

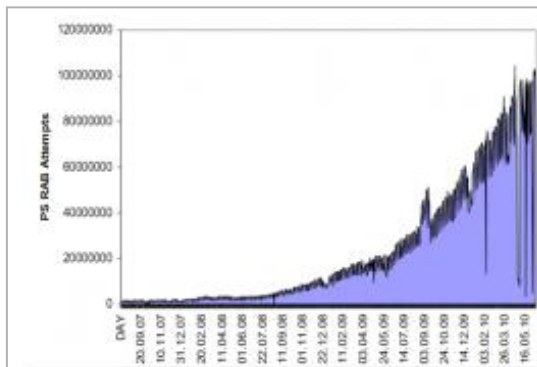
Evolved towards EPC

- EPC deployment consideration in China

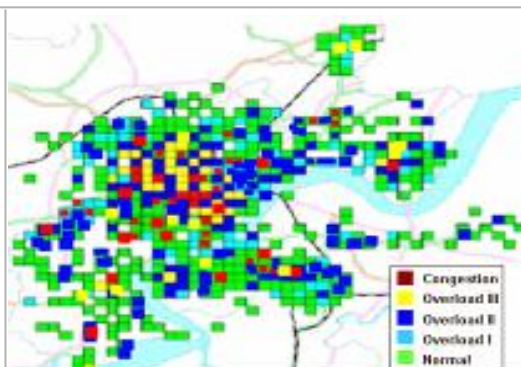
Huadong Hu (Huawei)

www.huawei.com

MBB drives network evolution



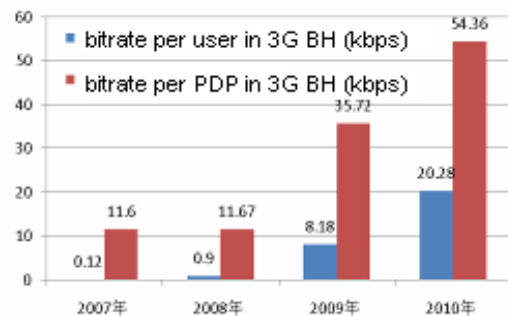
Signal flooding
Every year PS signal increases by 500%



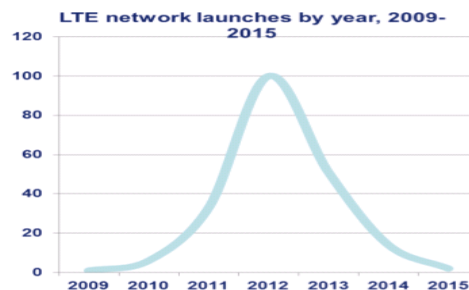
Load imbalance
5% base station load compared to 90% load in BH



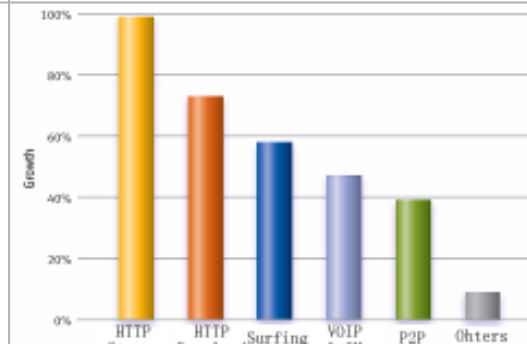
OTT services
Mobile operator's portal decreases from 57% (Year 07) to 22% (Year 08)



