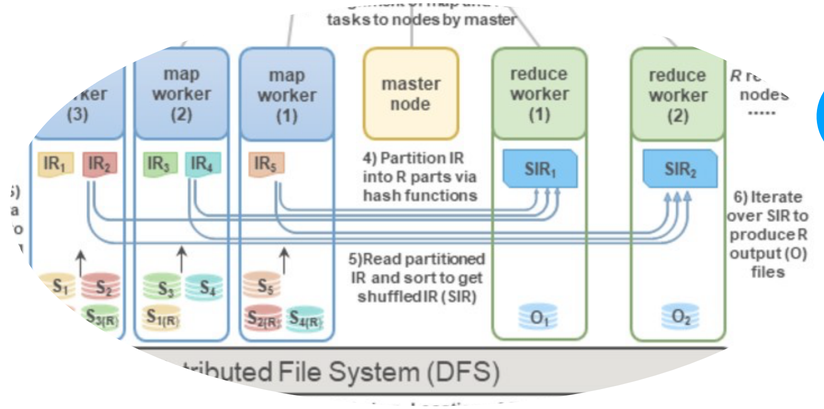
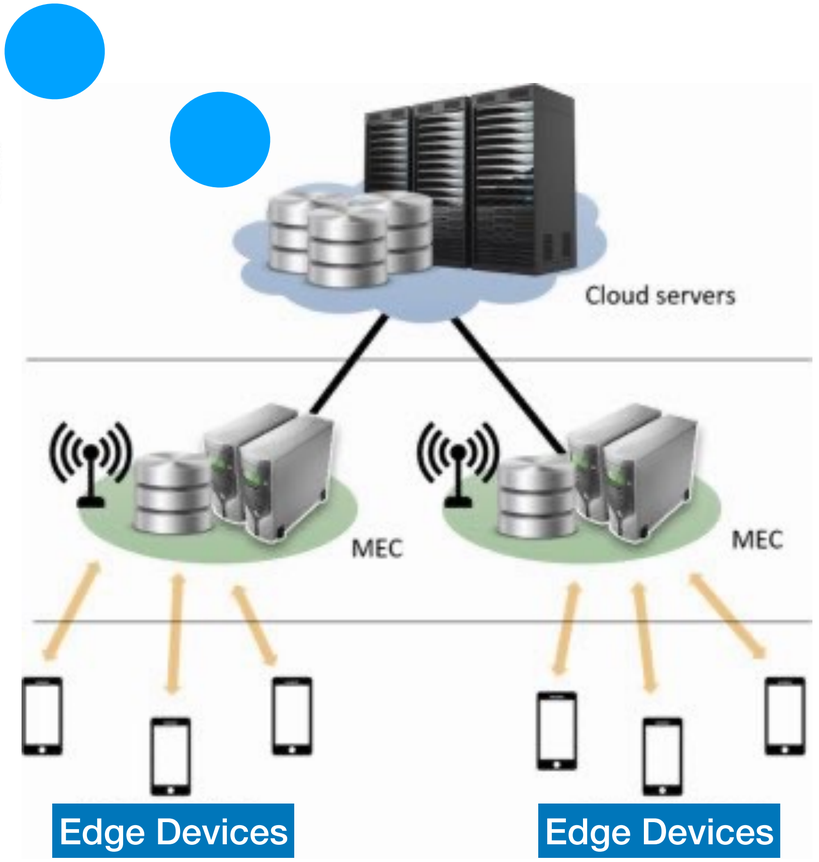
COIN-RG 109

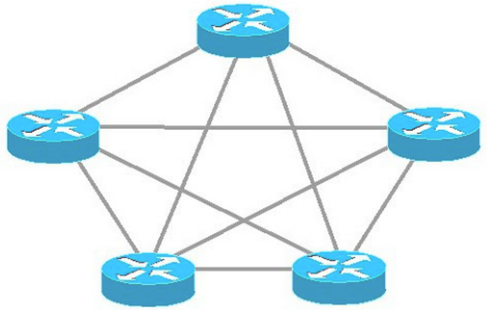
IETF-LISP-NEXAGON

Virtual Routing for AI Edge Reduction

AI to the Edge







Cloud:

