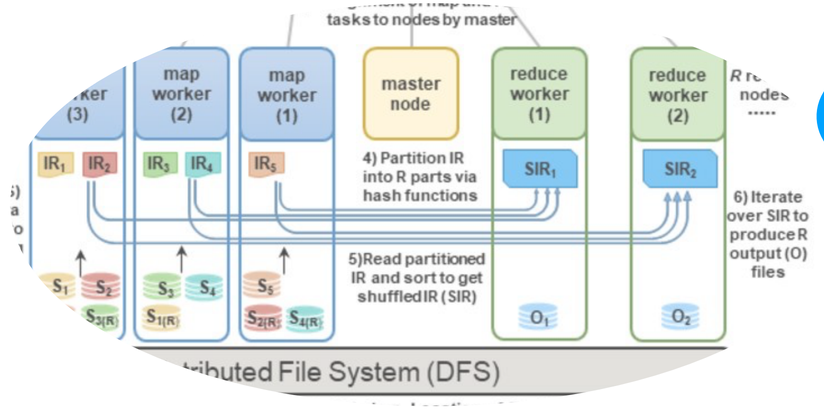
COIN-RG 109

IETF-LISP-NEXAGON

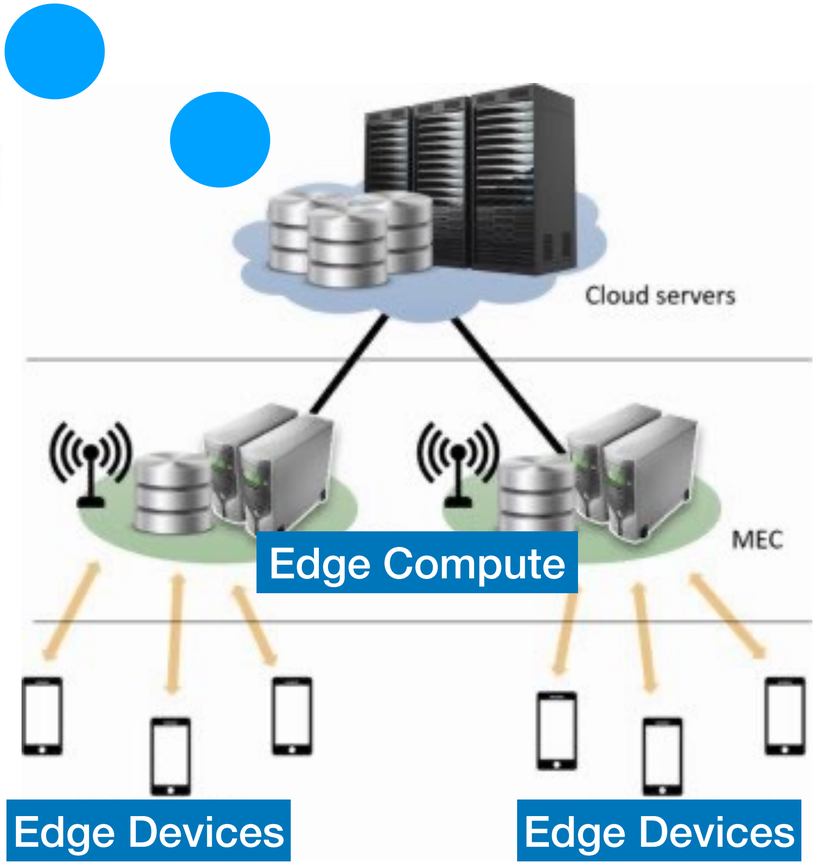
Virtual Routing for AI Edge Reduction

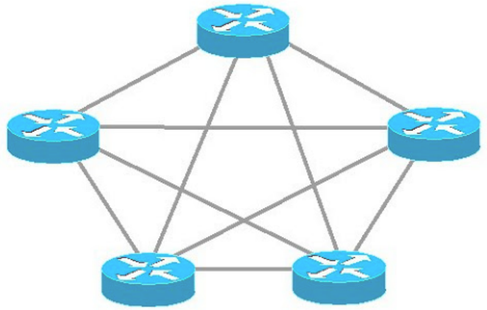
AI to the Edge



Cloud AI map-reduce:

- Raw data sampling => insights
- High EMR/Spark concurrency
- Spine-leaf Scatter-gather workloads



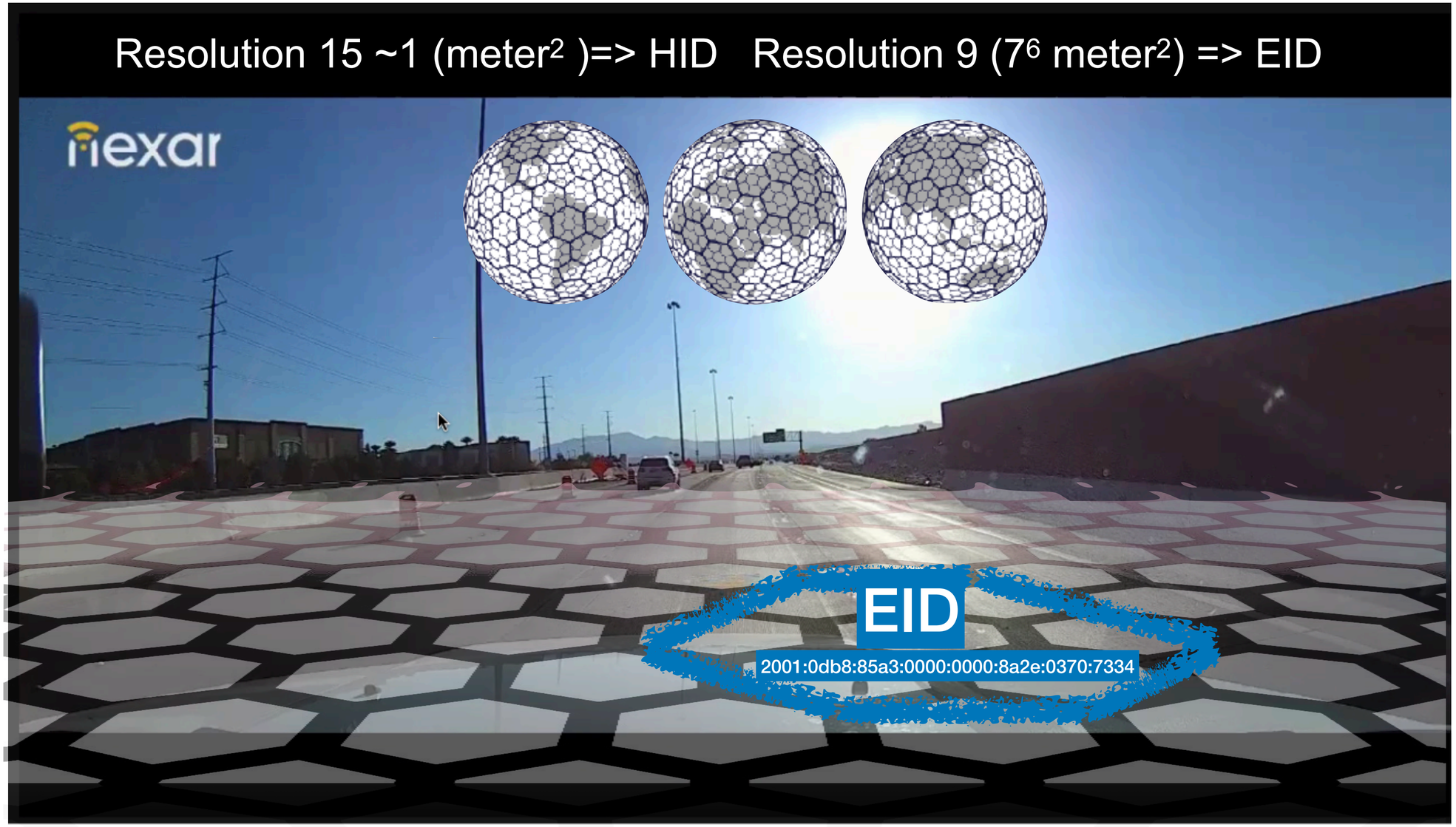


Edge Network Aggregation:

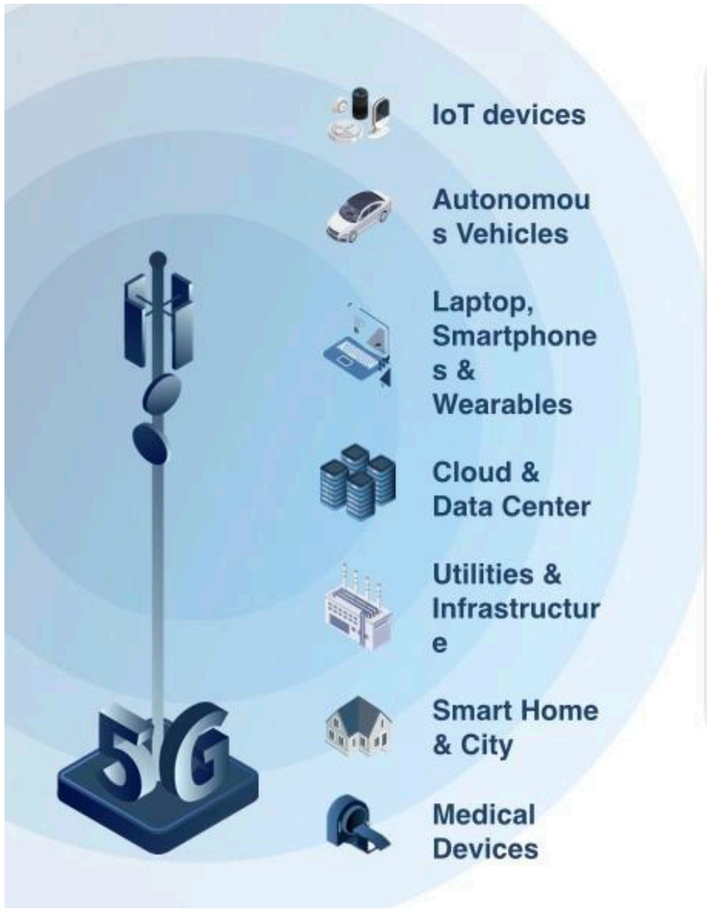
- Sub-sec SLA use-cases
- Scale heavy fresh upload
- Leverage GPU economics
- Regulatory and commercial

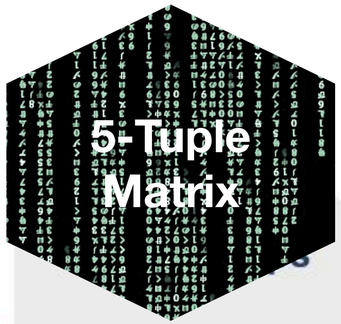
Edge Alternatives to Map IOT Samples Reduce to AI Insights

Auto Case Study



Cyber Case Study





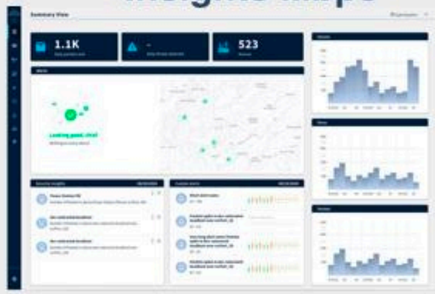
RAN MAN
MEC Tbs

Mapped Samples

Reduced insights

Mapped Samples

Cynamics AI Cloud
Insights Mbps

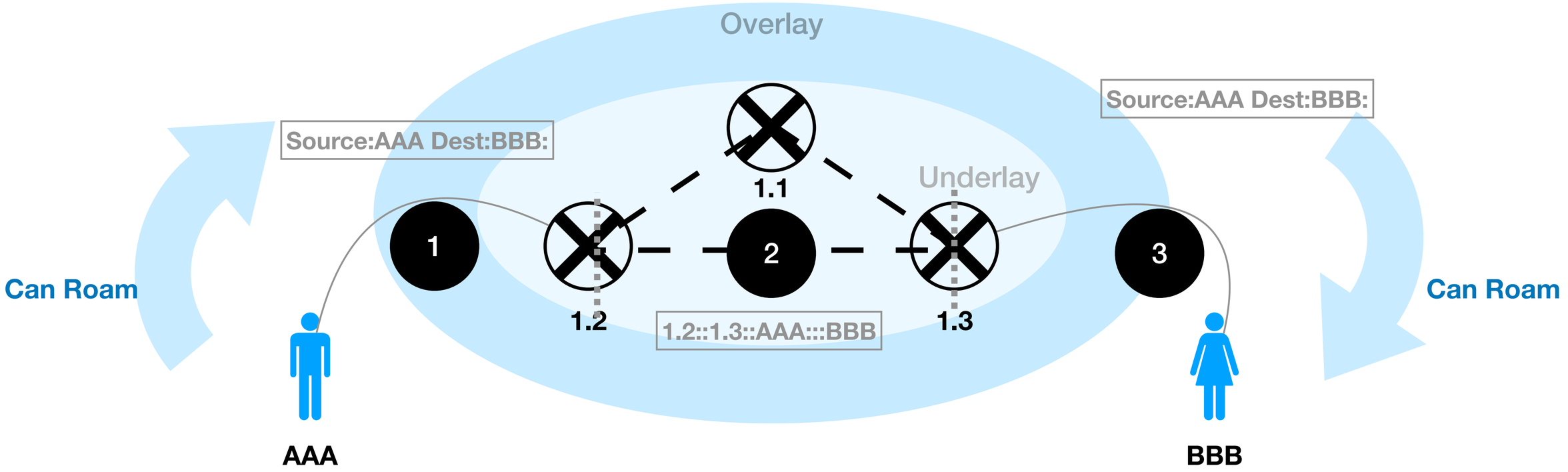


Sample point	Full BW	Sampled BW
1	40Gbps	40Mbps
2	40Gbps	40Mbps
..	40Gbps	40Mbps
n	40Gbps	40Mbps
TOTAL	**40*N Gbps**	**40 Gbps**