Throughput boosting
3G PS traffic increases very fast



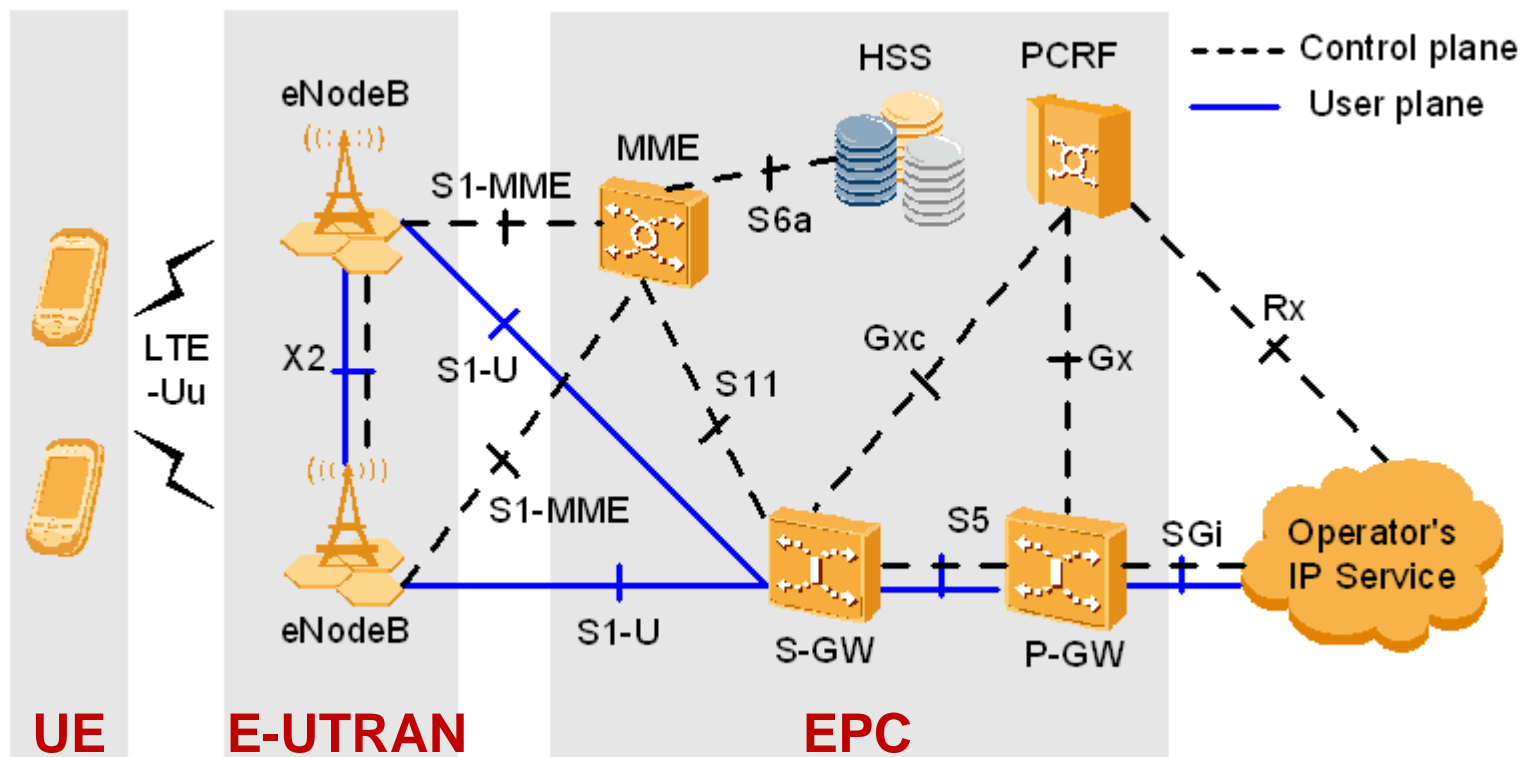
Multi-access Network Evolution
2012 will be peak of LTE-EPC deployment



