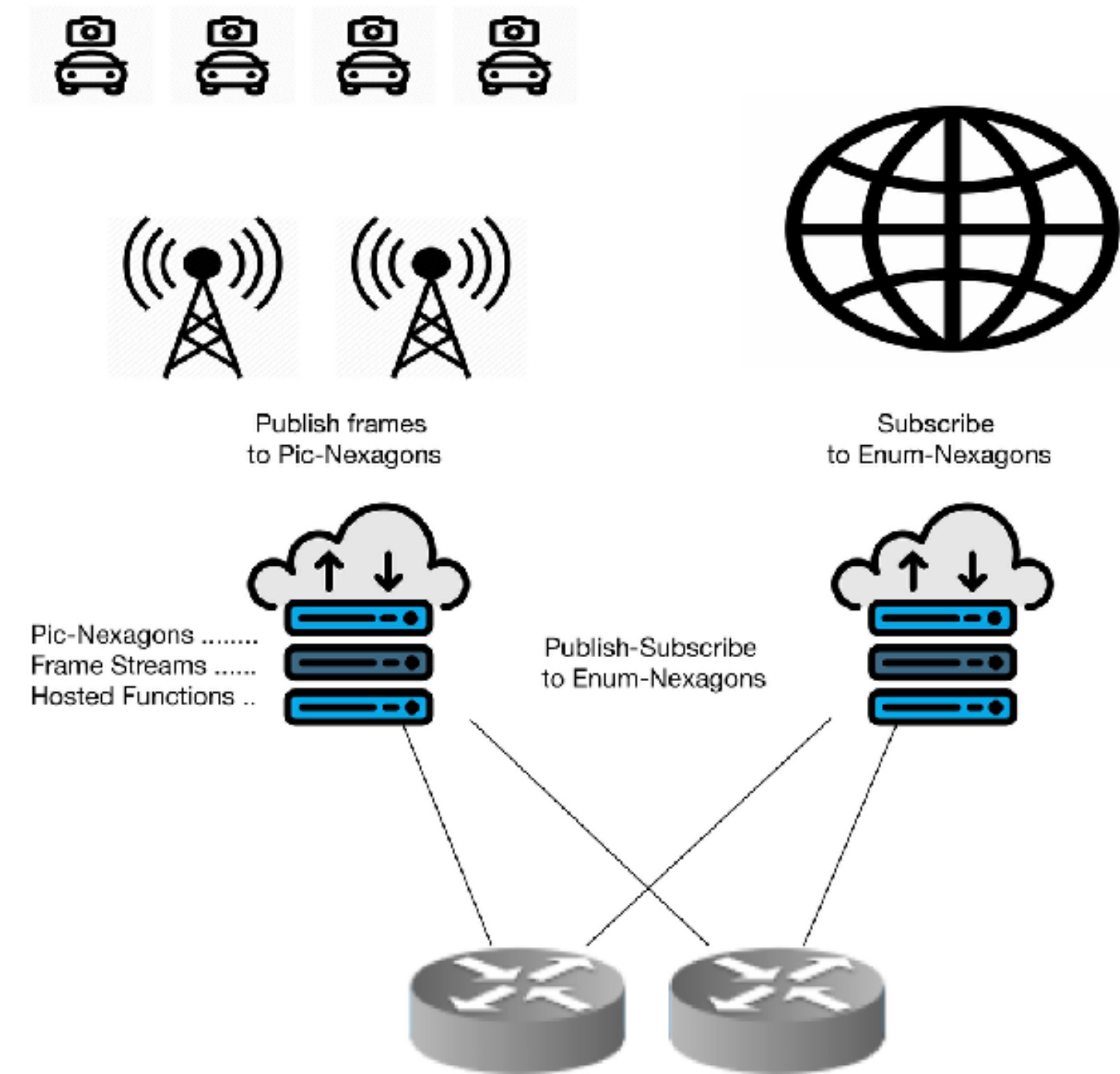
**DigitalTwin City Ground-Truth**  
**L3 v2v v2i Broker ==**  
**Interoperability**