Real time insightMbps feeds

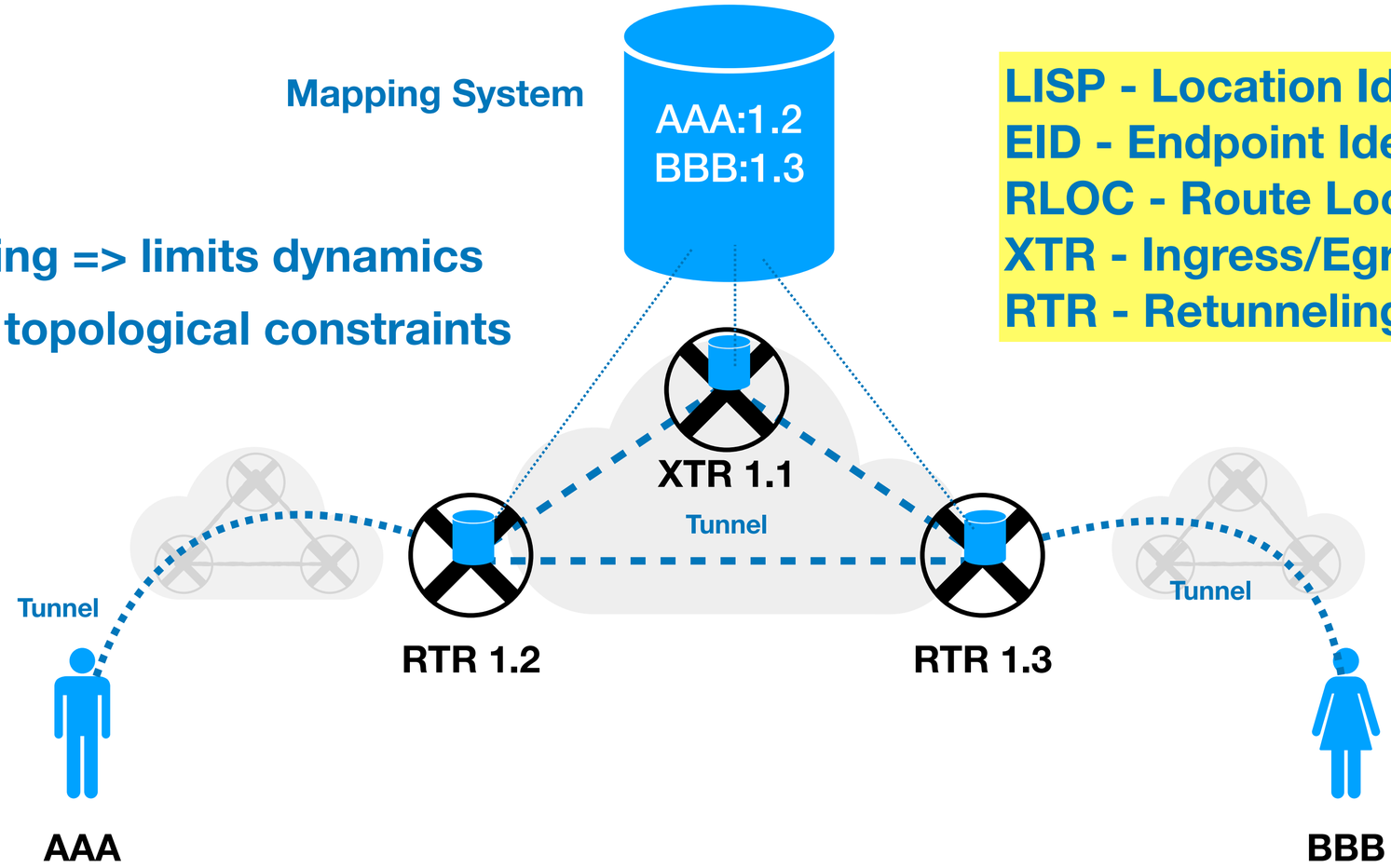
Virtual Routing 101: IP over UDP

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

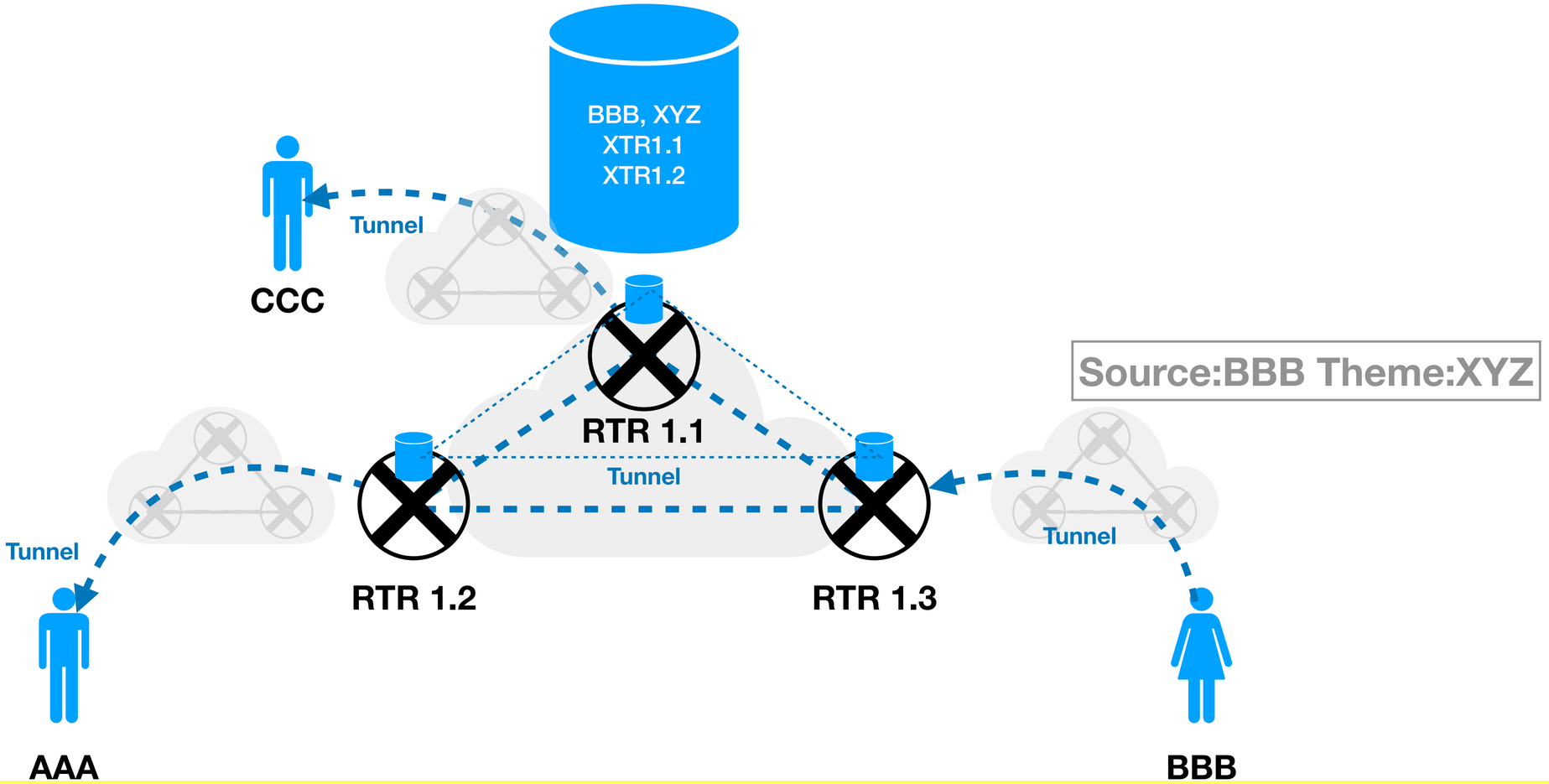


* Overlay route-peering => limits dynamics
* Existing routing => topological constraints

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

IP Underlay Scales Mapping System: logical EIDs => any RLOC
EIDs functions as => Map-Reduce Context and Routed Data index

Signal-Free Multicast



We can use mapping systems for Signal Free multicast
Scales to millions map-reduced scoped feeds to thousands of clients each