More real-time services
HTTP streaming increases 100% yearly

■ MBB progresses fast which push operators to seek low cost solution

EPC & EPS – A standardized solution

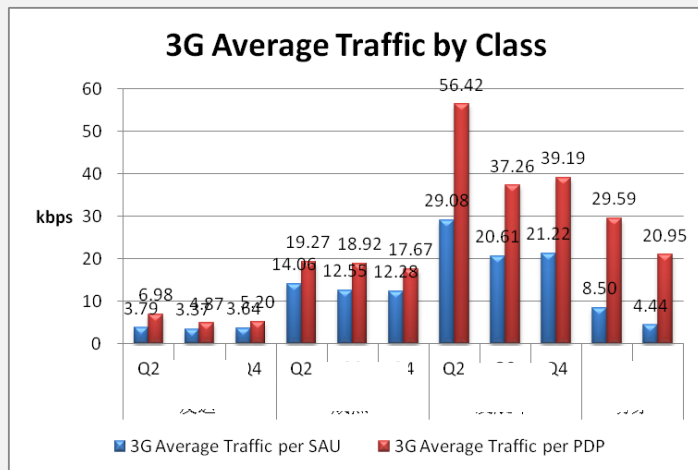


EPS

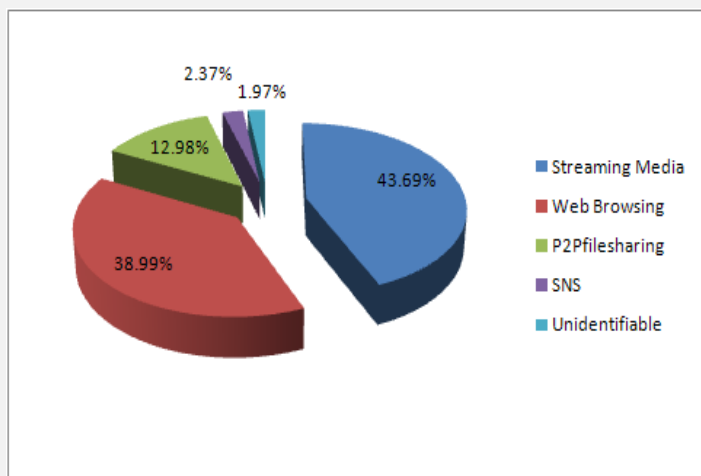
LTE: Long Term Evolution
 SAE: System Architecture Evolution
 EPC: Evolved Packet Core
 EPS: Evolved Packet System
 PCRF: Policy and Charging Rules Function

