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Stateless user-plane architecture for virtualized EPC (vEPC)

http://tools.ietf.org/html/draft-matsushima-stateless-uplane-vepc-01

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Today

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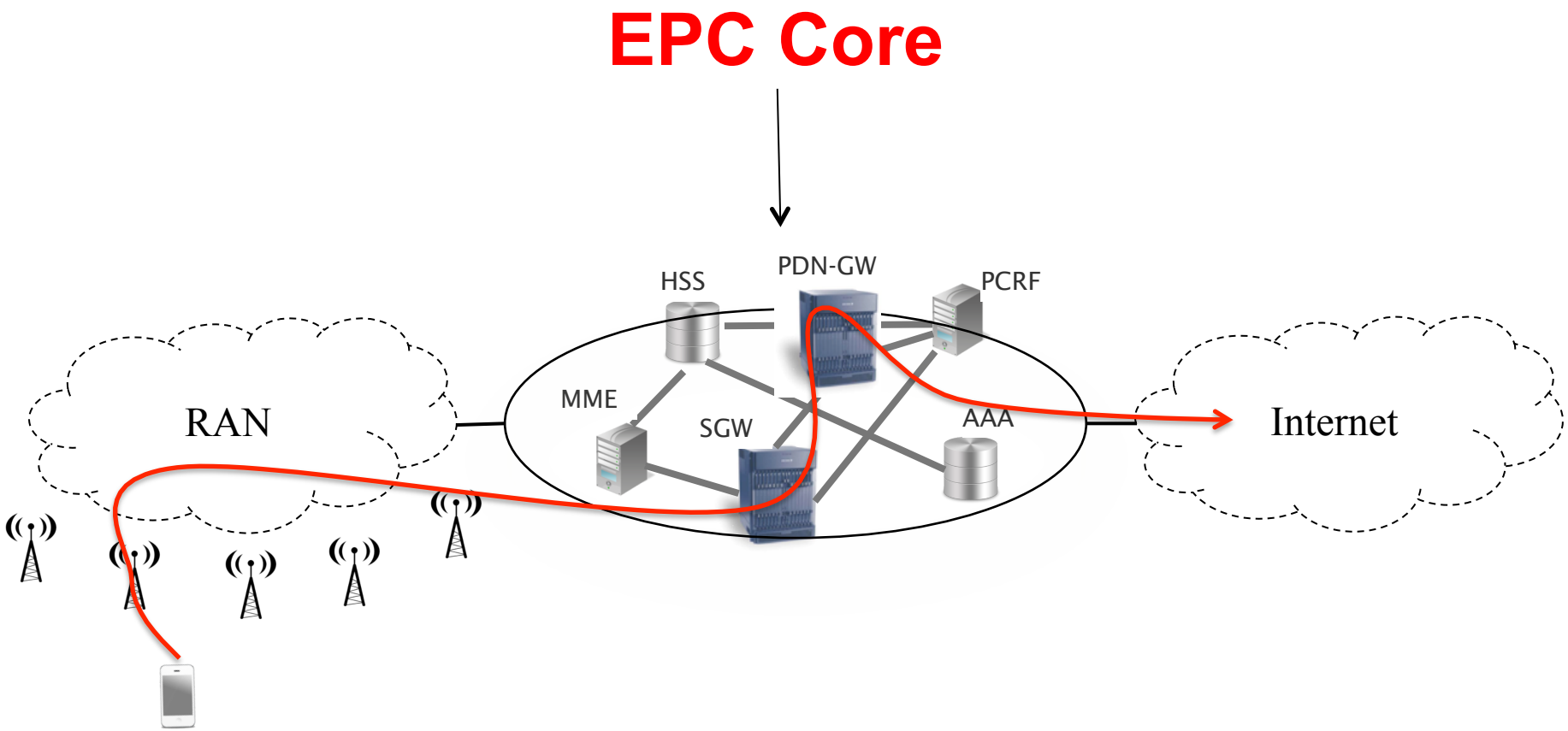