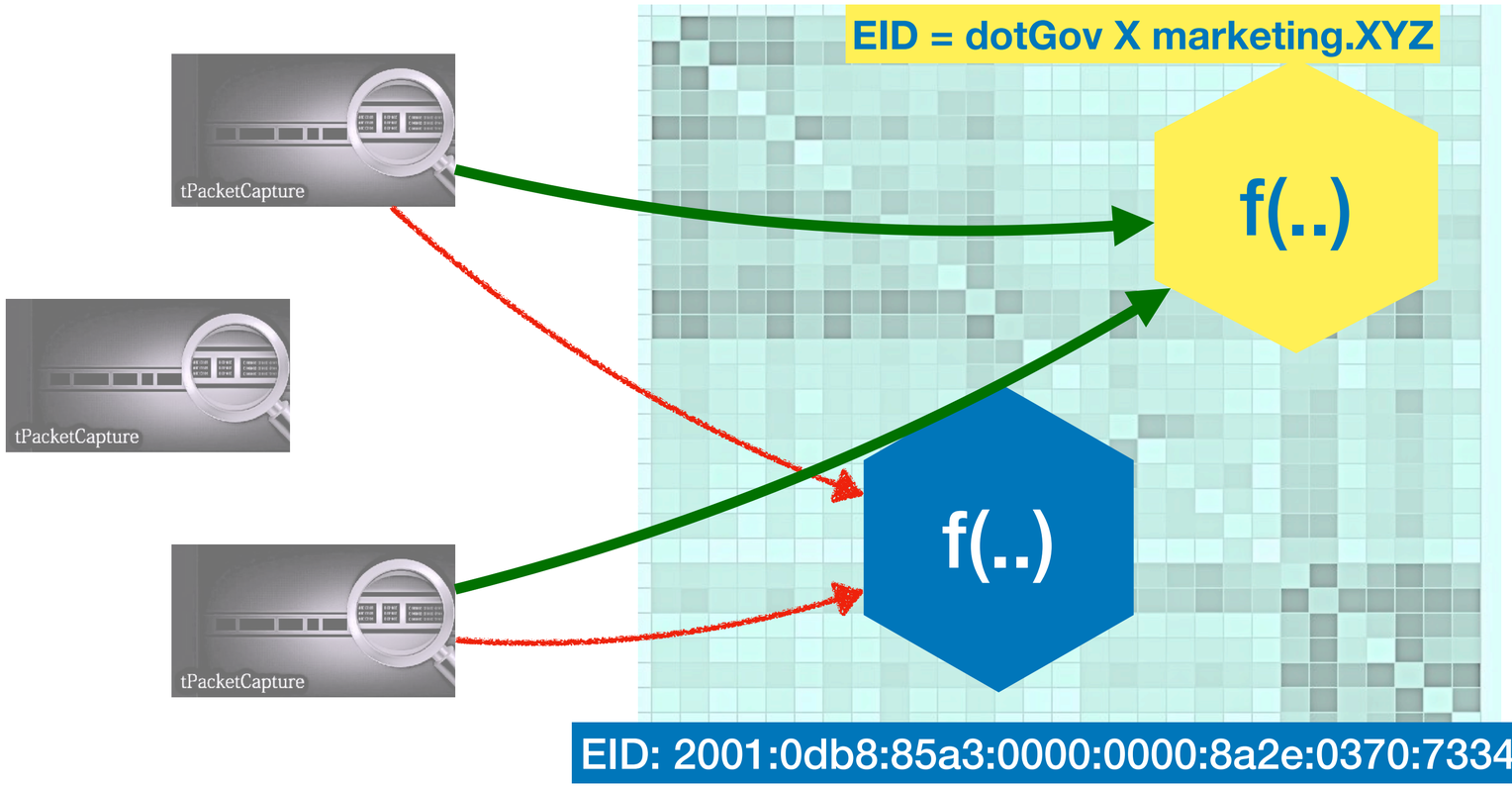
Communications Matrix EIDs

dotCom dotOrg dotGov dot.IO

VPC1 VPC2 VPC3 VPC4

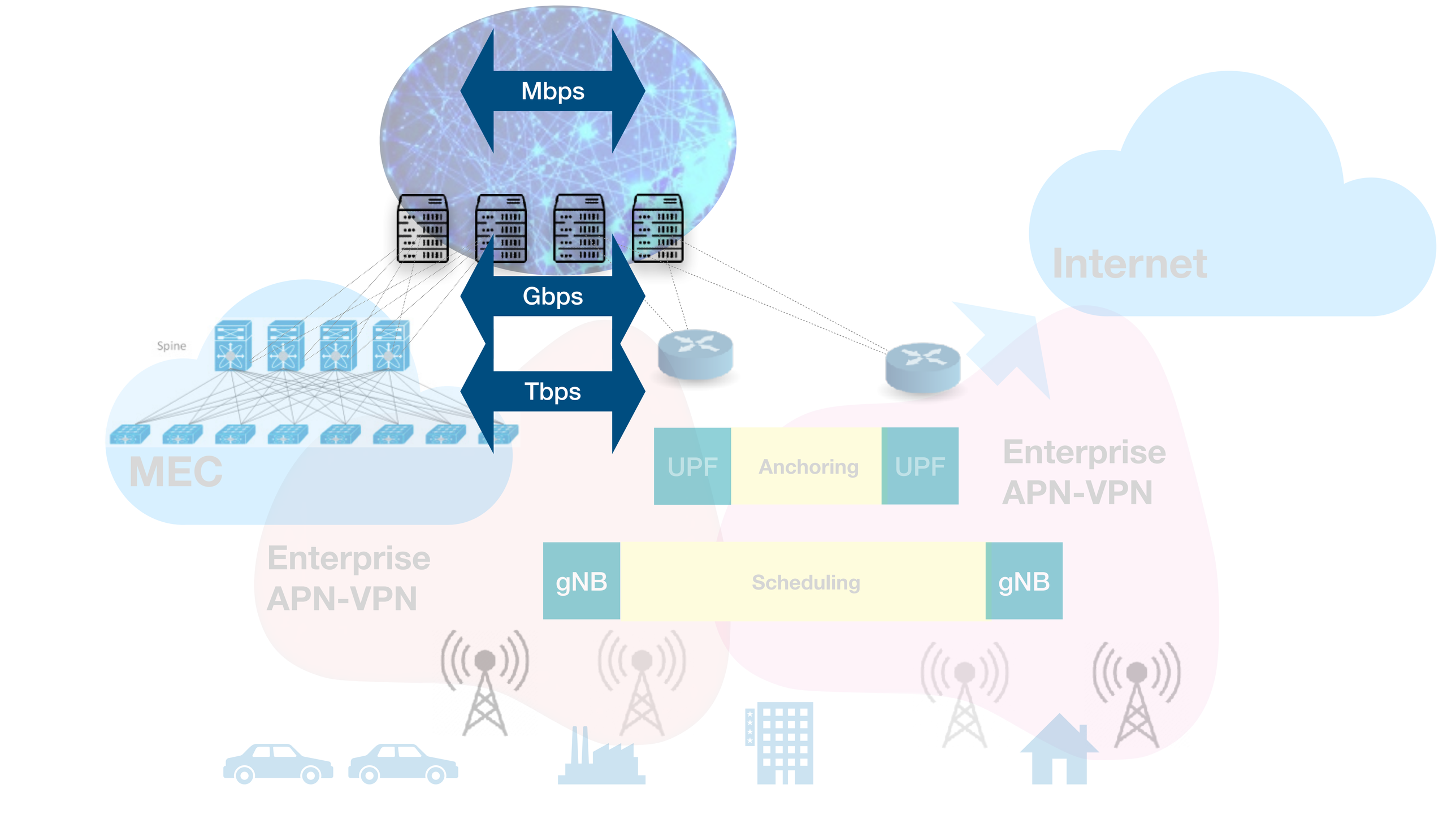
5 Tupple masks EIDs

Sflow/IPFIX Sampling

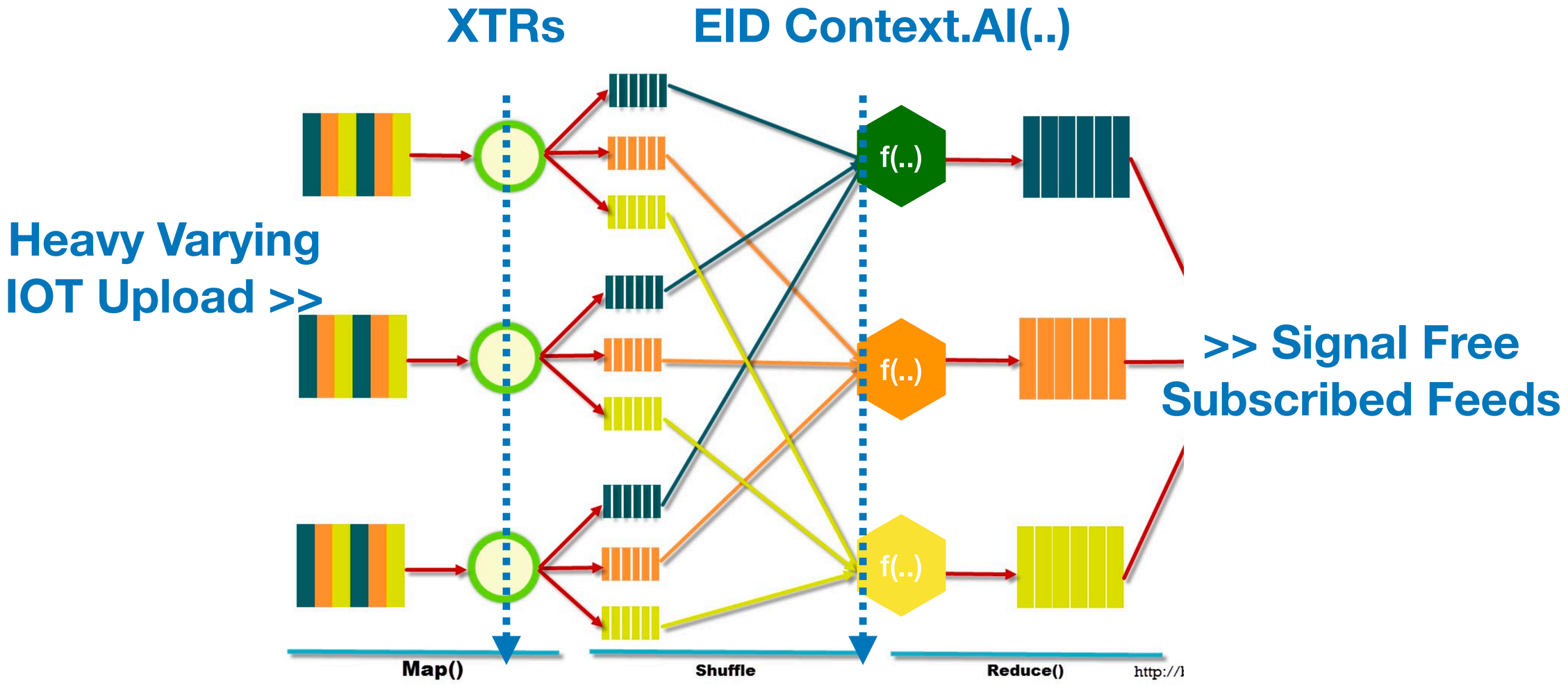


marketing.XYZ.com
Subnet 1
.
.
Subnet X
engineering.XYZ.com
1
.
.
Y
manufacturing.XYZ.com
1
.
.
Z

Attacks and Stats Feeds


Mbps
Gbps
Tbps
Internet
Spine
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()