- Data ➡️ Insights
- EMR/Spark Concurrency
- Spine-leaf Scatter-gather

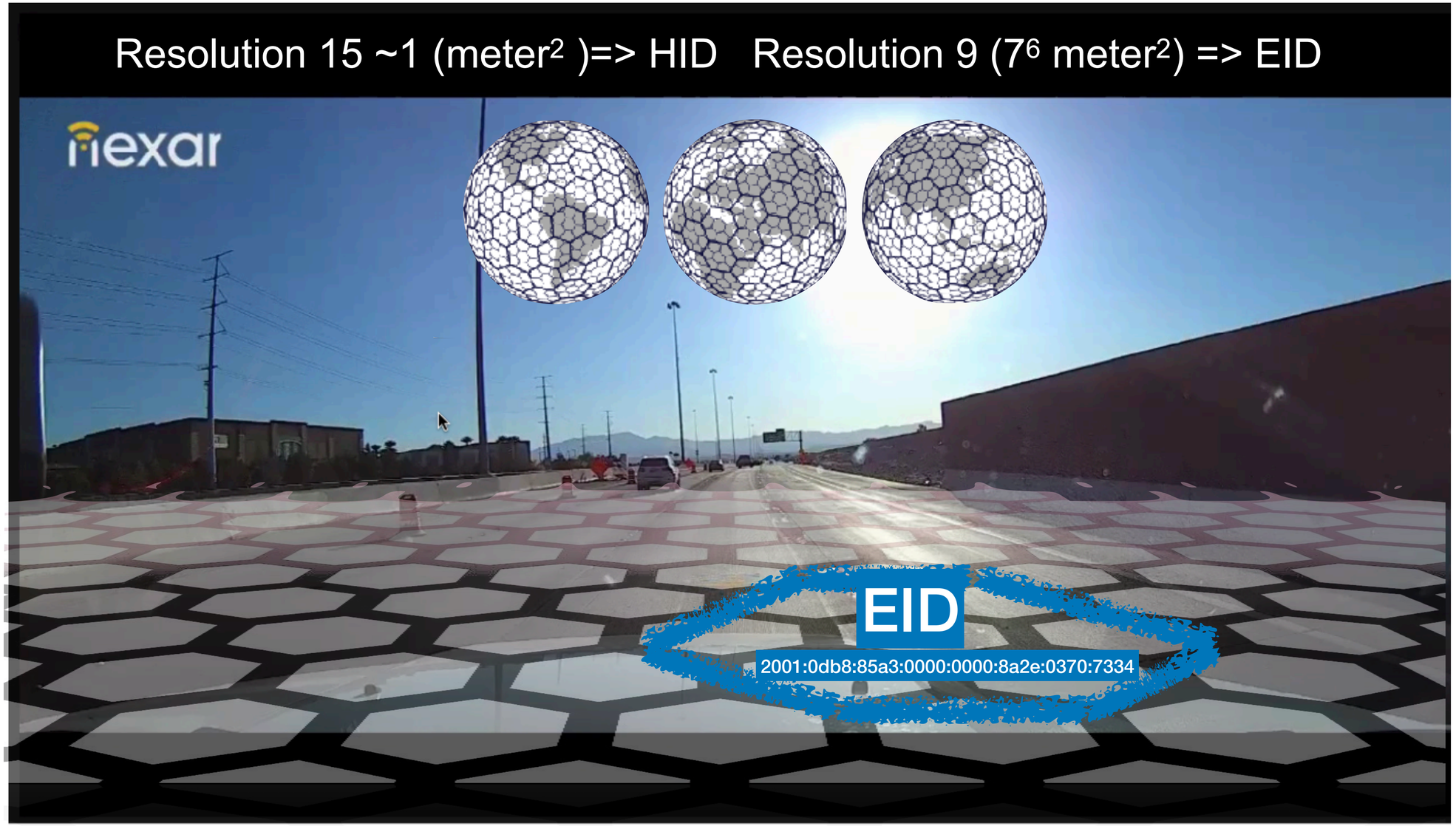
Edge

- SLA ➡️ Sub Sec
- Heavy fresh upload
- Commercial & Regulatory

Edge Alternatives Map Reduce Data →AI Insights

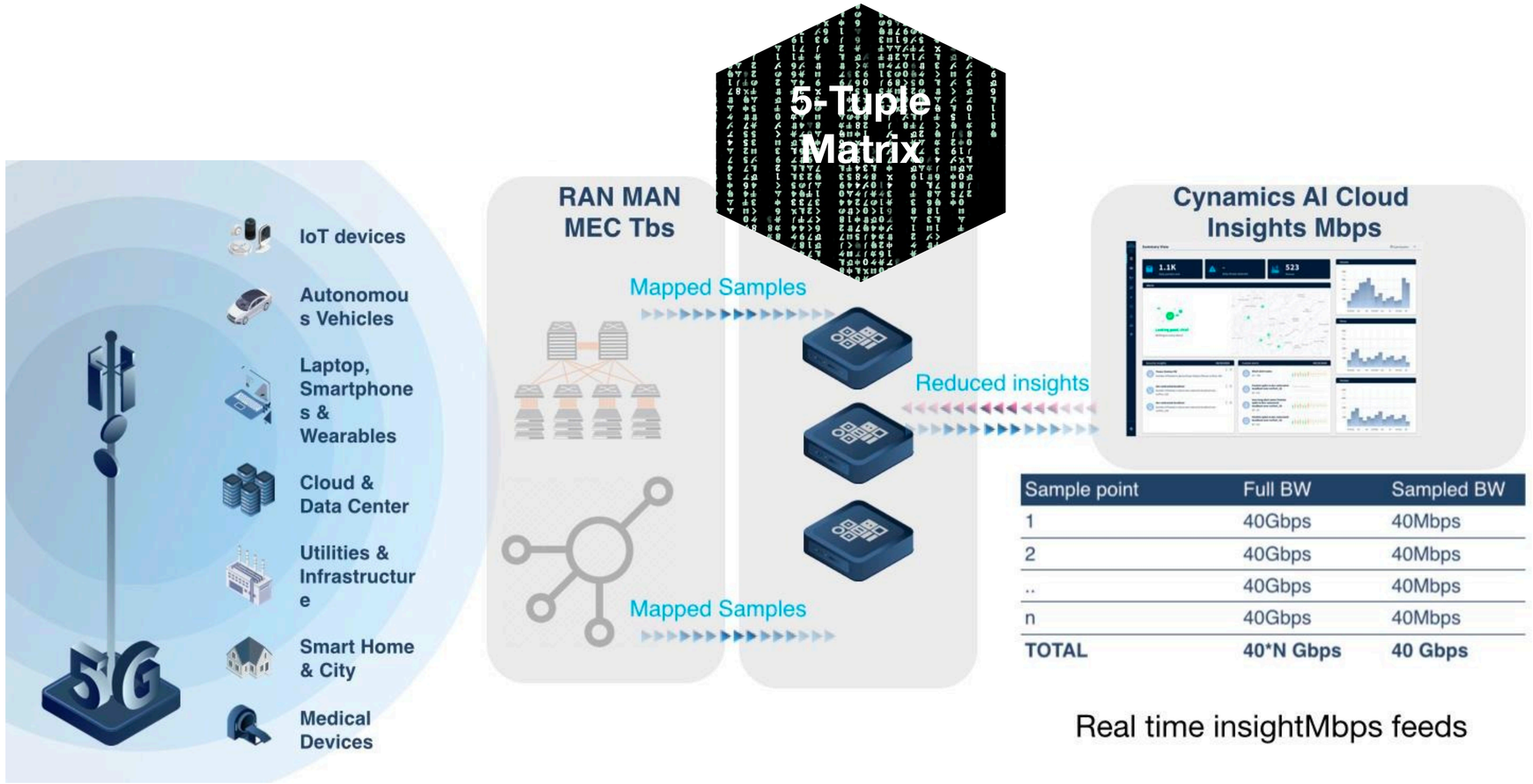
Auto Case Study

- ✓Volume
- ✓Responce
- ✓Costs
- ✓Constraints



Cyber Case Study

- ✓Volume
- ✓Responce
- ✓Costs
- ✓Constraints

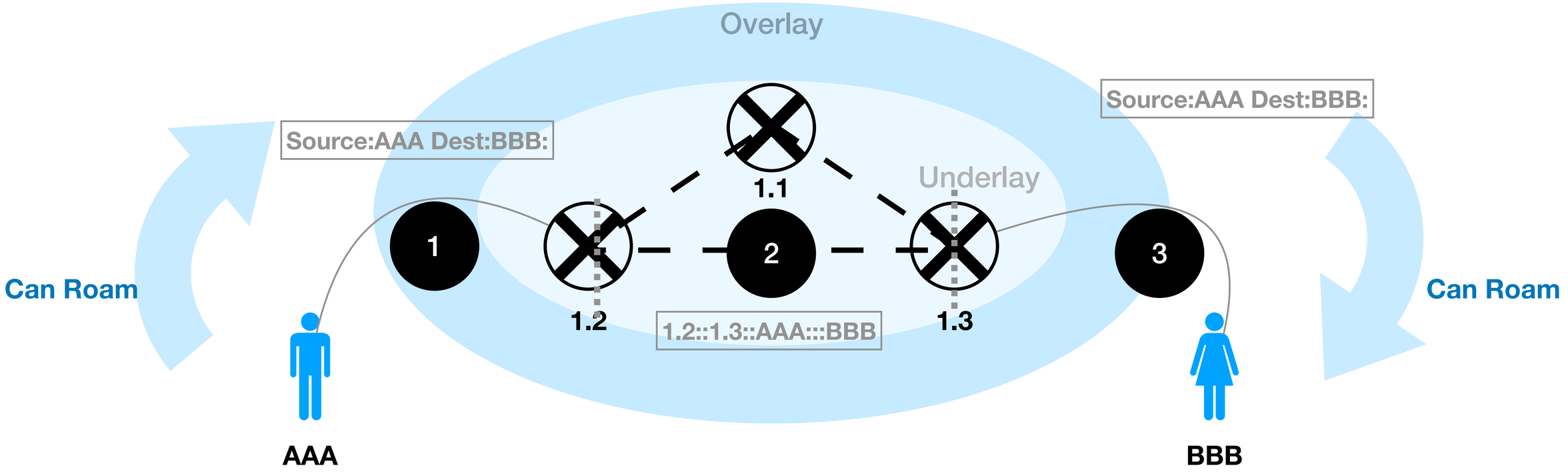


Sample point	Full BW	Sampled BW
1	40Gbps	40Mbps
2	40Gbps	40Mbps
..	40Gbps	40Mbps
n	40Gbps	40Mbps
TOTAL	**40*N Gbps**	**40 Gbps**