Network Function Virtualization

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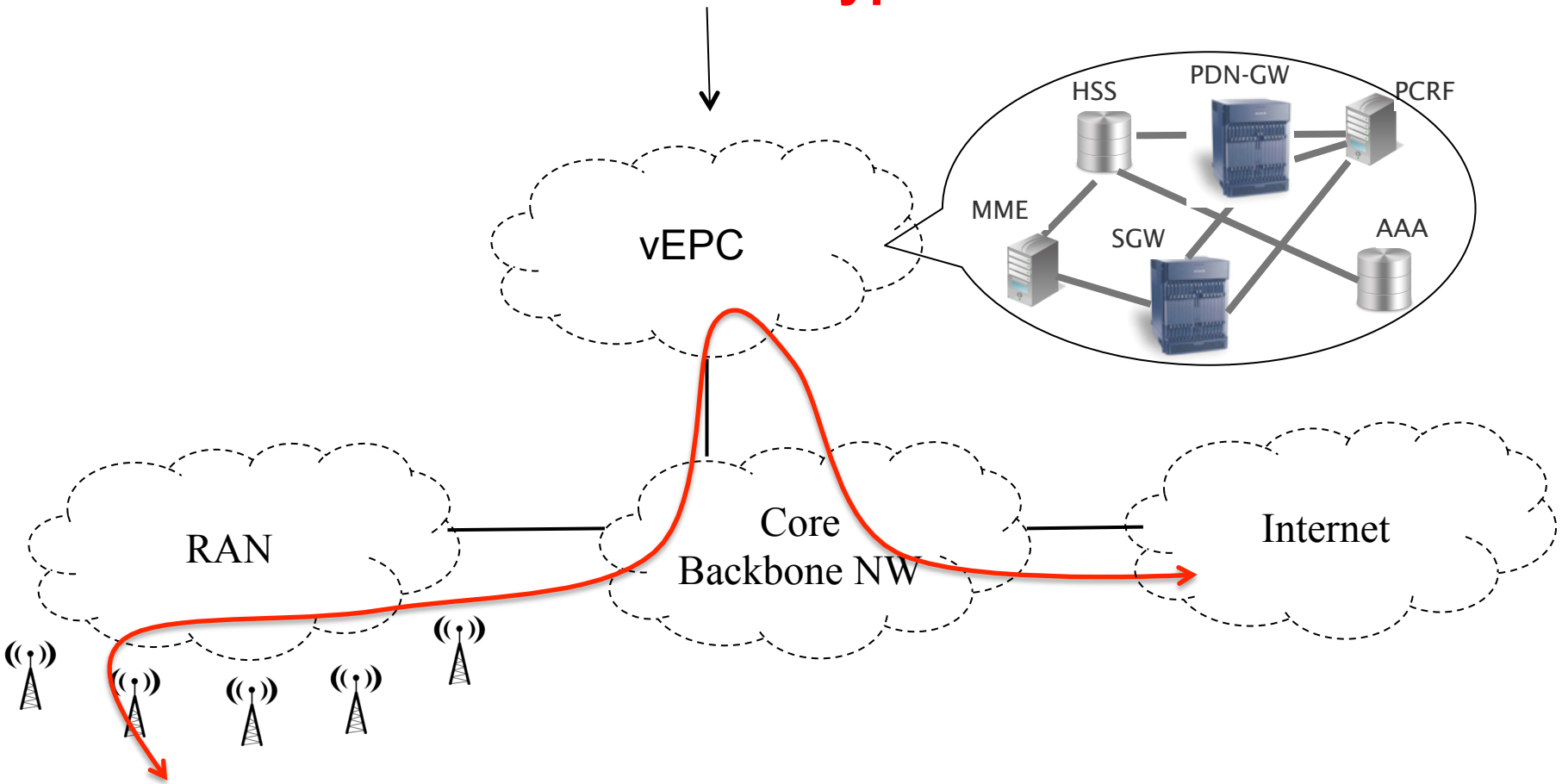
Virtualized EPC on Hypervisor



WHY: All packets incl. control signaling are routed to vEPC.

Splitting Control and User Plane

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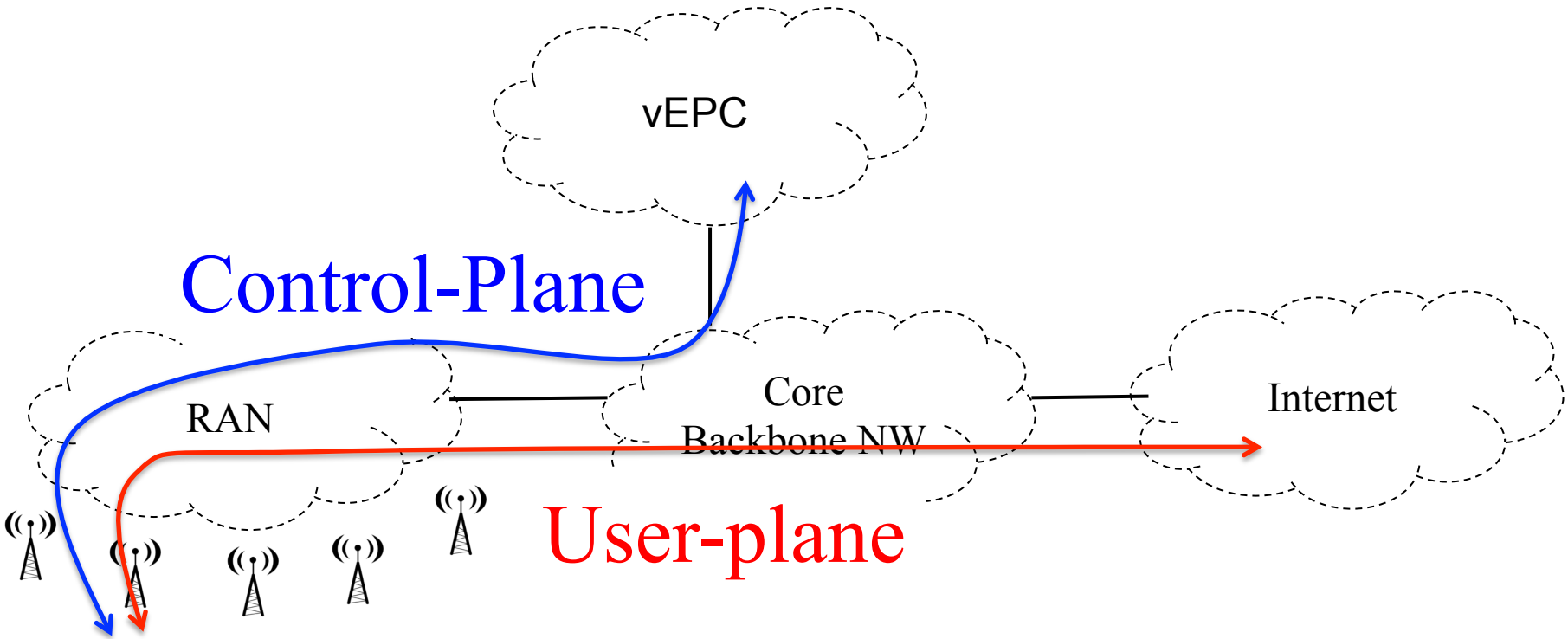