Automotive

AUTOMOTIVE EDGE COMPUTING CONSORTIUM

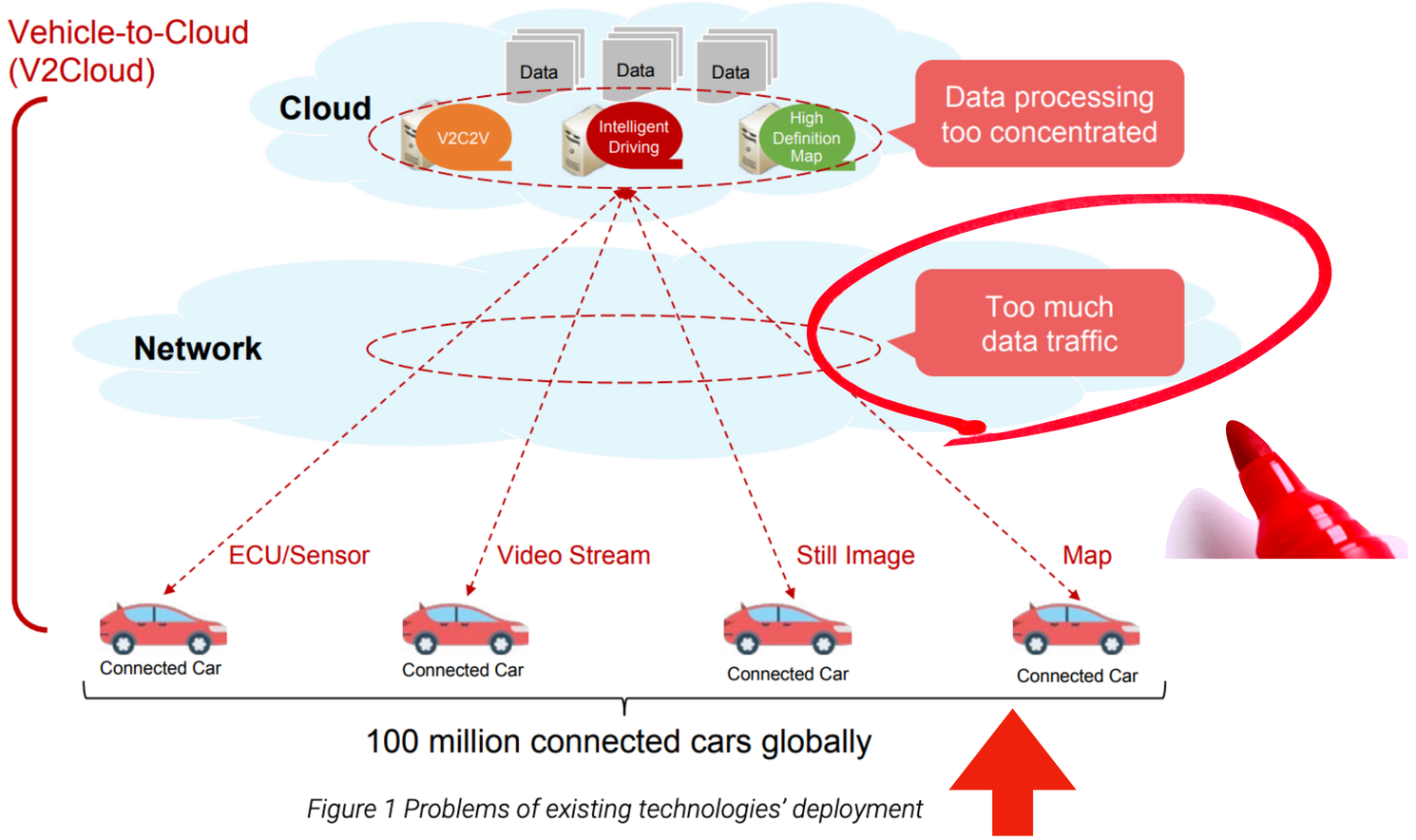
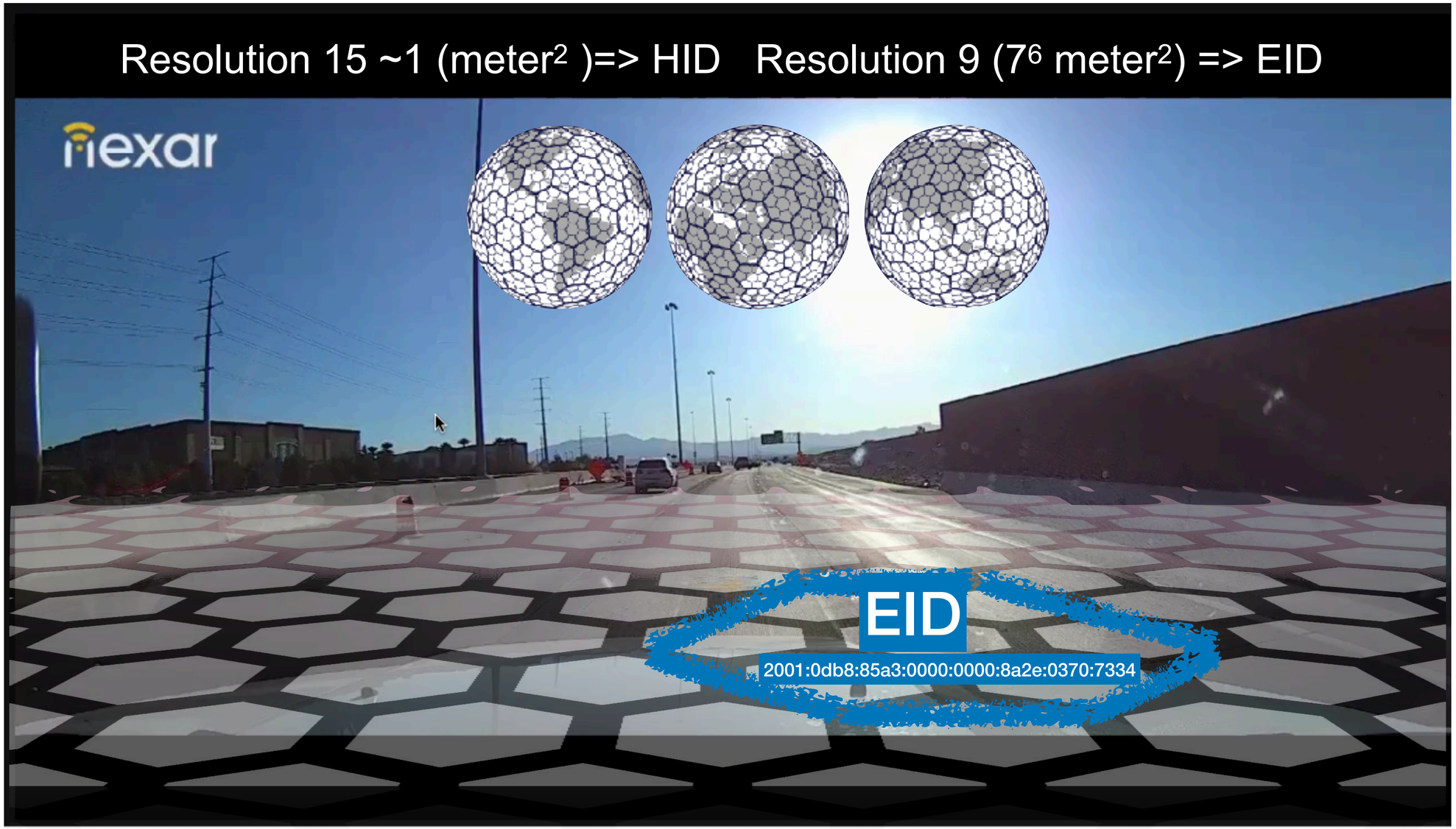


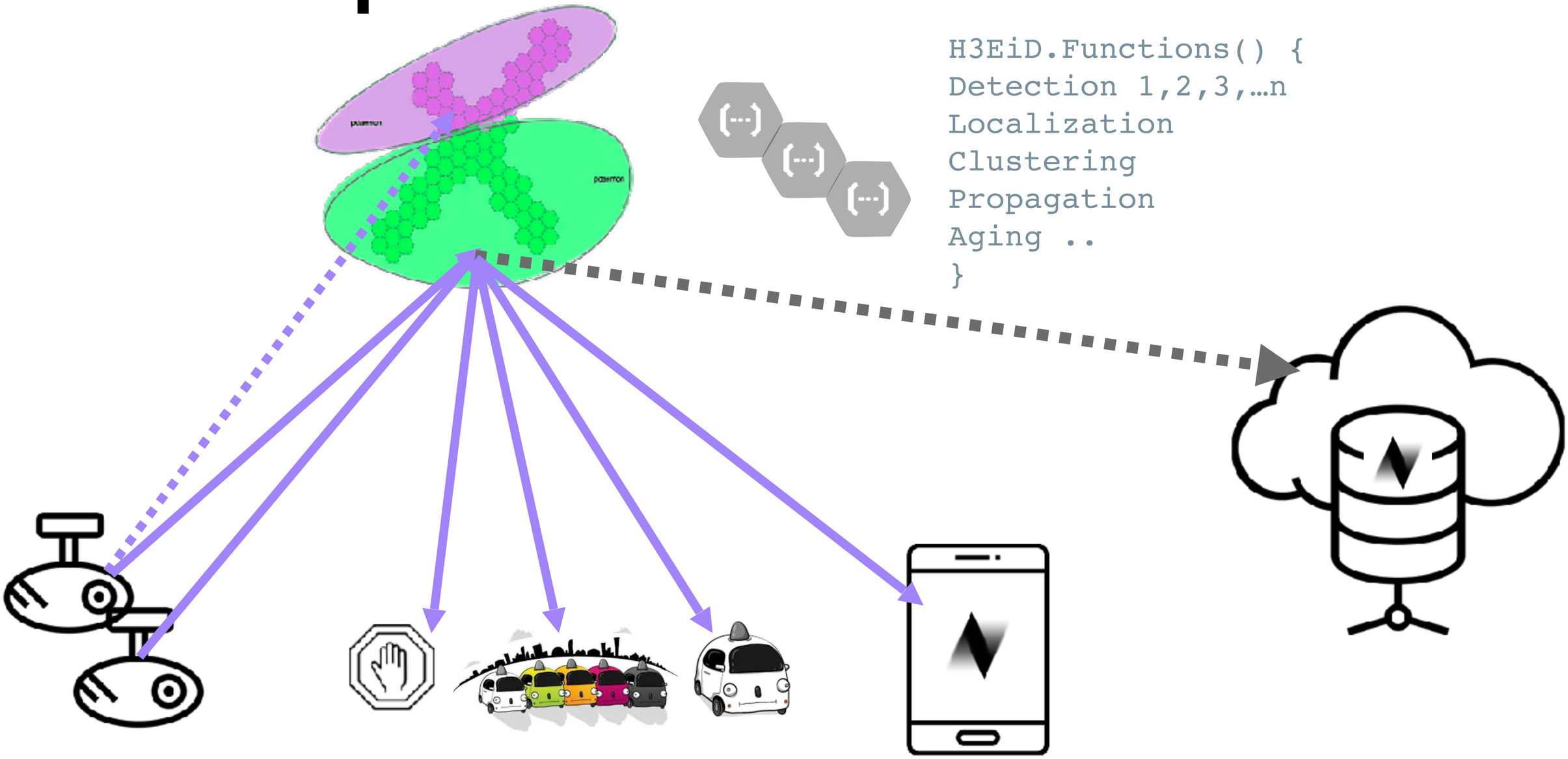
Figure 1 Problems of existing technologies' deployment