Real time insightMbps feeds

Virtual Routing 101: IP over UDP

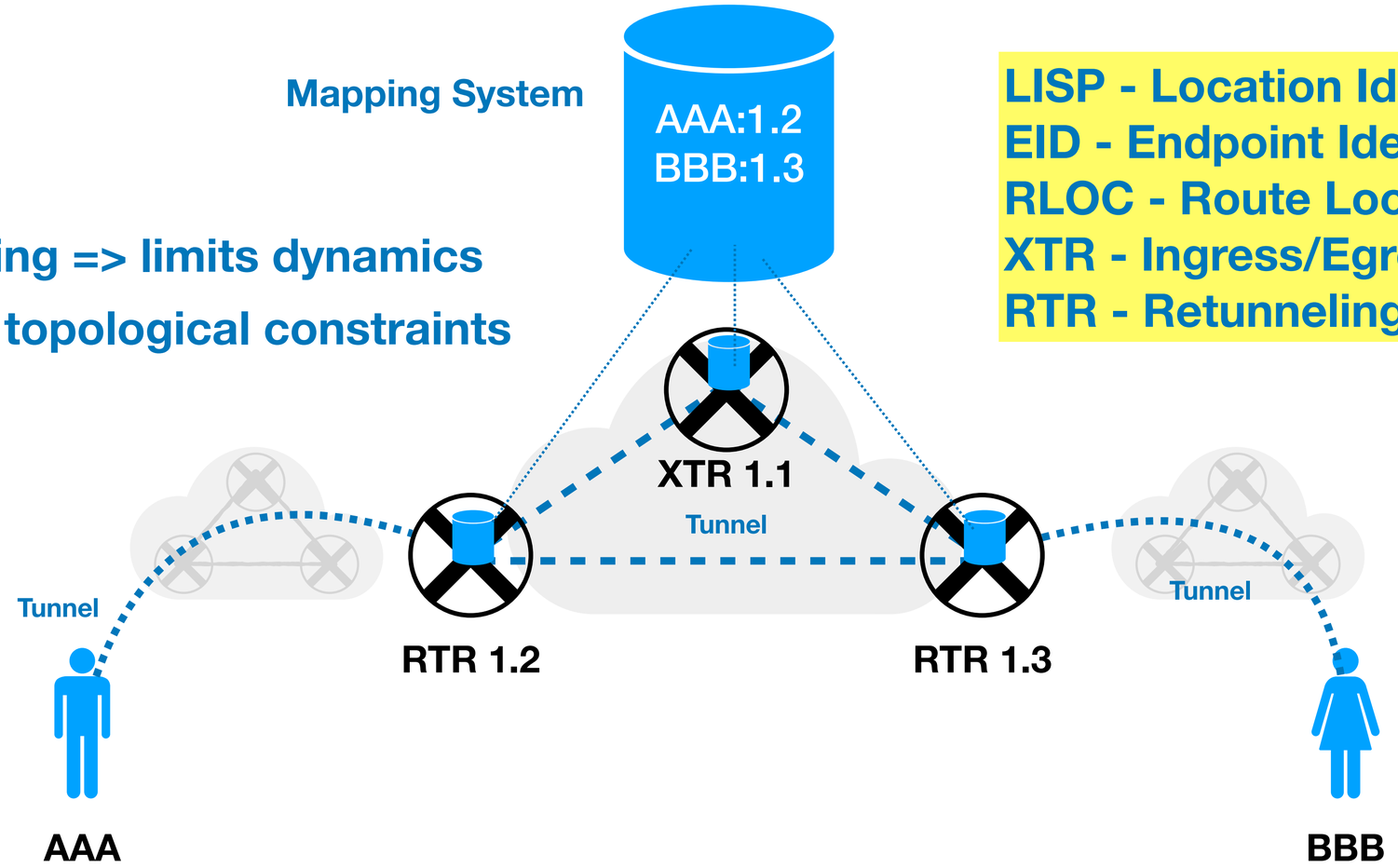
Basic Overlay Standards Specify Encapsulations, NOT How to Route in the Overlays



Use Tunnels to route two sets of addresses:
(1) Logical-Overlay (2) Topological-Underlay

LISP Overlay

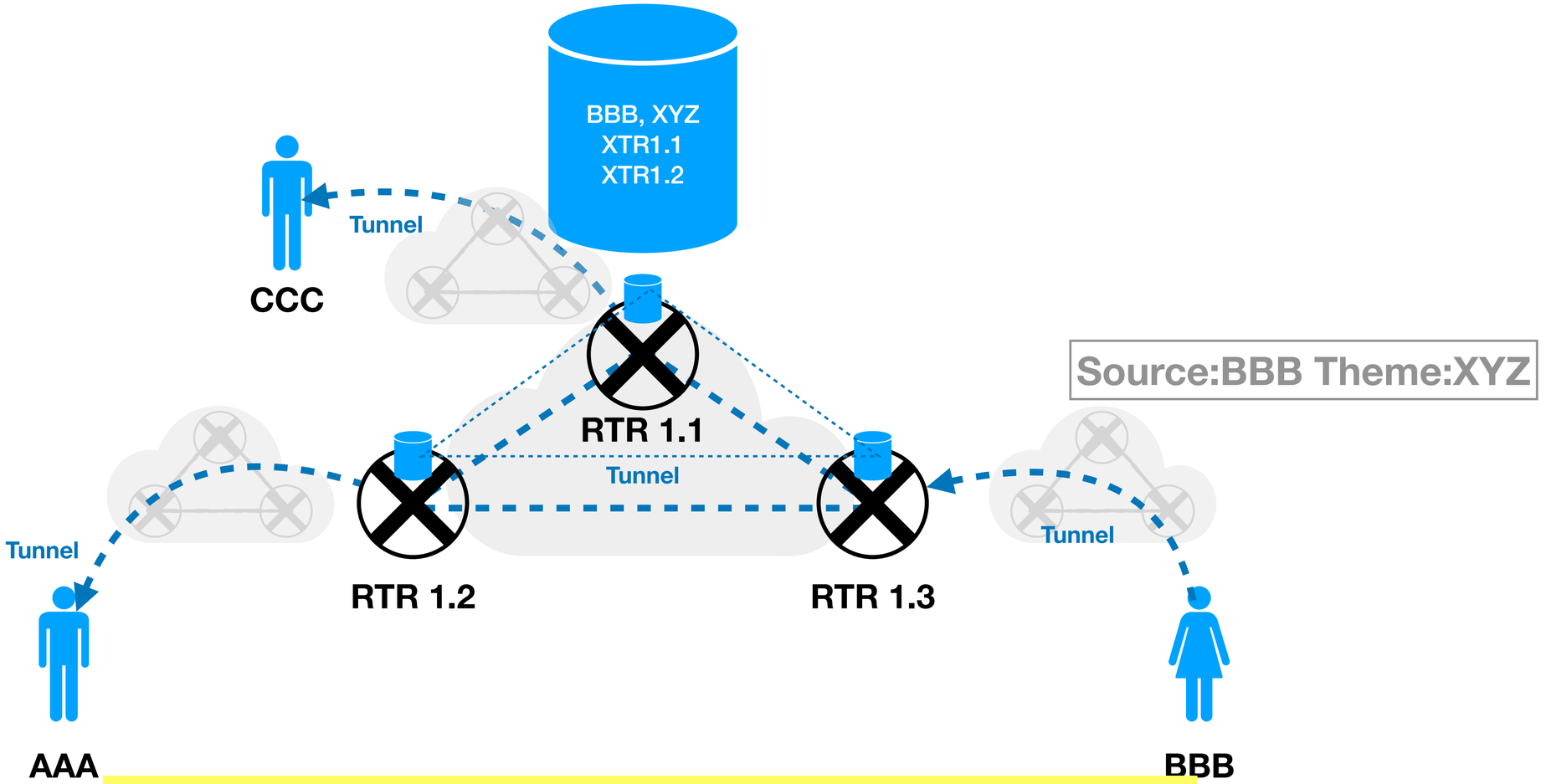
* Overlay route-peering => limits dynamics
* Existing routing => topological constraints



LISP - Location Identity Separation
EID - Endpoint Identifier (Logical)
RLOC - Route Locator (Topological)
XTR - Ingress/Egress Tunnel Router
RTR - Retunneling XTR (NAT/Mobile..)