Goal: User packets bypass vEPC

Motivation

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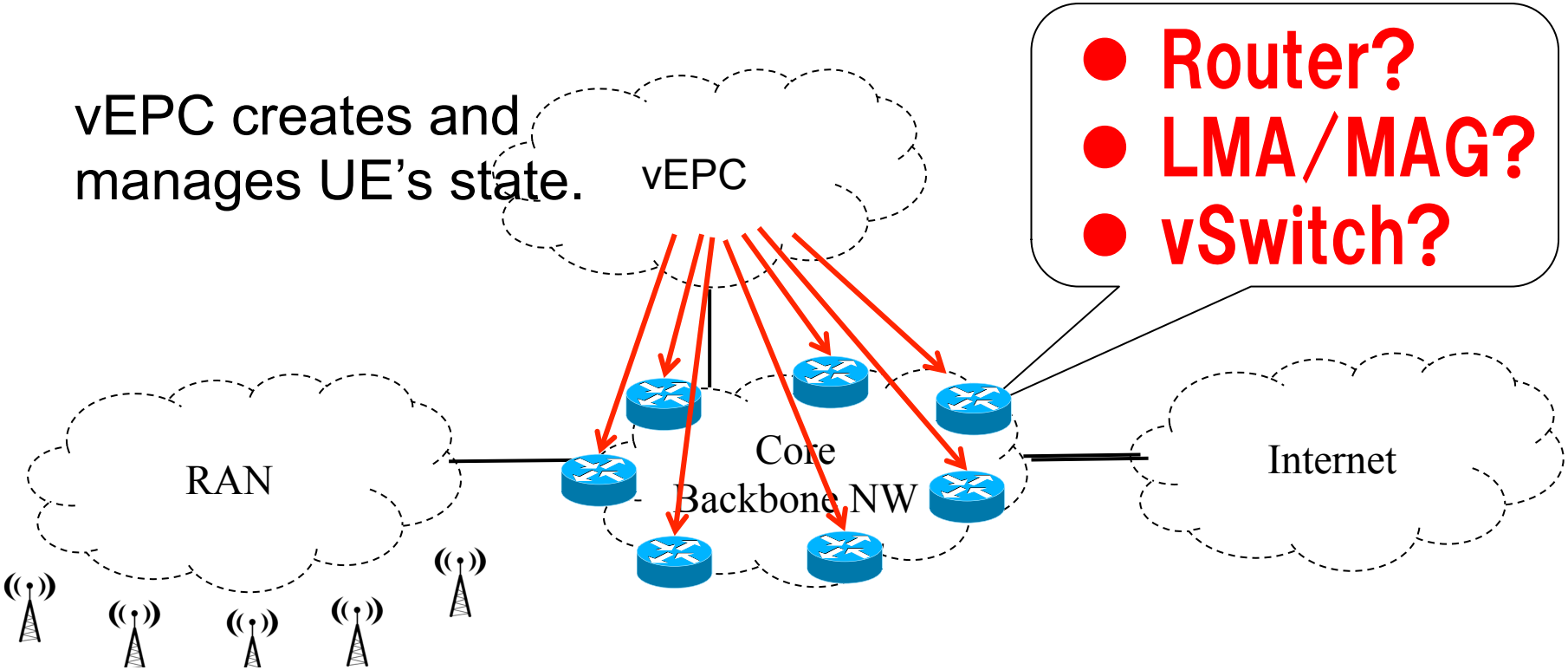
vEPC creates and manages UE's state.



A mechanism is required to reflect states in Control plane to routers in User plane.

- Routing protocols (BGP in our draft)
- Extension to Proxy Mobile IP (*draft-wakikawa-netext-pmip-cp-up-separation-00.txt*)
- SDN/OpenFlow!?
- FORCES Working Group

Stateless user-plane architecture

We use BGP!!!

Overview

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- Note: any questions regarding 3GPP specific question or backward compatibility are answered in offline.

- What we support in the draft
  - Motivation, Benefits of NFV, Requirements
  - BGP update between Control and User planes
  - Handover mechanism
  - Address delegation mechanism
  - IPv4 support mechanism
  - Backward compatibility: Control plane is untouched.
    - When special handling is needed like roaming, packets are routed to vEPC.