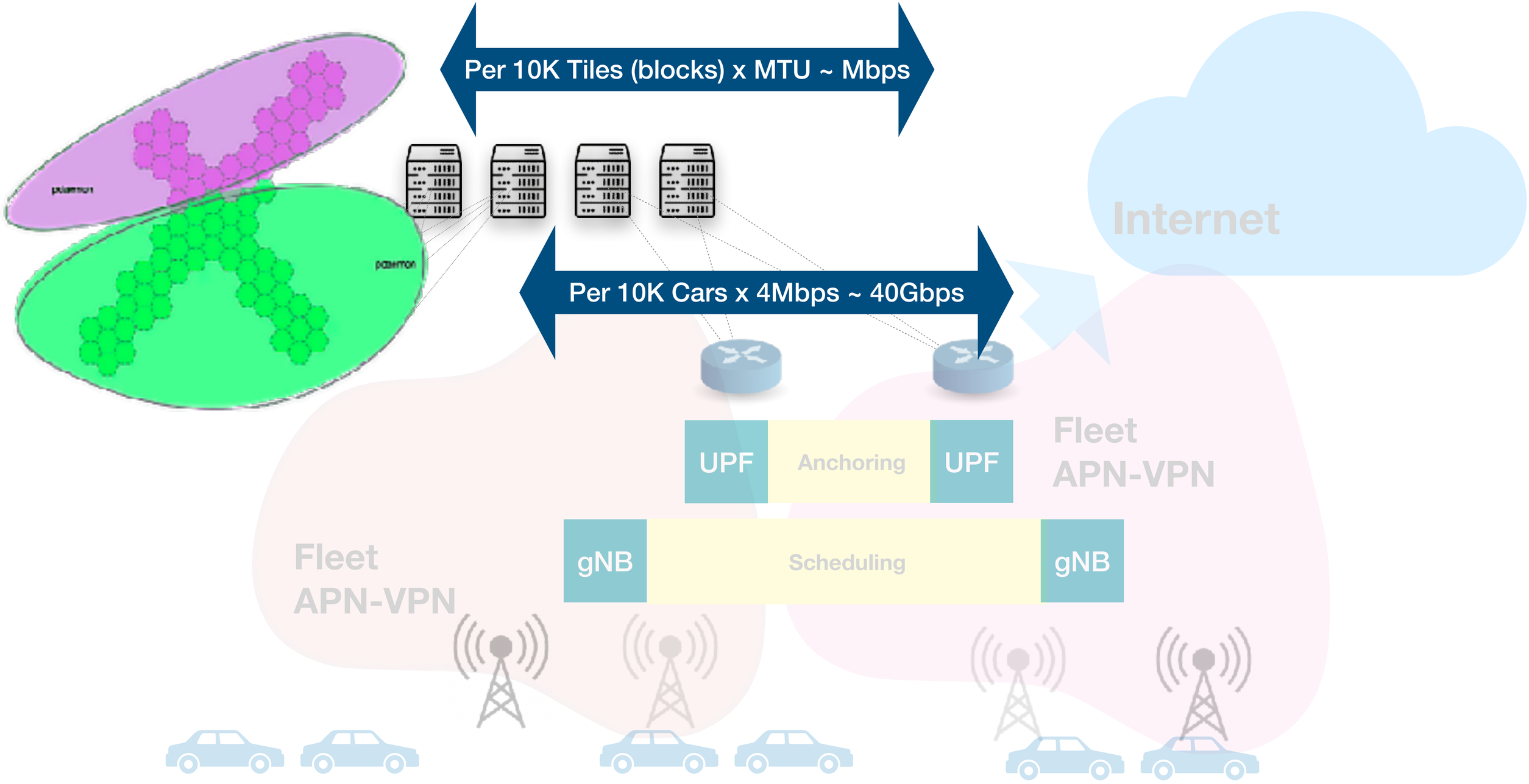
Heavy Fresh Vision & Sensory Continues Upload

Physical World EIDs

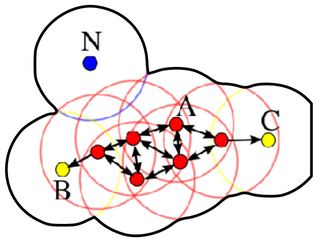


Map-Reduced to Feeds

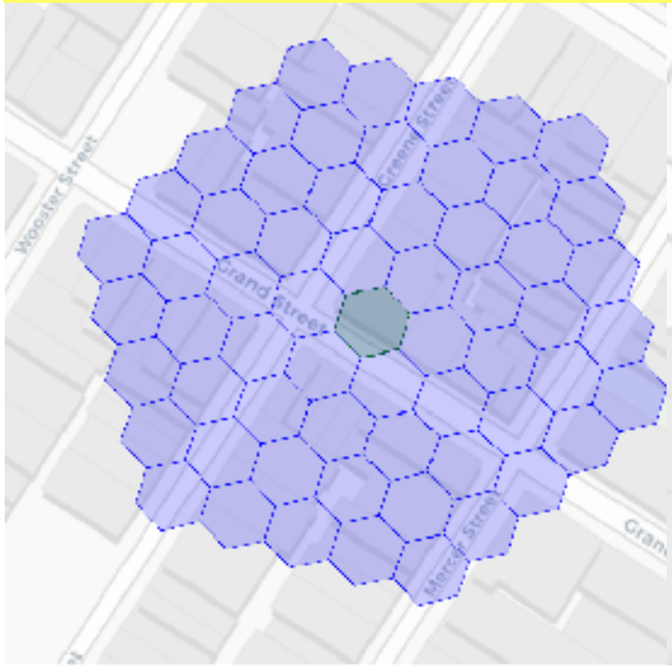


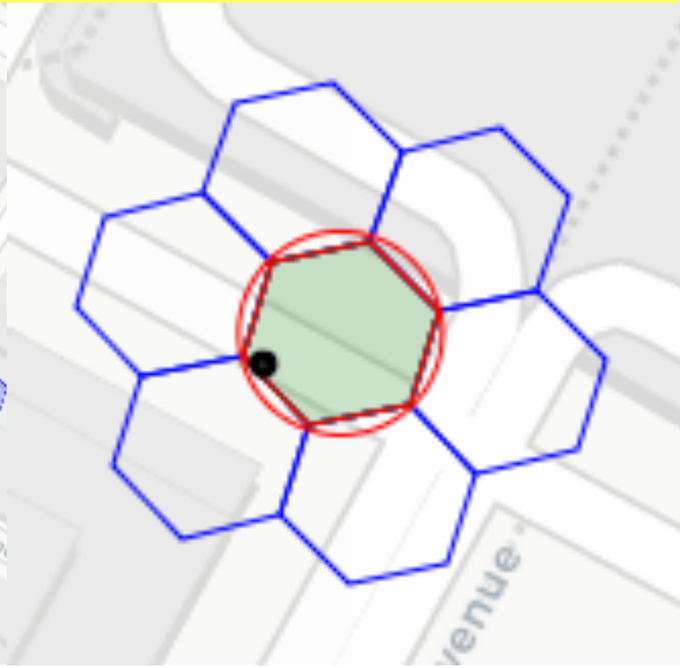

Per 10K Tiles (blocks) x MTU ~ Mbps
Per 10K Cars x 4Mbps ~ 40Gbps
Internet
UPF
Anchoring
UPF
Fleet
APN-VPN
gNB
Scheduling
gNB
Fleet
APN-VPN