Underlay ➡️ Scales Mapping System
EIDs => Routed Context, Map-Reduce Index

Signal-Free Multicast



Mapping ➡️ Signal Free Multicast

Scales: Ms of feeds to Ks of clients each

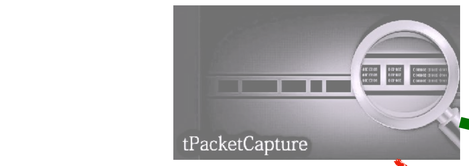
Communications Matrix EIDs

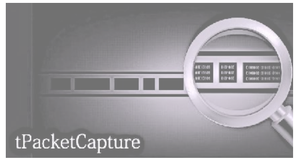
dotCom dotOrg dotGov dot.IO

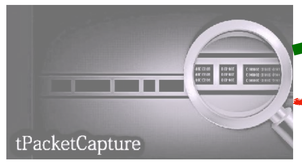
VPC1 VPC2 VPC3 VPC4

5 Tupple masks EIDs

Sflow/IPFIX







EID = dotGov X marketing.XYZ

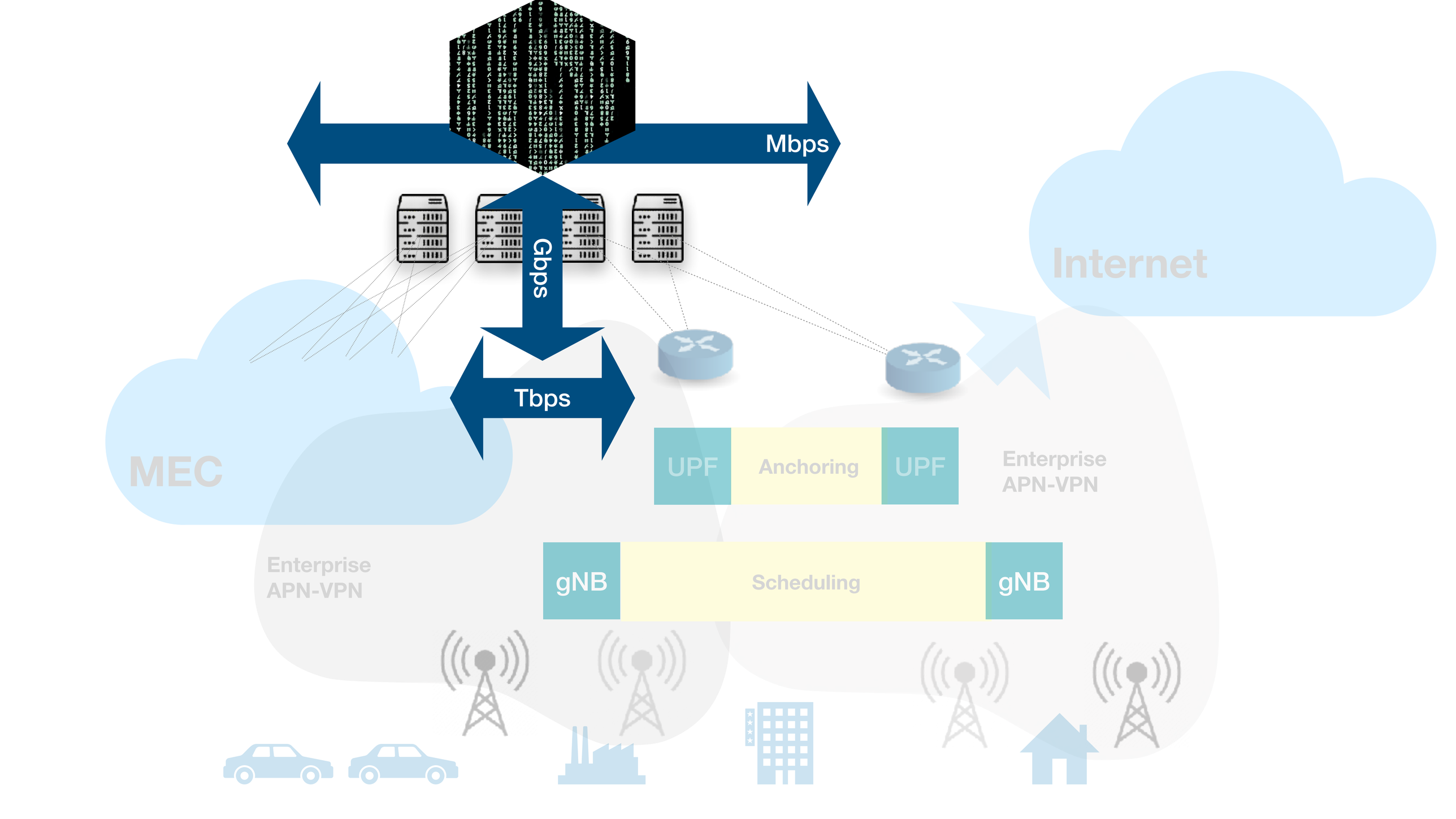
f(..)

f(..)

