中国移动
China Mobile

Mobile Edge Computing – solutions, simulations, trials

China Mobile Research Institute

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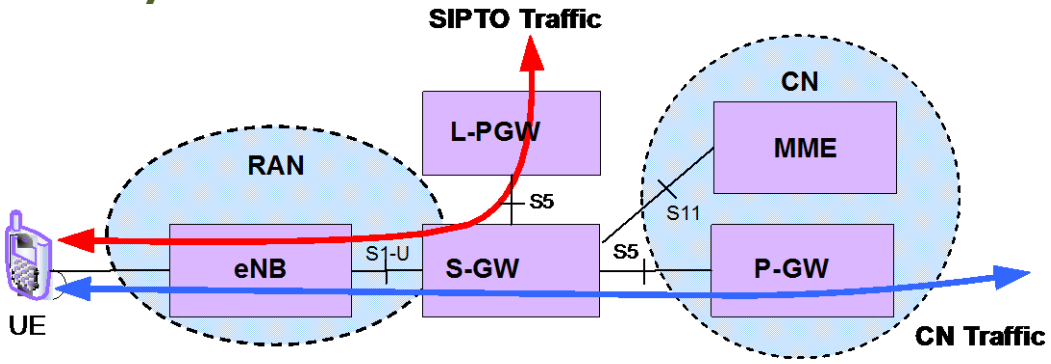
agenda

- **Solutions for mobile edge computing**
  - Analysis of existing mechanisms
  - RAN aware flexible IP routing and open Radio API
- **Simulations for mobile edge computing**
  - RAN info exposure for DASH optimization
- **Trials for mobile edge computing**

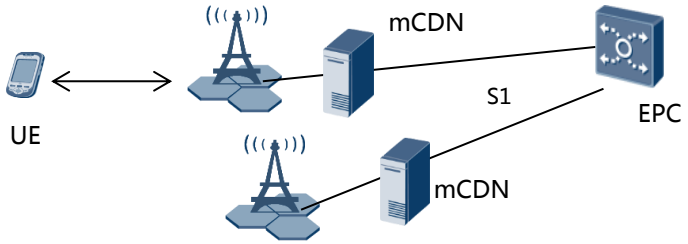
Solutions for mobile edge computing

LIPA/SIPTO defined in 3GPP



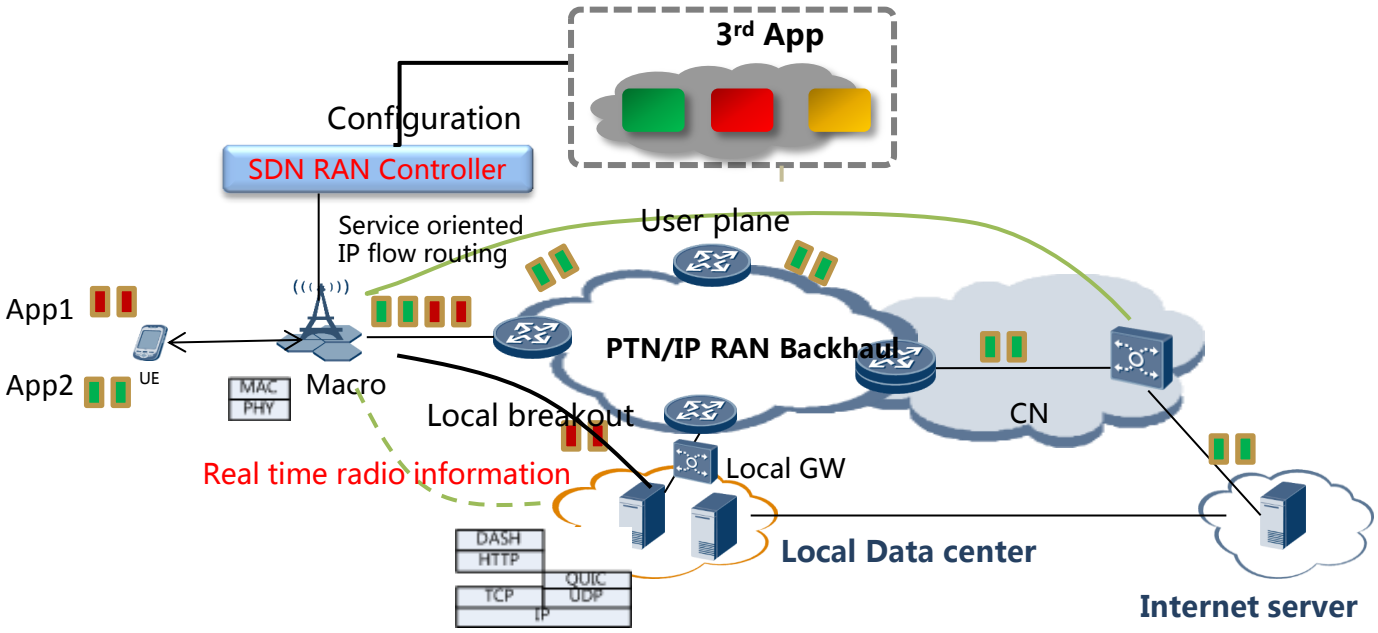
- CN (e.g MME) select L-PGW or P-GW based on different APN configured in UE
- APN per service is not supported for most terminals