Services & Apps in the network

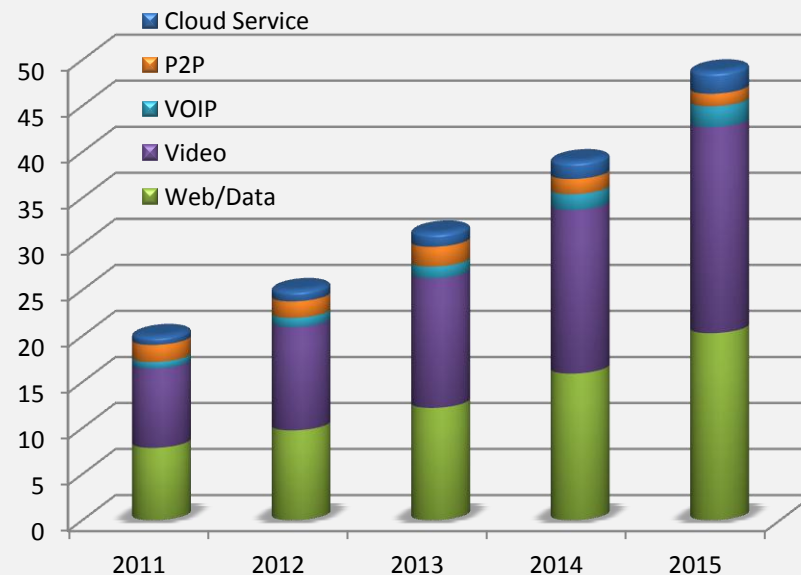
2011 operator service information



2011 An operator case of network traffic



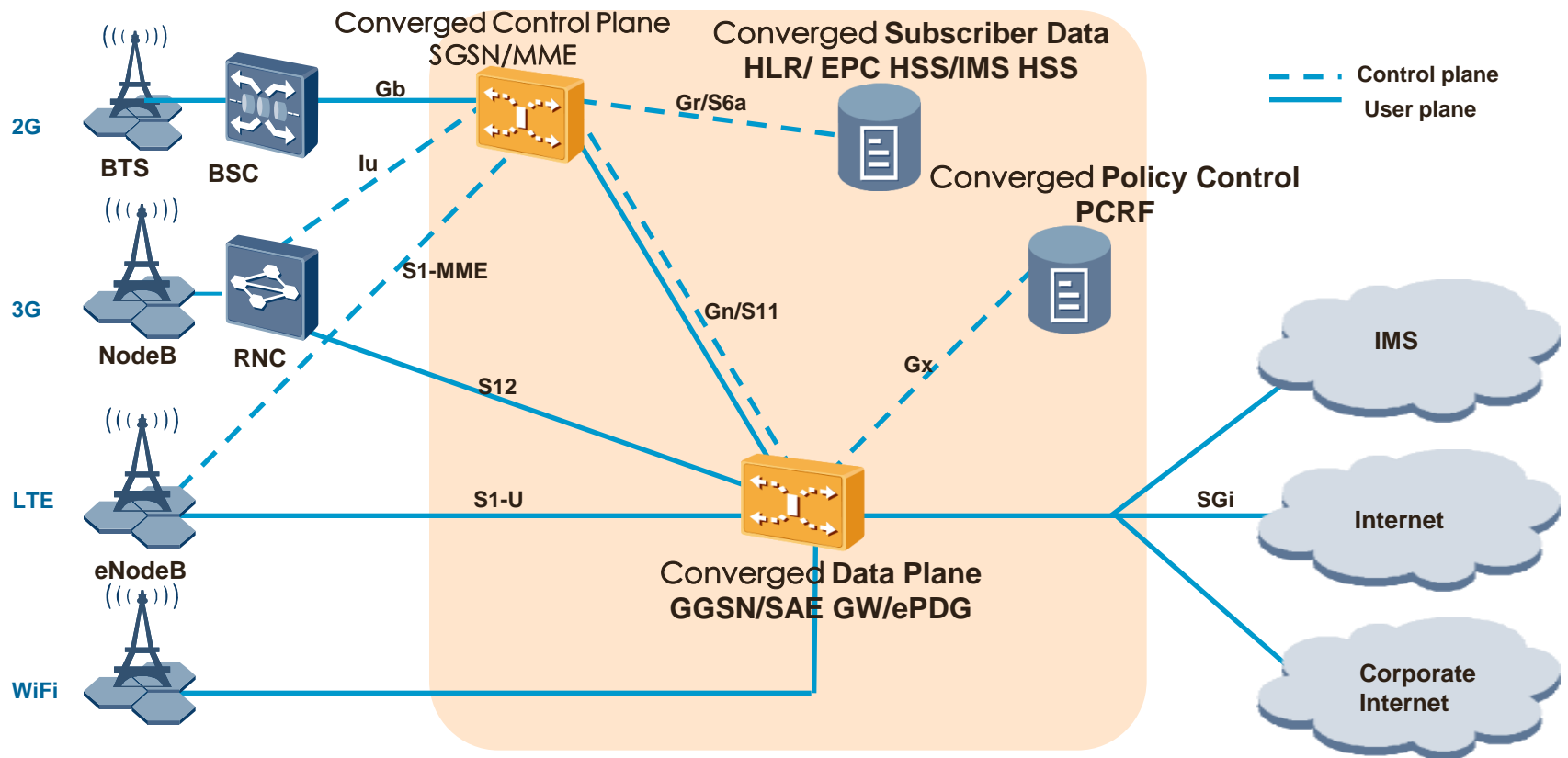
Mobile customer traffic predict



Throughput	2011	2012	2014	2015	2016
Data(Kbps)	20	25	31.25	39	48.75

Service	Voice	Web & Data	Video	P2P	Cloud Storage
Percentage	5%	42%	46%	3%	5%

Evolution to Converged Multi-Access PS

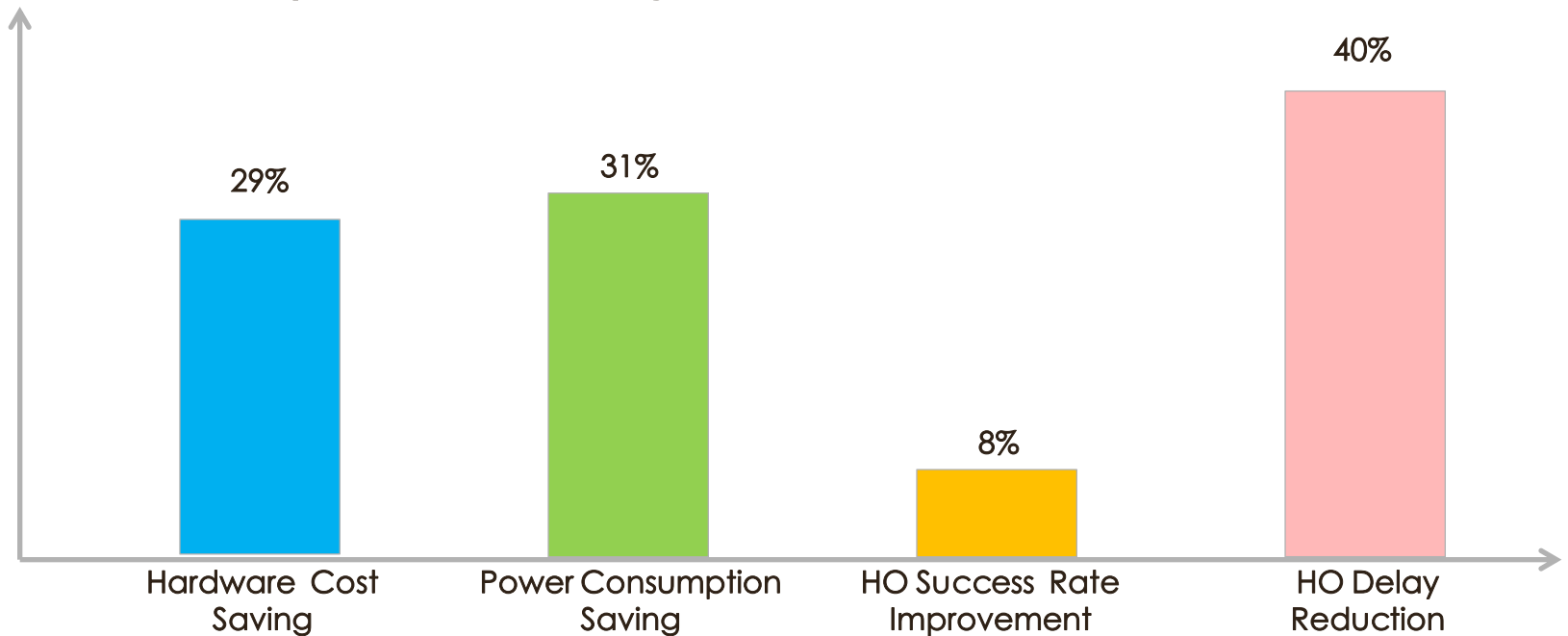