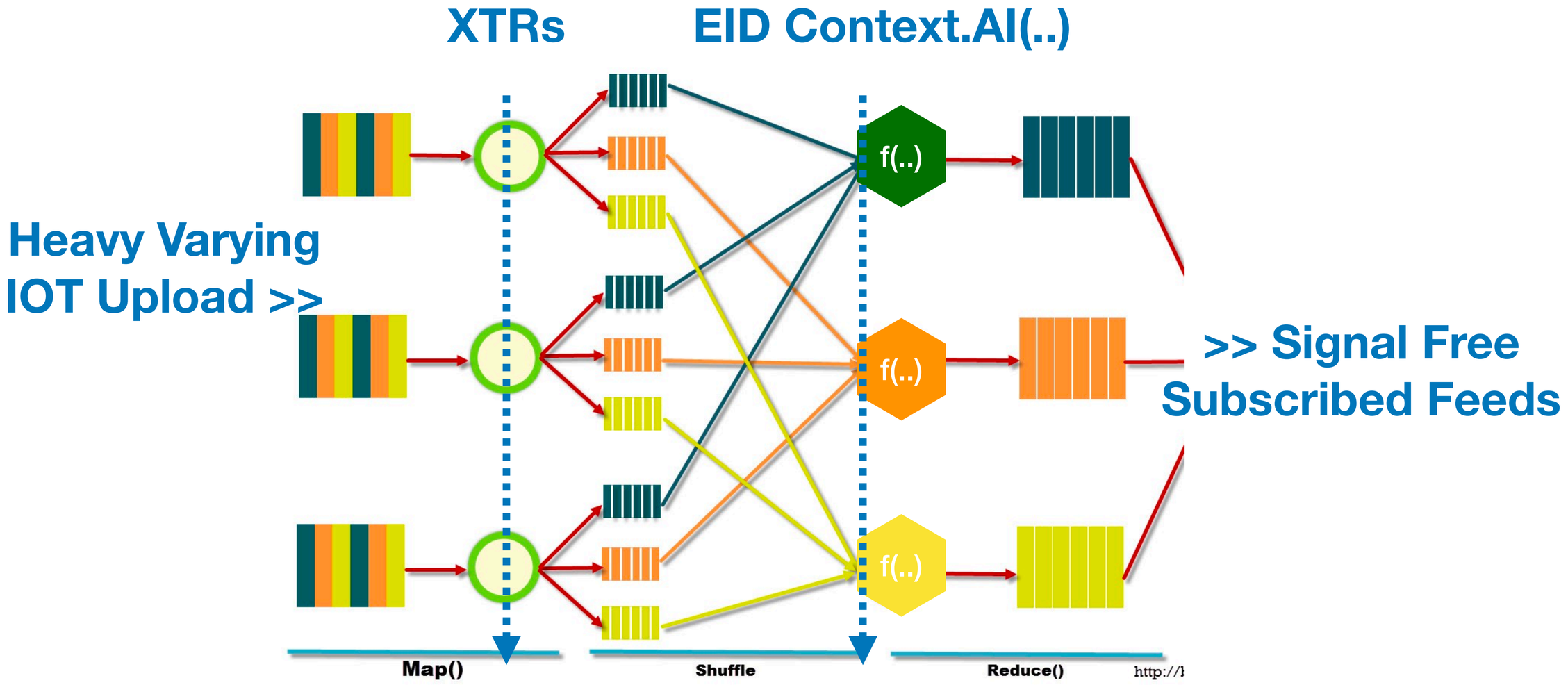
EID: 2001:0db8:85a3:0000:0000:8a2e:0370:7334

marketing.XYZ.com
Subnet 1
.
.
Subnet X
engineering.XYZ.com
1
.
.
Y
manufacturing.XYZ.com
1
.
.
Z

Attacks and Stats Feeds


Mbps
Gbps
Tbps
Internet
MEC
UPF
Anchoring
UPF
Enterprise
APN-VPN
Enterprise
APN-VPN
gNB
Scheduling
gNB

The Pattern


XTRs
EID Context.AI(..)
Heavy Varying
IOT Upload >>
f(..)
f(..)
f(..)
>> Signal Free
Subscribed Feeds
Map()
Shuffle
Reduce()

Auto Dynamic Big Data

AUTOMOTIVE EDGE COMPUTING CONSORTIUM

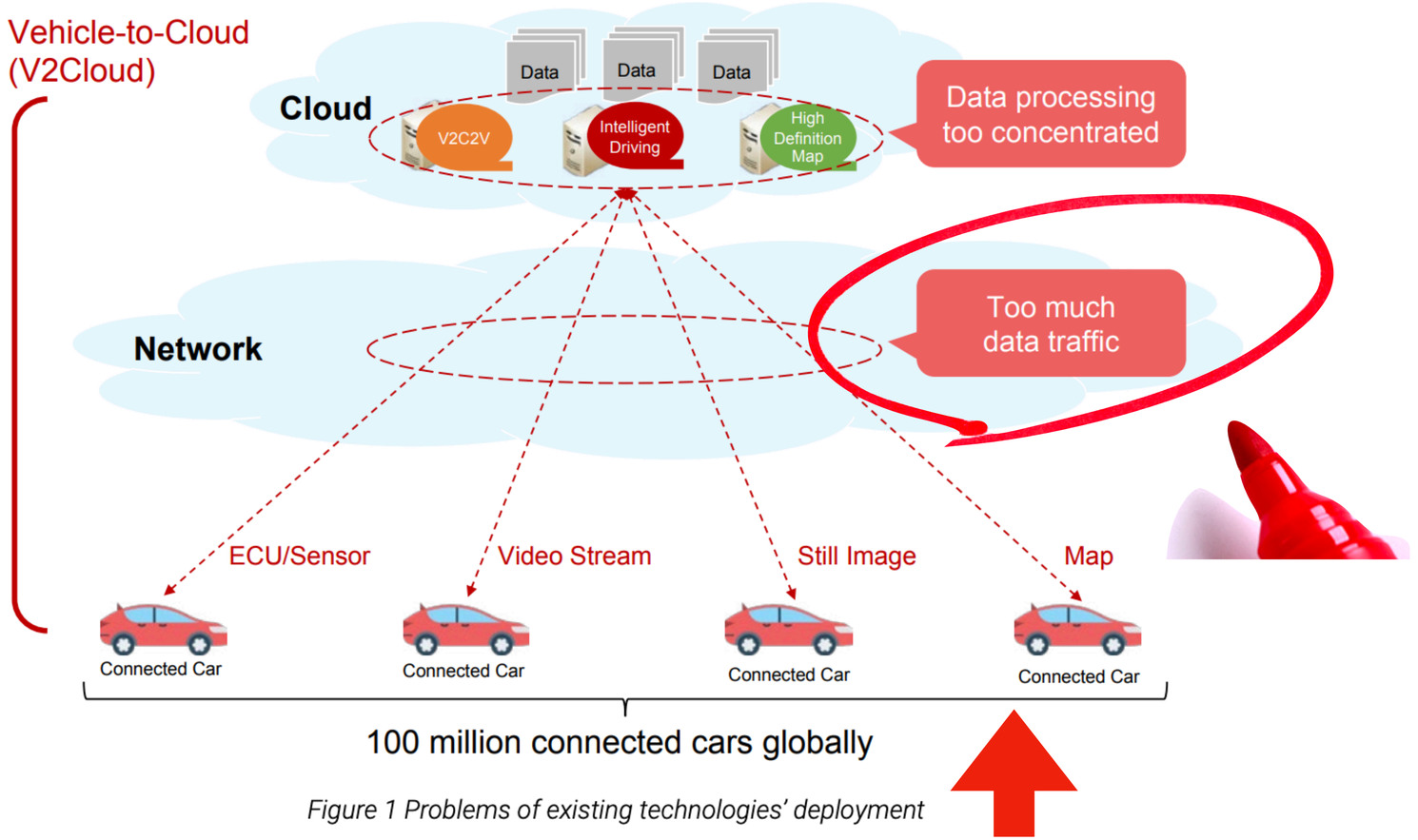
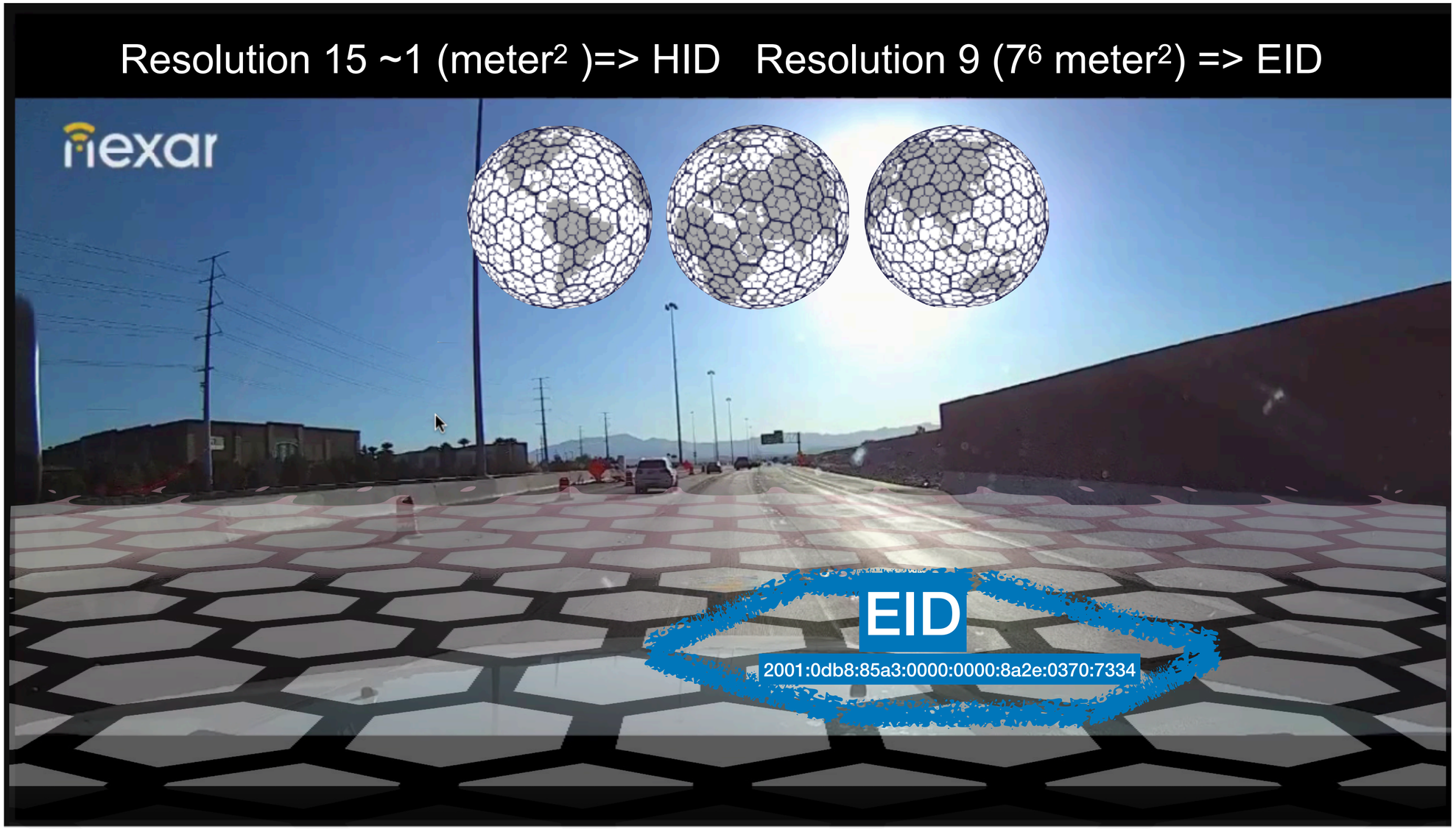


