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 Devices

Edge Alternatives Map Reduce Data ➡ AI Insights

Edge
- SLA ➡ Sub Sec
- Heavy fresh upload
- Commercial & Regulatory
Auto Case Study

Resolution 15 (1 m²) => HID
Resolution 9 (76 m²) => EID

✔ Volume
✔ Response
✔ Costs
✔ Constraints
Cyber Case Study

- ✔ Volume
- ✔ Response
- ✔ Costs
- ✔ Constraints

5-Tuple Matrix

RAN MAN MEC Tbs

Mapped Samples

Reduced insights

Mapped Samples

Cynamics AI Cloud Insights Mbps

<table>
<thead>
<tr>
<th>Sample point</th>
<th>Full BW</th>
<th>Sampled BW</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>40Gbps</td>
<td>40Mbps</td>
</tr>
<tr>
<td>2</td>
<td>40Gbps</td>
<td>40Mbps</td>
</tr>
<tr>
<td>...</td>
<td>40Gbps</td>
<td>40Mbps</td>
</tr>
<tr>
<td>n</td>
<td>40Gbps</td>
<td>40Mbps</td>
</tr>
</tbody>
</table>

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

Underlay ➔ Scales Mapping System

EIDs => Routed Context, Map-Reduce Index

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

Mapping ➡ Signal Free Multicast
Scales: Ms of feeds to Ks of clients each
Communications Matrix EIDs

Sflow/IPFIX

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

EID = dotGov X marketing.XYZ

5 Tuple masks EIDs

Attacks and Stats Feeds

marketing.XYZ.com
  Subnet 1
    
  Subnet X
  engineering.XYZ.com
    1
    
  manufacturing.XYZ.com
    1
    
    Z
The Pattern

Heavy Varying IOT Upload >>

XTRs  EID Context.AI(..)

>> Signal Free Subscribed Feeds
Auto Dynamic Big Data

Figure 1 Problems of existing technologies’ deployment

Heavy Fresh Vision & Sensory Continues Upload
Physical World EIDs

Resolution 15 \( \sim 1 \text{ (meter}^2 \text{) } \Rightarrow \text{HID} \)  
Resolution 9 \( (7^6 \text{ meter}^2) \Rightarrow \text{EID} \)
Map-Reduced to Feeds

H3EiD.Functions() {
  Detection 1,2,3,…n
  Localization
  Clustering
  Propagation
  Aging ..
}
Scheduling

Anchoring

gNB

gNB

gNB

UPF

UPF

UPF

Internet

Fleet

APN-VPN

Per 10K Tiles (blocks) x MTU ~ Mbps

Per 10K Cars x 4Mbps ~ 40Gbps

Fleet

APN-VPN

Fleet

APN-VPN

Scheduling

gNB

gNB

gNB

gNB

Fleet

APN-VPN

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