Four dimensions of convergence contribute to Resource Sharing, lower CAPEX/OPEX, better User Experience

- Converged Data Plane: Convergence of GGSN, SAE GE and ePDG
- Converged Control Plane: Convergence of SGSN and MME
- Converged Subscriber Data: Convergence of HLR, EPC HSS and IMS HSS
- Converged Policy Control: Convergence of PCRFs for 2G/3G and LTE

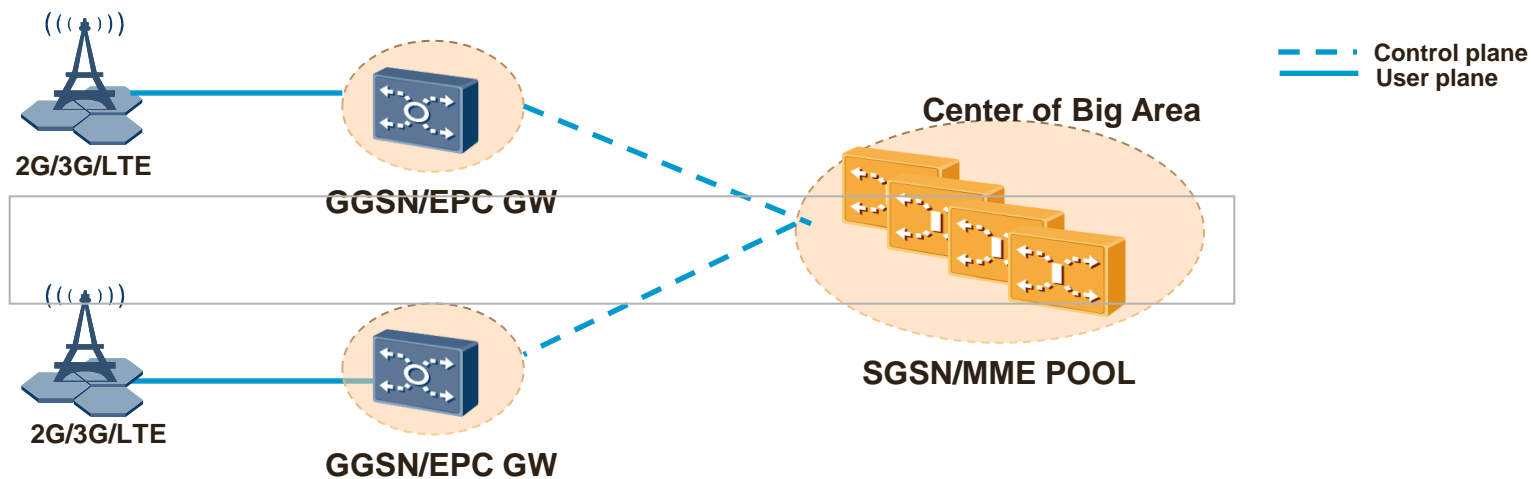
PS Convergence for Lower Cost and Better User Experience