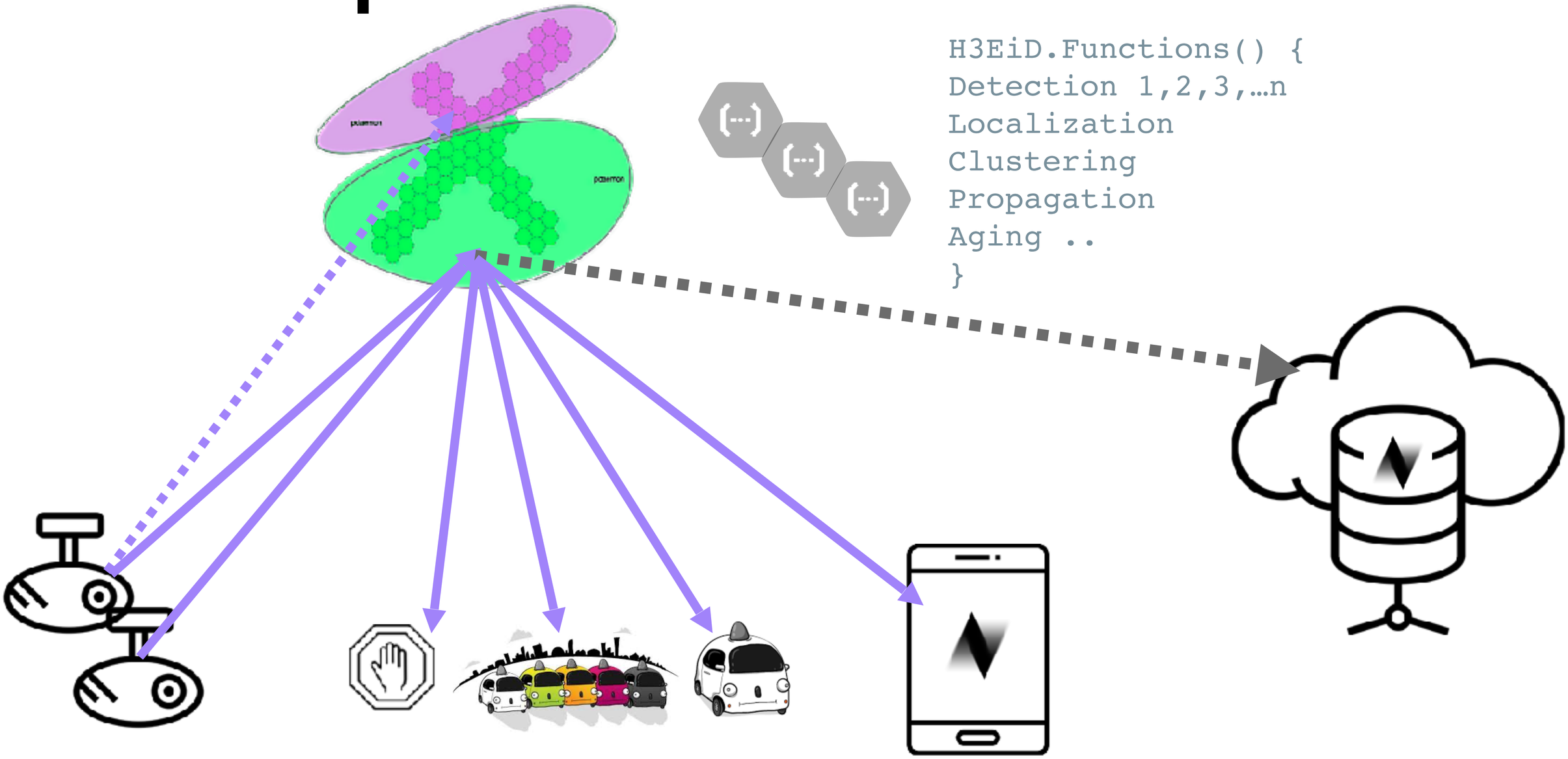
Figure 1 Problems of existing technologies' deployment