Configuration

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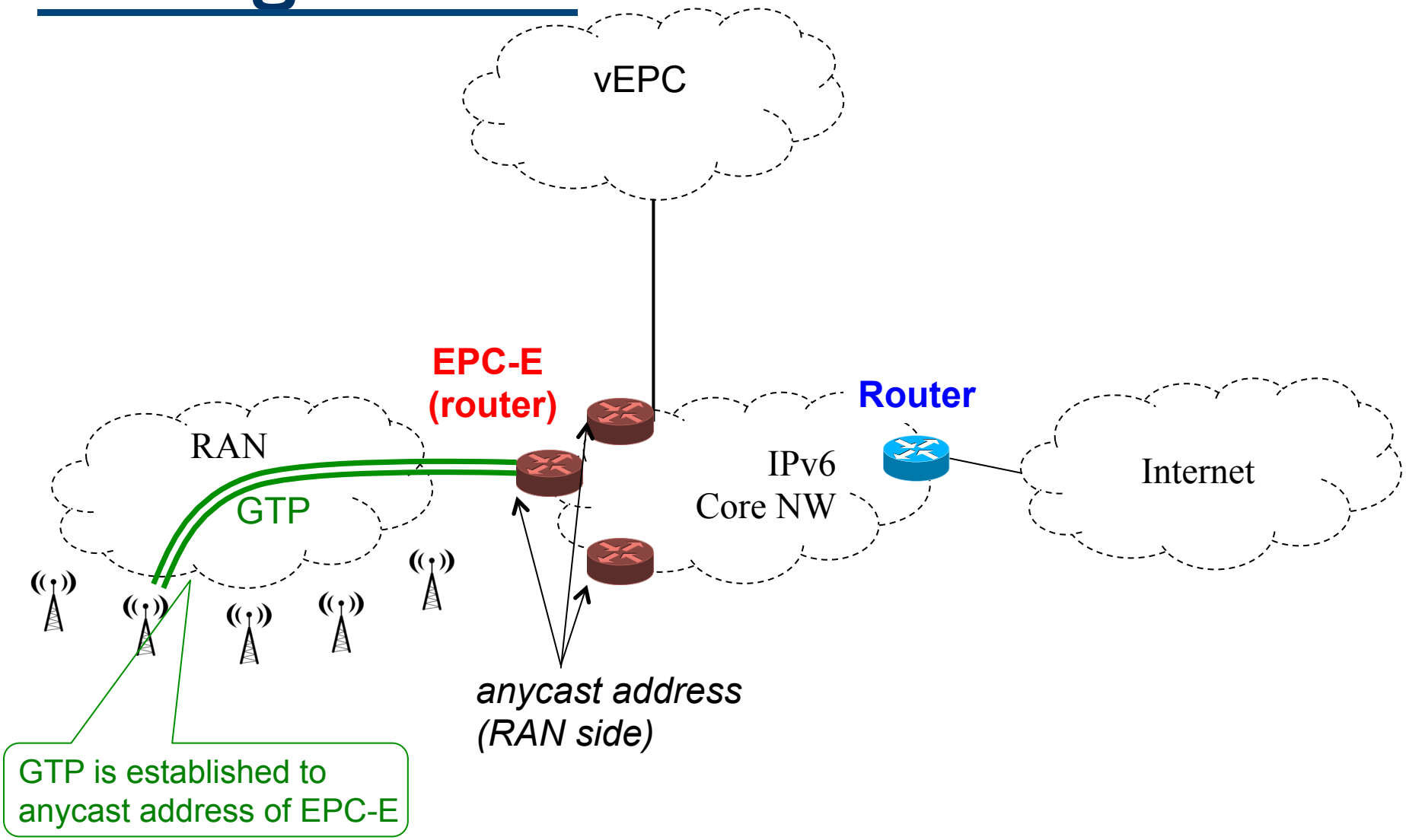

Route Update

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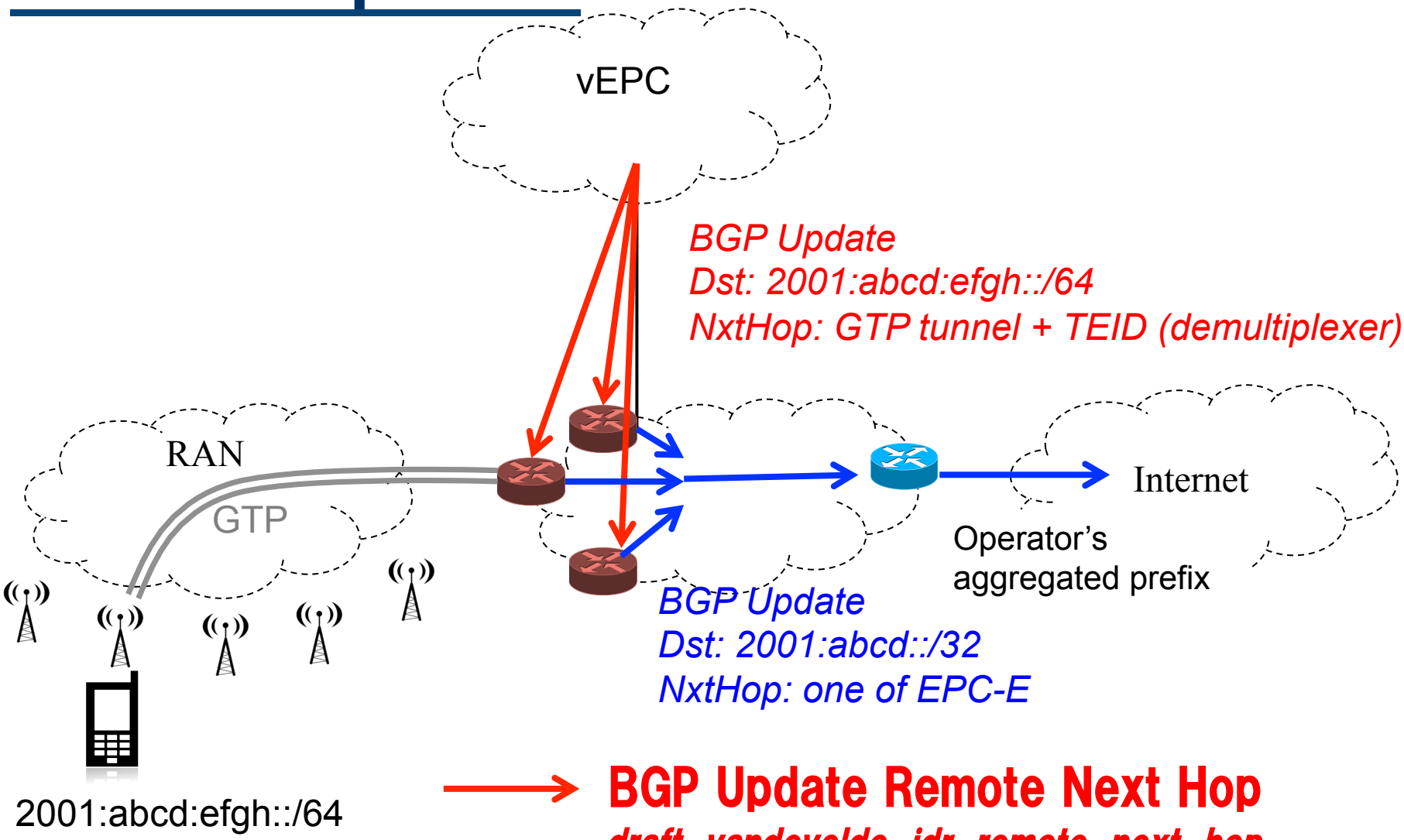