Value Analysis for Converged EPC Model with 1 million Subscribers



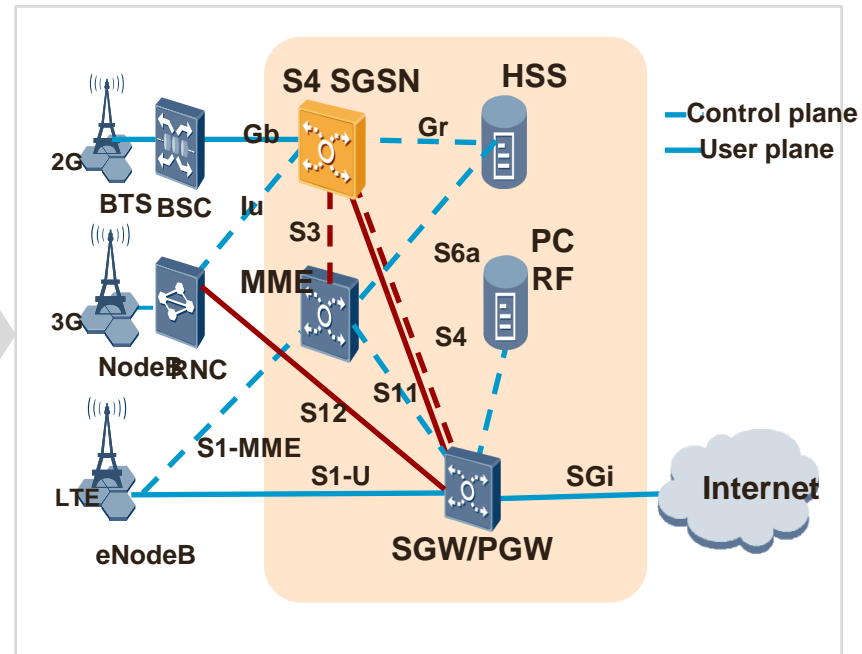
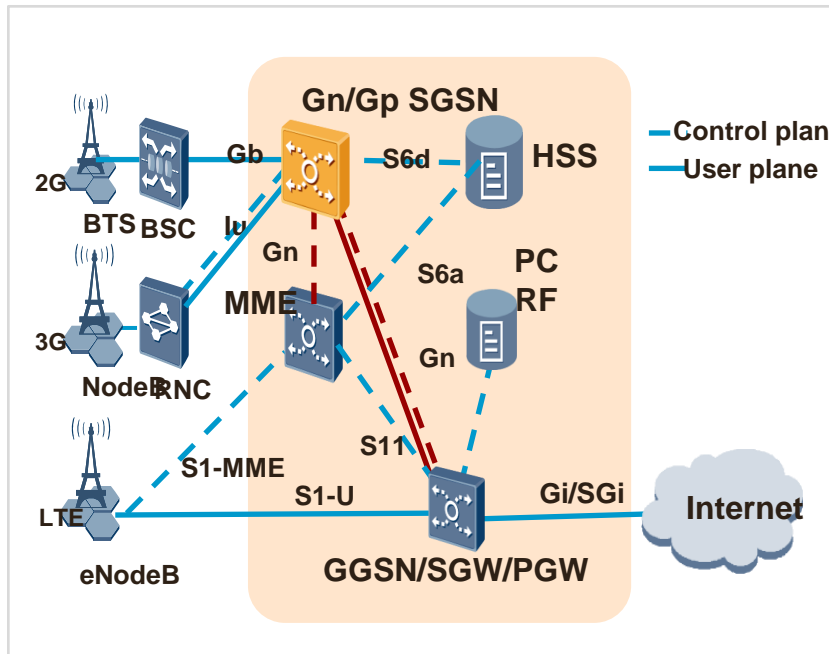
- **Lower Cost:** 2G/3G/LTE Converged PS, Full Sharing of Single Board Resource, HW Cost Saving, Power Consumption Saving
- **Better User Experience:** 2G/3G/LTE Converged PS, Intra-Node HO instead of Inter-Domain HO, Higher HO Success Rate and Lower HO Delay for better User Experience