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

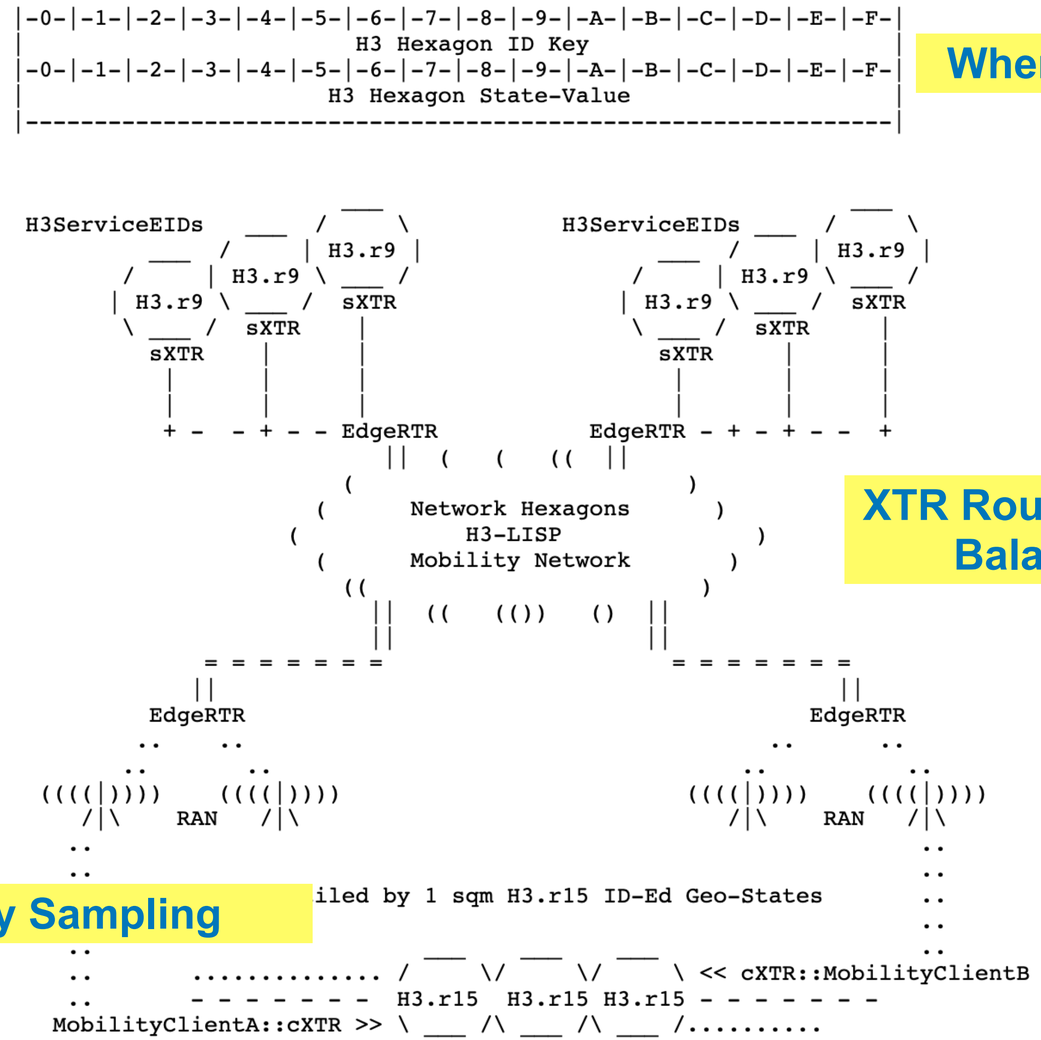


Context: DBScan, Simplex coalescing, Homography, Visual localization
Change detection, Lane number, Traffic direction, neighboring tiles …





Interoperable Off-The-Shelf



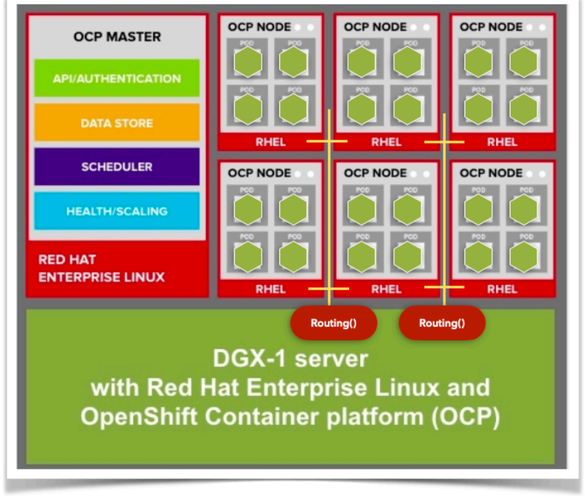
Where/What Reduced Feed Per Context EID

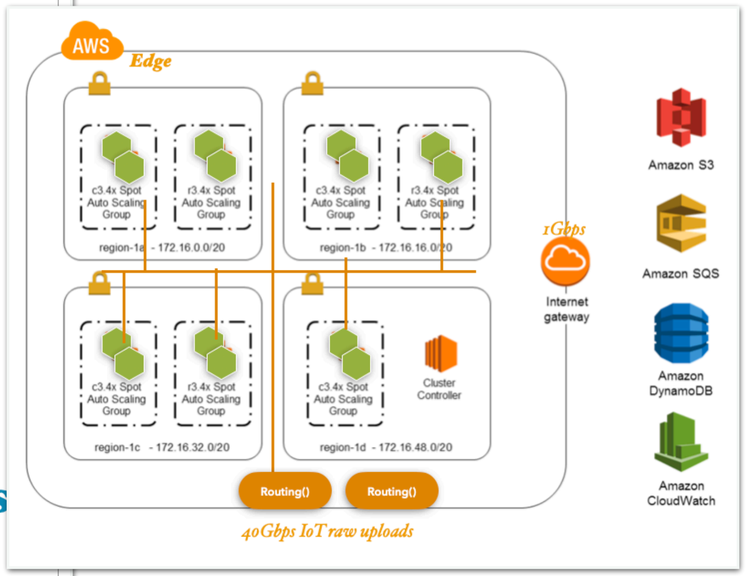
XTR Routing => Deployment Scaling
Balancing, H/A, Protections

Street Vision & Sensory Sampling

Routed HPC Edge

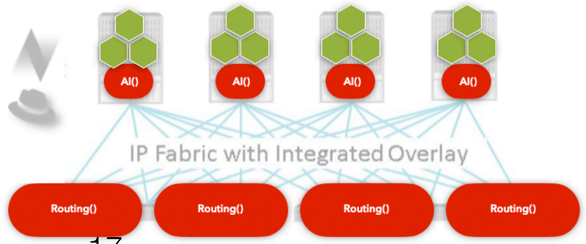
- Engage high concurrency GPU machines
- Choose best upload aggregation points
- Choose best GPU economics for the task
- Comply with private premise constraints





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