Transparent CDN/Cache deployed between RAN&CN



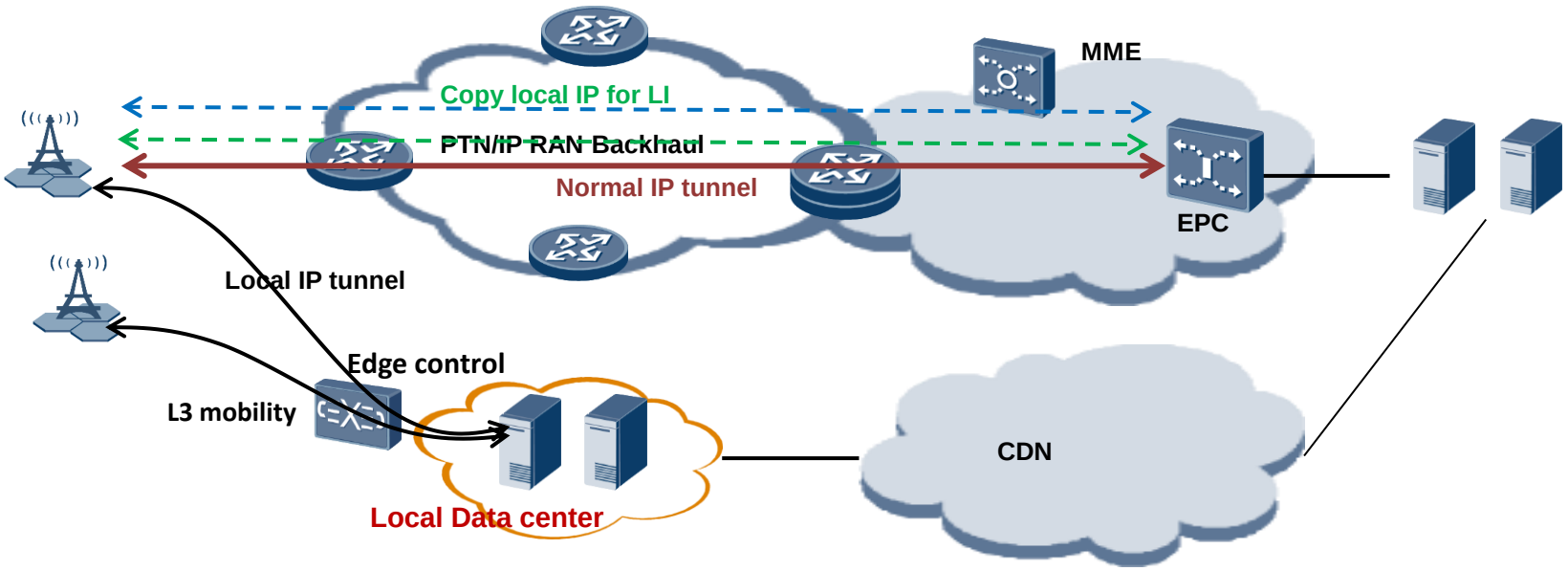
- Intercept S1 interface, no change for RAN, but inflexible deployment (one to one)
- Complicated mechanisms for lawful interception and charging

RAN aware flexible IP routing and open Radio API



- Flexible user plane IP flow routing based on service, like IP addr, port, UE ID and etc.
- Real-time radio information exposure for application layer optimization
- Support flexible deployment (one to many, RAN/PTN aggregation)

Mobility , LI, charging…

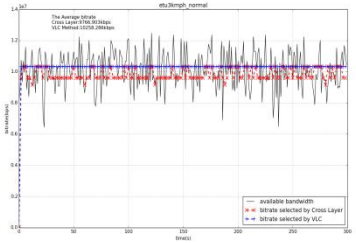


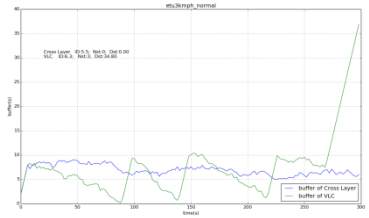
- Edge control to handle local mobility
  - Edge mobility control
  - Local user plane anchoring
- Lawful interception
  - RAN copy local IP to EPC
- Charging
  - RAN report charging info to EPC