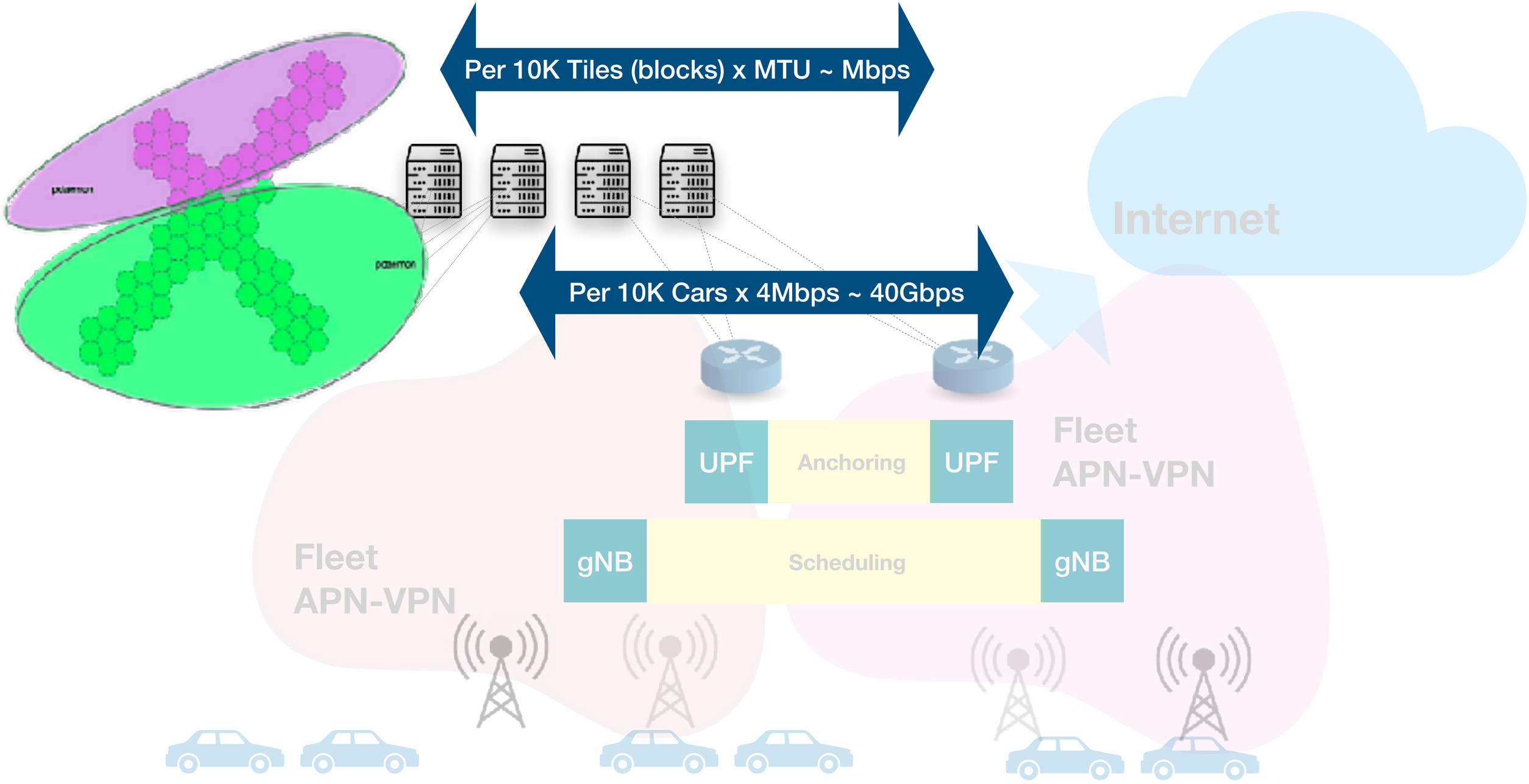
Heavy Fresh Vision & Sensory Continues Upload

Physical World EIDs

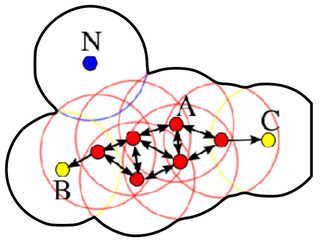


Map-Reduced to Feeds

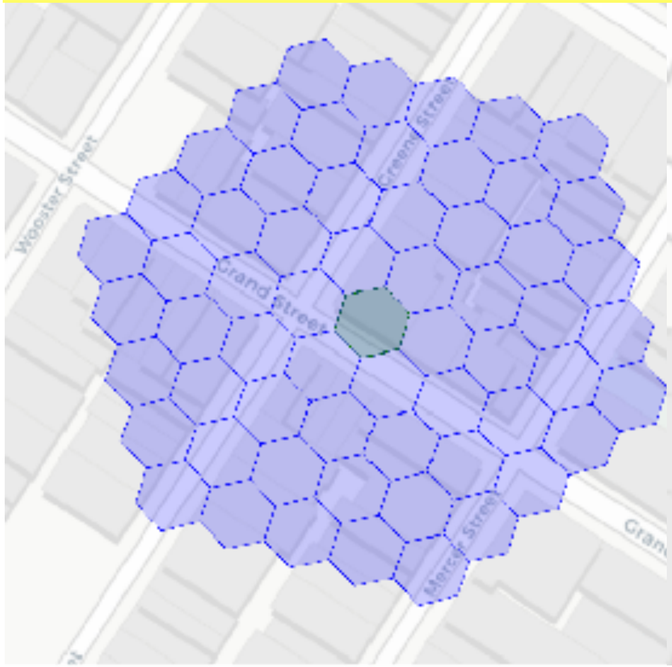


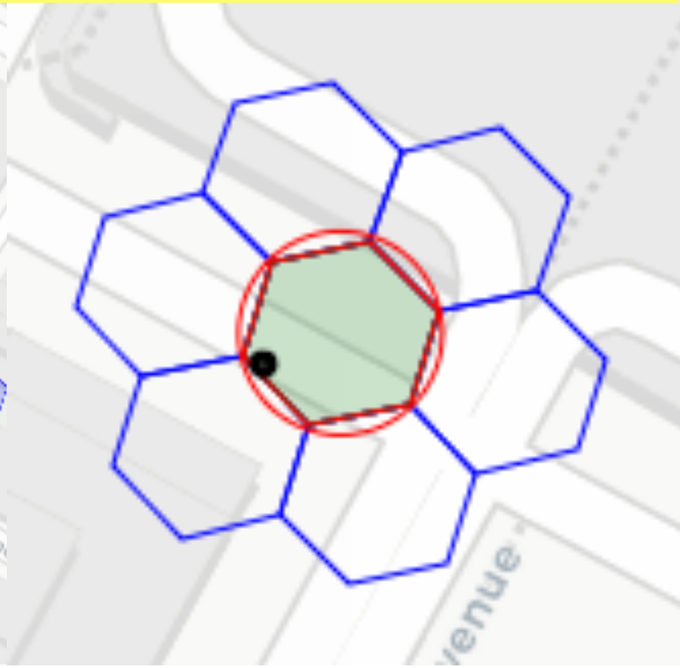

Per 10K Tiles (blocks) x MTU ~ Mbps
Per 10K Cars x 4Mbps ~ 40Gbps
Internet
UPF
Anchoring
UPF
Fleet
APN-VPN
gNB
Scheduling
gNB
Fleet
APN-VPN

Functional Reduction: EID.Context::AI(..)