BGP Update Remote Next Hop

draft-vandevelde-idr-remote-next-hop

BGP Update (Normal)

Route Update

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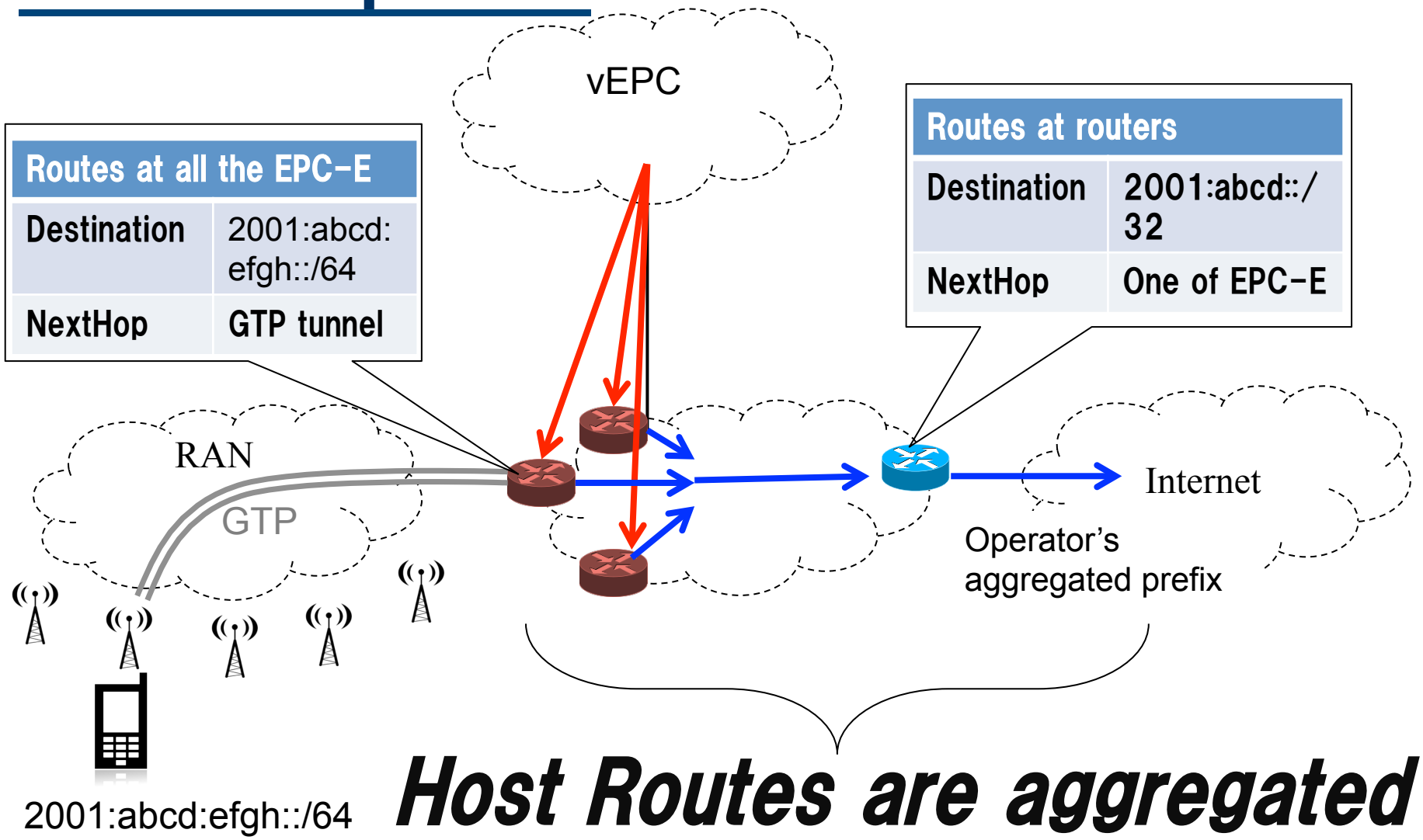