Nexagon Client-Edge Interface:

1. Ground-Truth for Roads DigitalTwin
2. L3 Interoperable Broker for v2v v2i

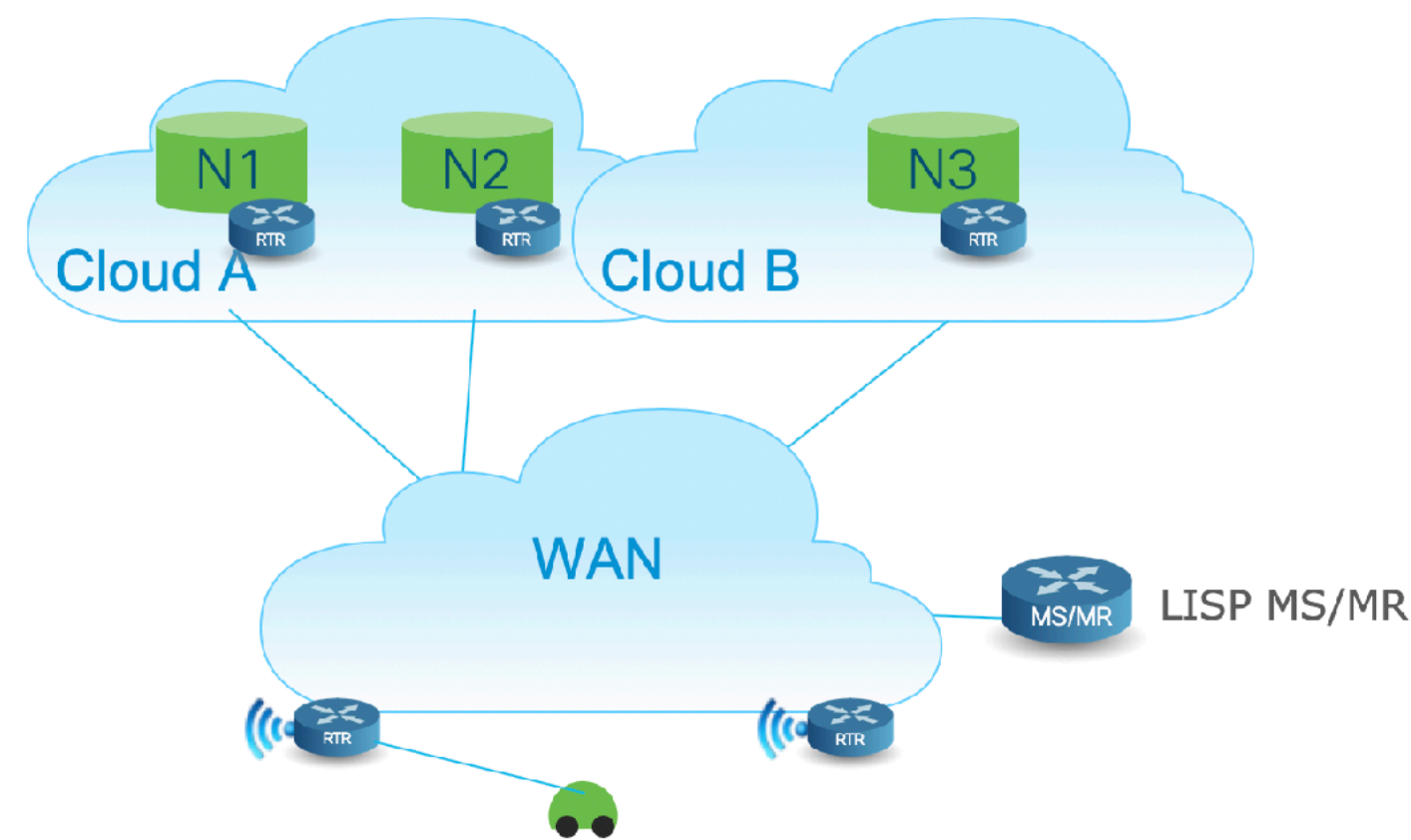


Sources: EY, ITU, TM Forum





# Value of LISP Edge



Source: Fabio Alberto Cisco

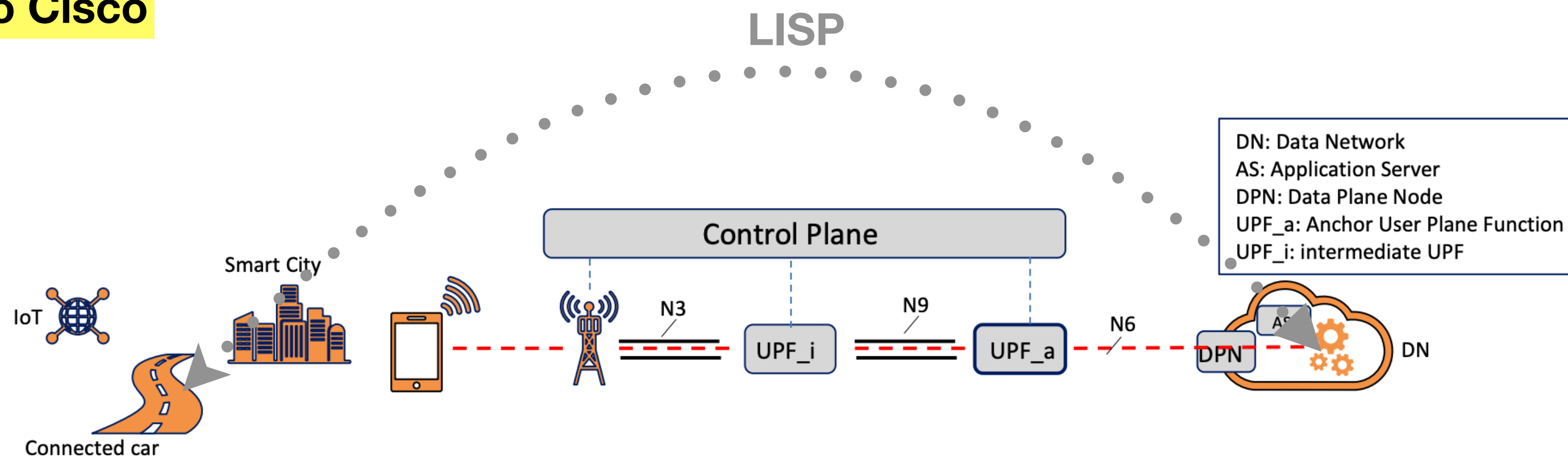
As part of ongoing Innovation work around Edge cloud we are looking into this Draft and supporting it.

- in the effort of CSP network to support smart-sensor data-sharing:
    - safety, predictive-maintenance, logistics, business-intelligence
    - on behalf of gov-muni, enterprises, and connected-car customers
  - CSPs faced two extreme options:
    - specialized narrow-focused, purpose-built DSRC/C-V2X mobility infrastructure
    - commodity hosting-connectivity of proprietary-fragmented per brand backends
  - nexagon geo-state-network standard allows us to offer stable 5G/LTE edge interface:
    - compile interoperable fresh-data from multiple sources per geo-state
    - streamline as-as-service to gov/ent/oem subscribers per application
1. We are working with both tech-companies / customers to position use-cases
  2. We have been show-casing low-latency brokered solutions offering safety
  3. Proving network-brokered edge relays alerts of breaches in sub 20 msec
  4. We support adoption of the nexagon draft as part of lisp virtual-ip standard
  5. Leverage ots edge routers for geo-state privacy, latency, security, subscription

Thanks,

Nir Hen  
Lead Innovation Coach

Source: Nir ATT Foundry@Dox



Source: Marco NEC

Privacy, Latency, Security, Subscription, Scoping, Sharding by LISP Routing  
MEC Slicing, Steering, CoS by EID Parsing, Gi N6 Routers <=> 5G EPC