Simulation - RAN info exposure for DASH optimization

- Expose RAN MAC throughput for dynamic selection of DASH video bit rates
- MAC throughput sampling per 50ms , consecutive 10 times: normalization and sliding window
- Obvious improvement for video smoothness and throughput in some scenario

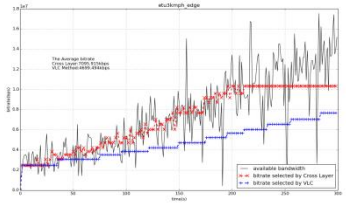
3km/h random

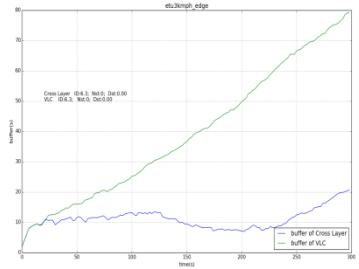




Before: 3 times pause and last 34.8 seconds， 10.2Mbps
After: No pause , 9.8Mbps

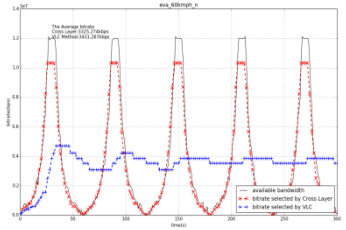
3km/h cell edge

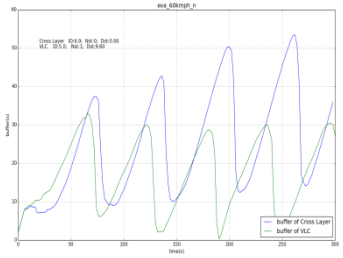




Before: No Pause, 4.6Mbps
After: No Pause, 7.1Mbps

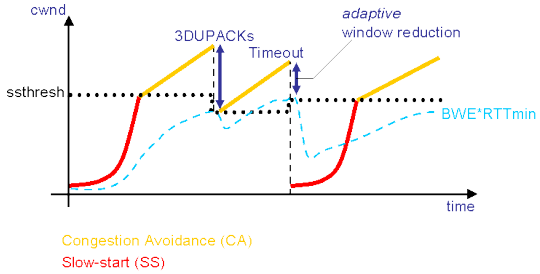
60km/h



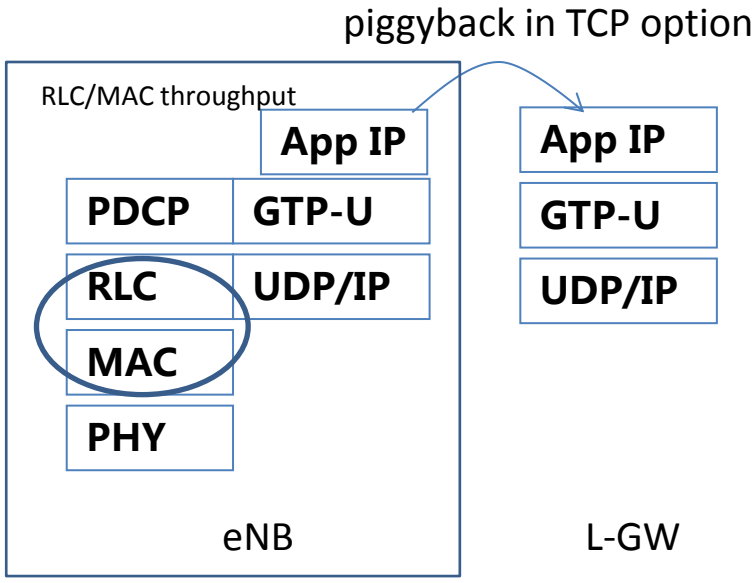


Before: 1 time pause and last 9.6 seconds， 3.4Mbps
After: No pause 3.3Mbps

- Working together with Huawei, Alibaba to verify in CMCC 4G network
  - Flexible IP routing based on RAN decision
  - RAN info exposure for application optimization
    - Phase 1: TCP
    - Phase 2: more app to come…



- TCP BW estimation
  - ➢ Use UE MAC throughput to replace TCP BW estimation
- TCP window optimization
  - ➢ Optimize TCP initial, congestion avoidance, RTO window…



Trails result is expected to share by Q1, 2016

Thanks for listening!