Host Routes are aggregated

Handover

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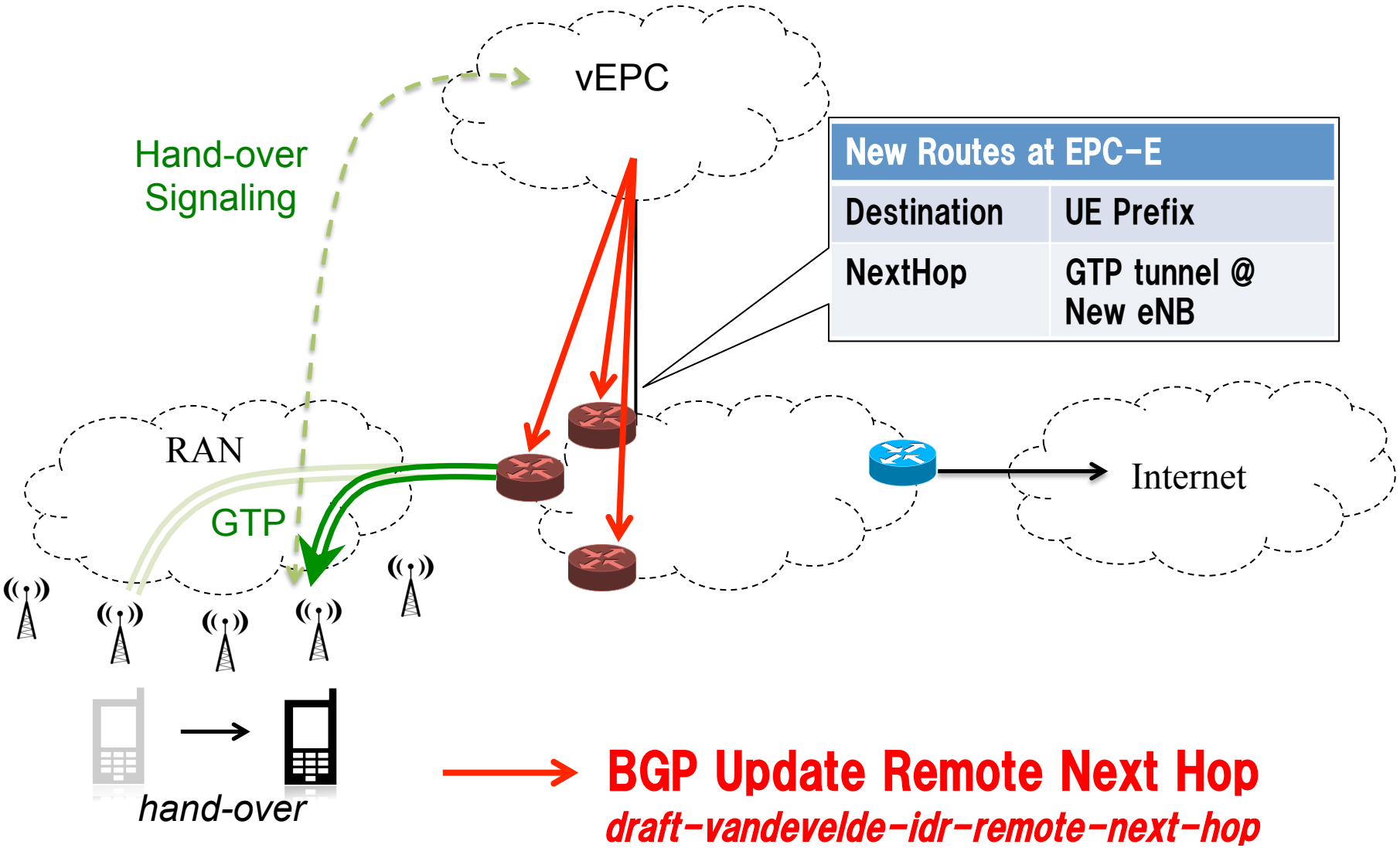