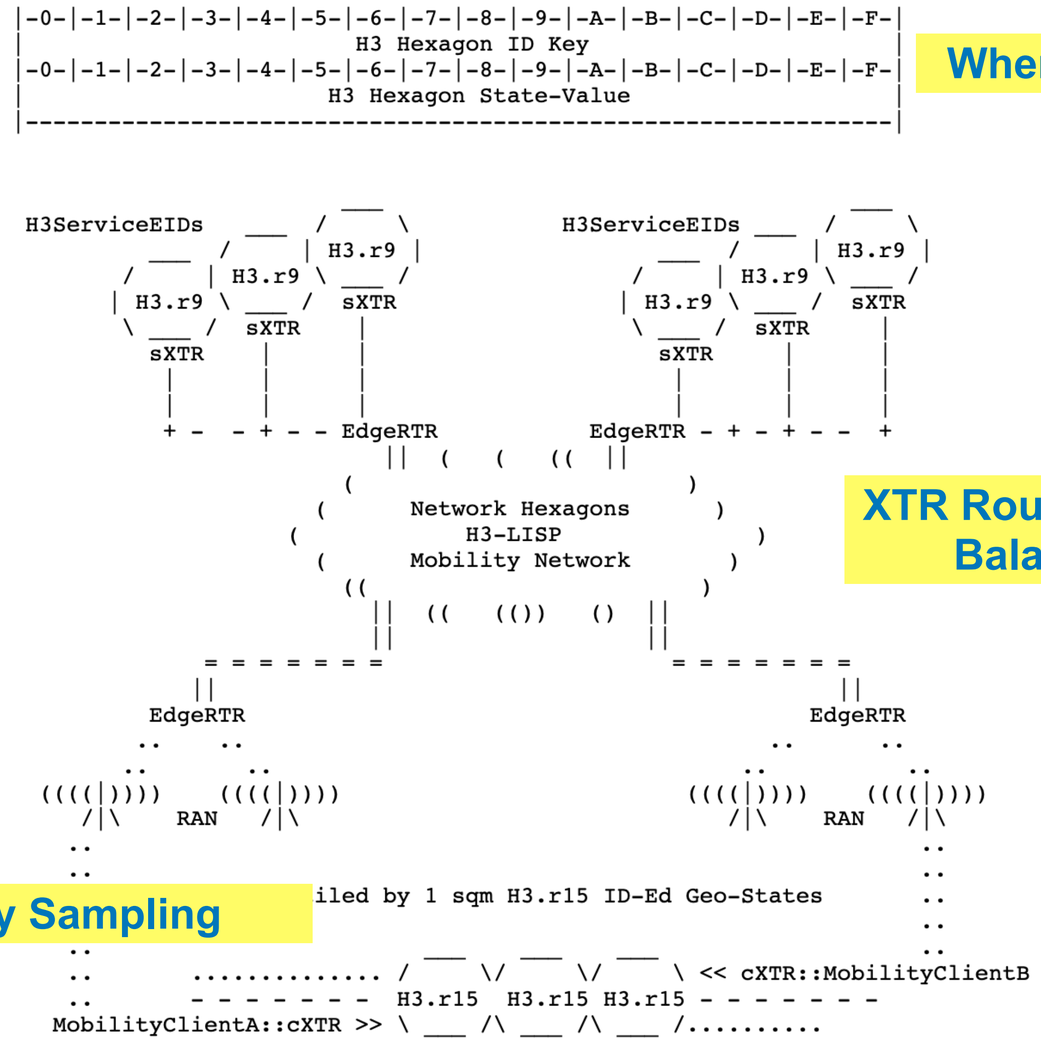


Context: DBScan, Simplex coalescing, Homography, Visual localization
Change detection, Lane number, Traffic direction, neighboring tiles …





Interoperable Off-The-Shelf



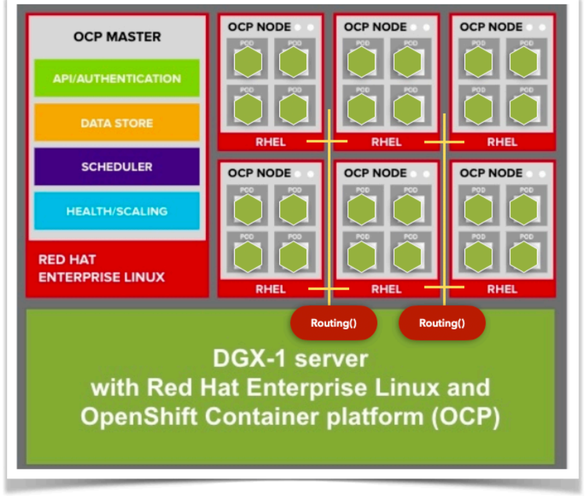
Where/What Reduced Feed Per Context EID

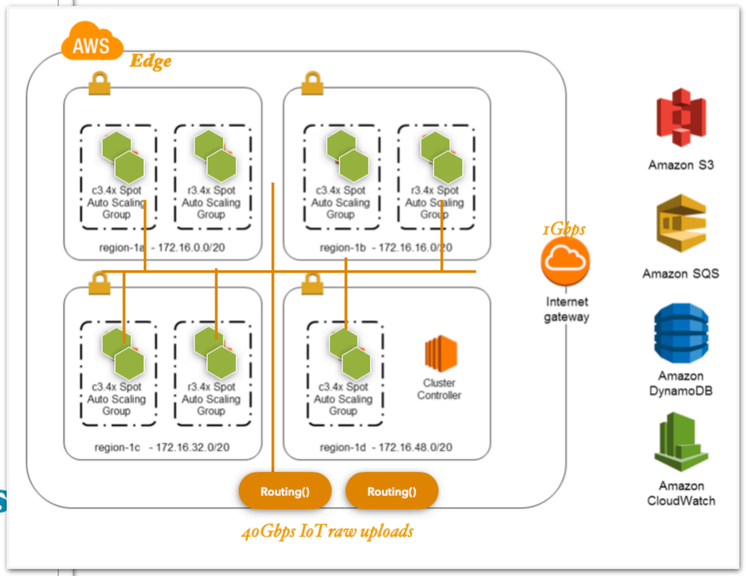
XTR Routing => Deployment Scaling
Balancing, H/A, Protections

Street Vision & Sensory Sampling

Routed HPC Edge

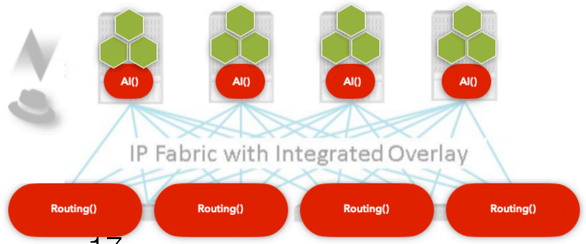
- Engage high concurrency GPU machines
- Choose best upload aggregation points
- Choose best GPU economics for the task
- Comply with private premise constraints





Portable AI Network Nodes

Each node aggregates IoT vision & sensory and generates geo-spatial feeds. Feeds consist of verified current state and latest filtered frames per geo-location. Feeds are available to mobile clients, driving & parking apps, command & control. Feed can be uploaded to cloud databases for history, trends, and deeper queries. Each node facilitates protected sandboxed hosted **feed-taps** for enterprise specific data derivatives.



EID Routing for COIN AI Edge

1. ***EID Context***: Natively source-routable logical data-index
2. ***XTR Map***: Edge aggregation steers raw uploads to EIDs
3. ***Lambda AI Reduce***: Apply EID.context::functions(raw data)
4. ***MLD Subscribe***: to portable [Source, Theme] EID feeds
5. ***Scales:*** Ms of feeds via standard Signal-Free Multicast

RFC6830 RFC 8378 draft-ietf-lisp-nexagon-06
draft-ietf-lisp-rfc6830bis-35 draft-ietf-lisp-rfc6833bis-29

Thank You