New Routes at EPC-E	
Destination	UE Prefix
NextHop	GTP tunnel @ New eNB

Address Delegation

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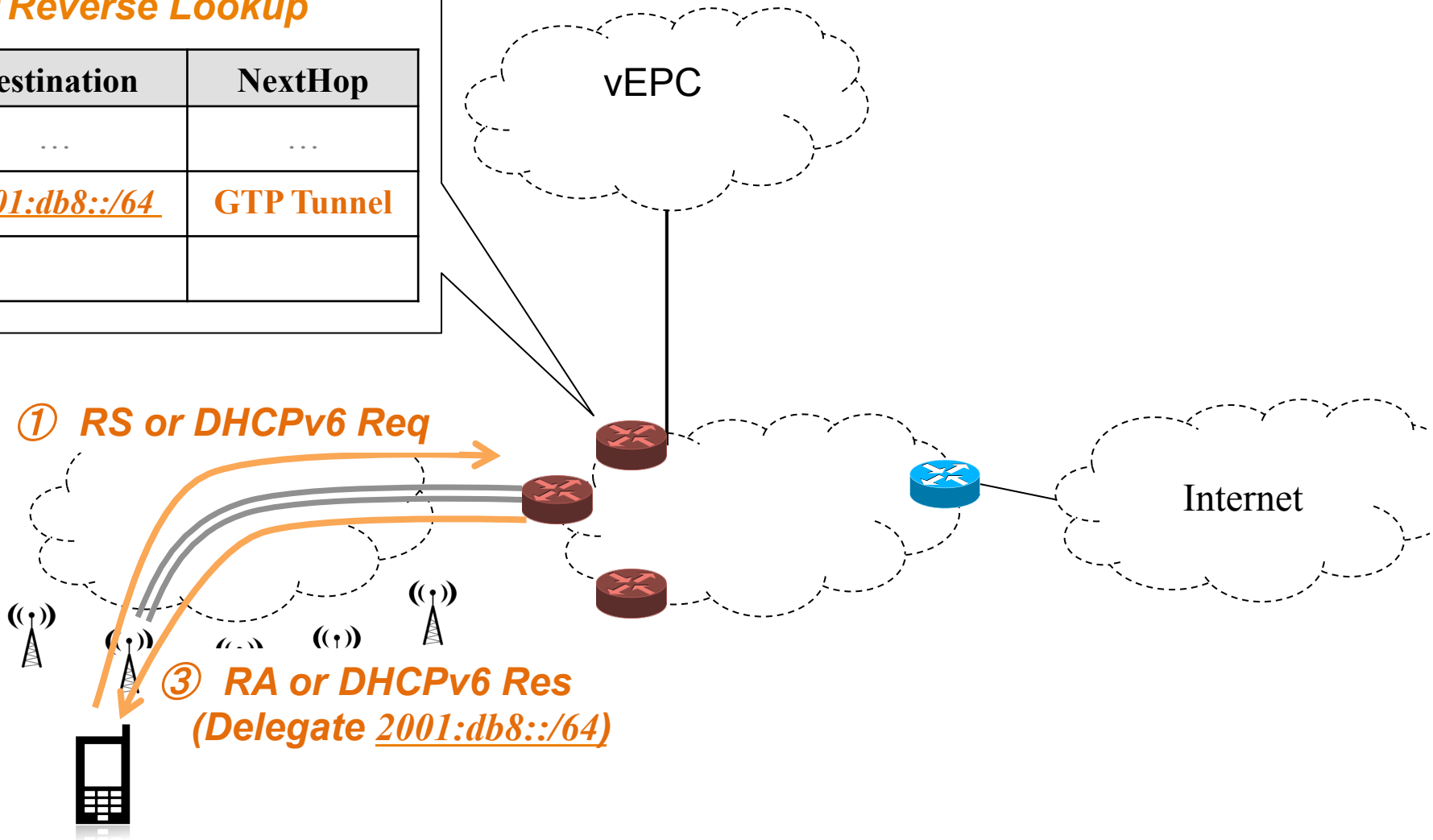
② Reverse Lookup

Destination	NextHop
…	…
2001:db8::/64	GTP Tunnel



Backward compatibility

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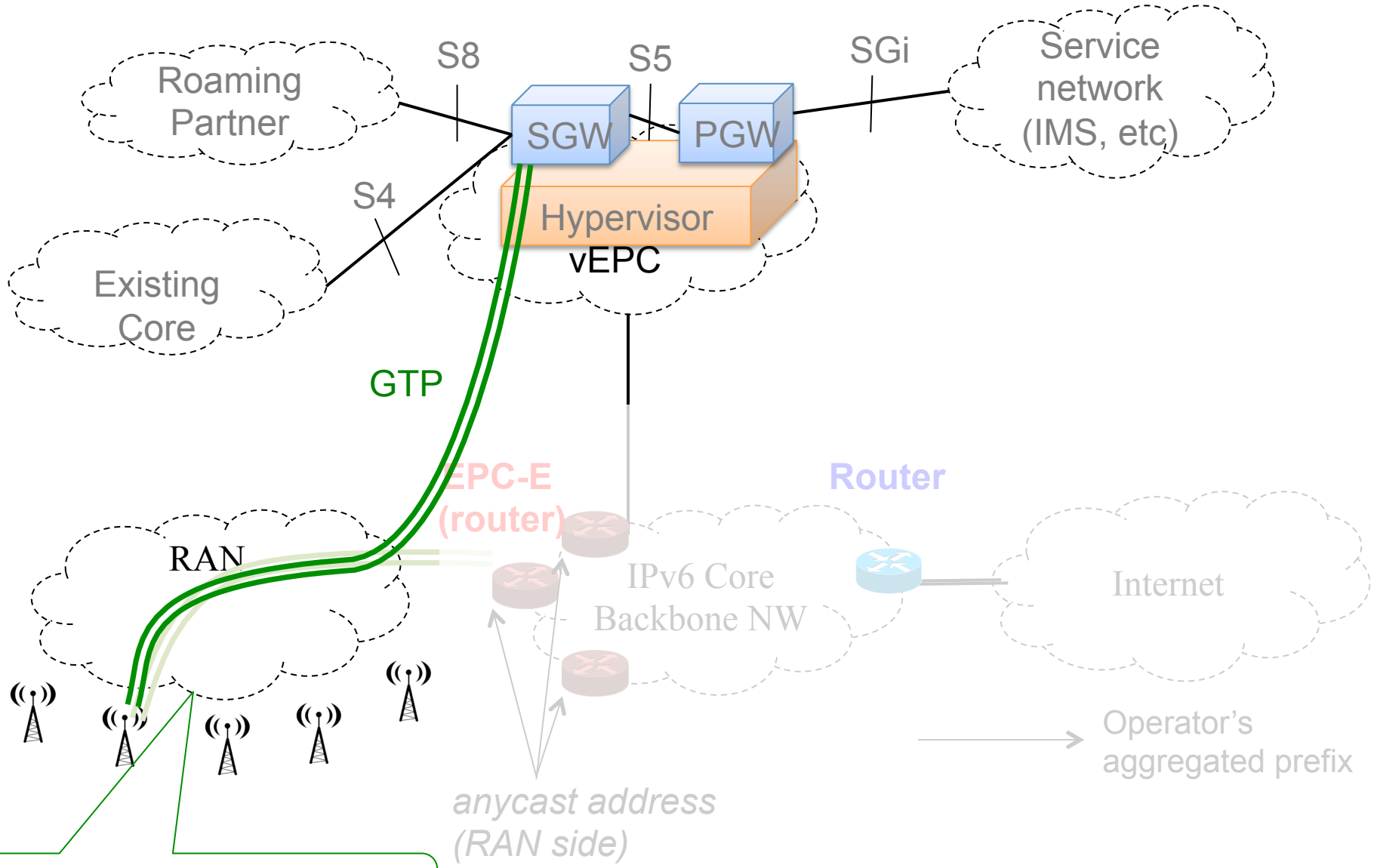

GTP is established to legacy EPC located in vEPC cloud.

Study Items: BGP capability

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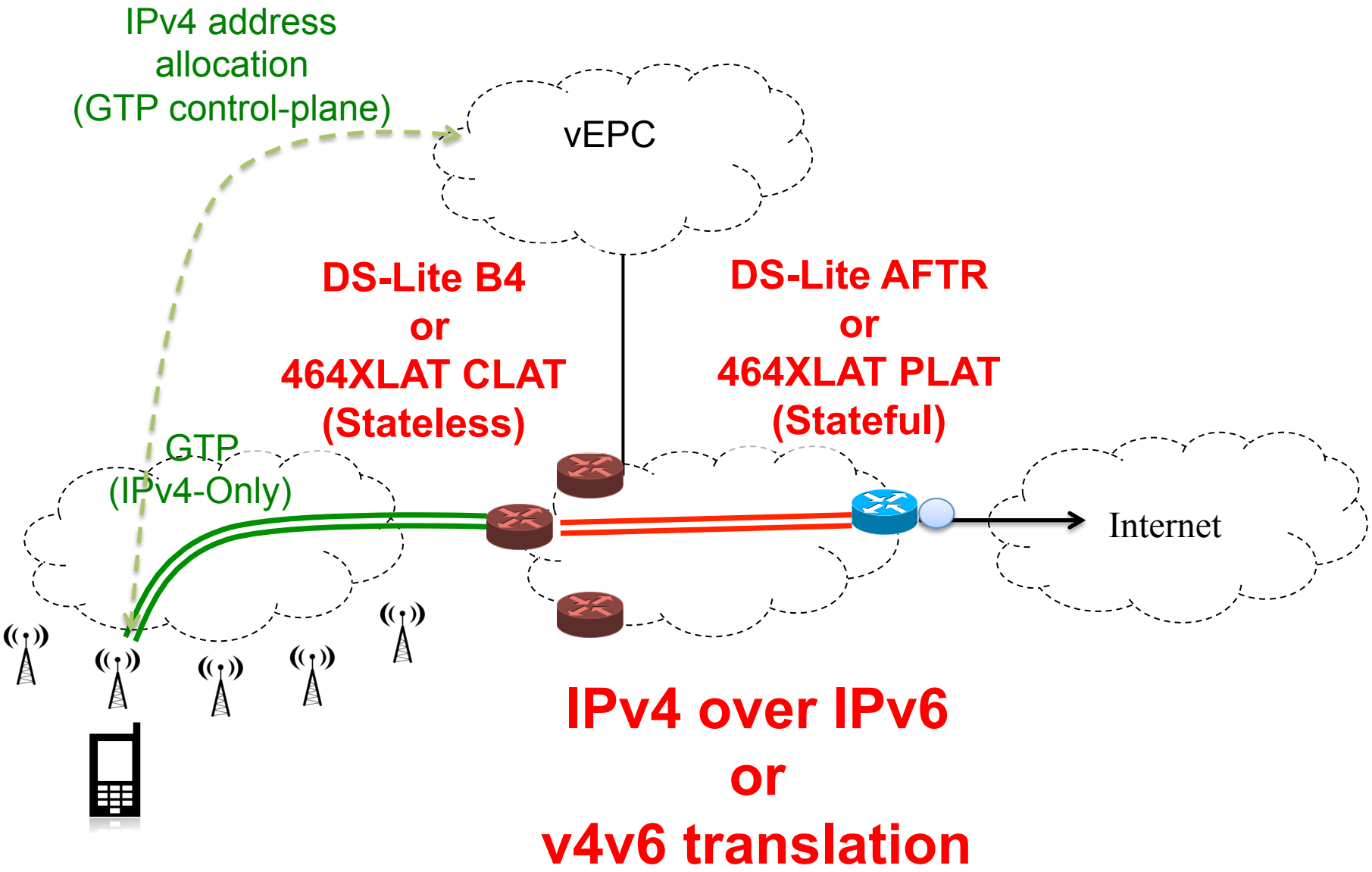
An existing BGP Route Reflector can send over 5M/sec BGP updates!*

*: We still need to investigate statistics of number of handover event in deployed cellular network

Table 2: Control Plane Convergence Results for RR tests

No. of RR-clients/ BGP sessions	Total Number of routes learnt per client	Total Number of Routes learnt from all RR-clients	Address family (For VPN routes, 8,000 Route targets were used)	Convergence Time (seconds)
1000	1000	1Million	IPv4	75
1000	1000	1Million	VPNv4	221
1000	1000	1Million	IPv6	194
1000	1000	1Million	VPNv6	293
2000	500	1Million	IPv4	138
2000	500	1Million	VPNv4	394
2000	500	1Million	IPv6	284
2000	500	1Million	VPNv6	551

Source: ISOCORE Technical Report
http://www.cisco.com/en/US/prod/collateral/routers/ps9343/ITD13029-ASR1000-RP2Validationv1_1.pdf

IPv4 Support

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