Converged MME and SGSN for Lower OPEX



- Separation of Control and User Planes makes Centralized MME Deployment Possible
 - ✓ As a control node, network will not bring too much traffic to centralized MME
- Lower Construction and Maintenance Cost
 - ✓ Lower maintenance cost with less sites resource
- Better Network Performance
 - ✓ Fewer LAU/HO with MME POOL can improve network performance
- Better Network Scalability
 - ✓ Faster network upgrade with better network scalability by supporting of MME with high capacity and performance

GnGp SGSN or S4 SGSN – No Obvious Value of S4 SGSN



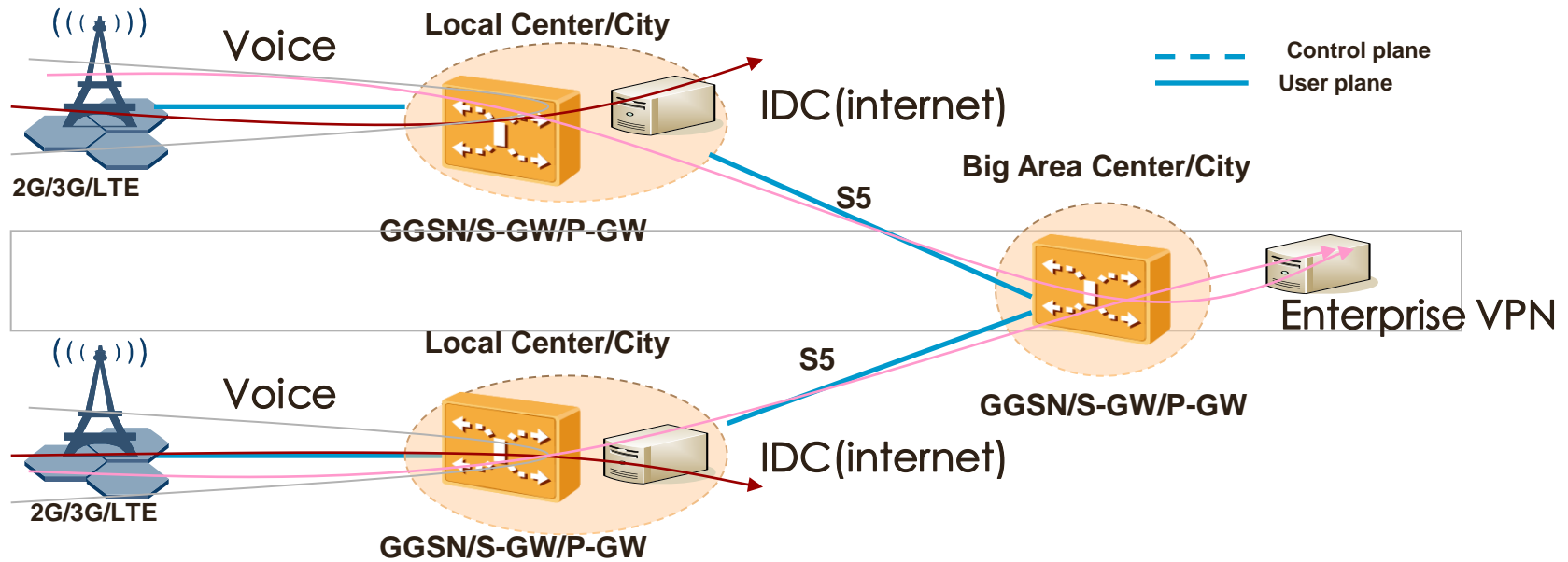
New Features of S4 SGSN

- R8 Direct Tunnel & United Data Plane
- Idle Signaling Reduction
- QCI based united QoS Policy
- Inter-Working with Non-3GPP

Deployment Suggestion of S4 SGSN

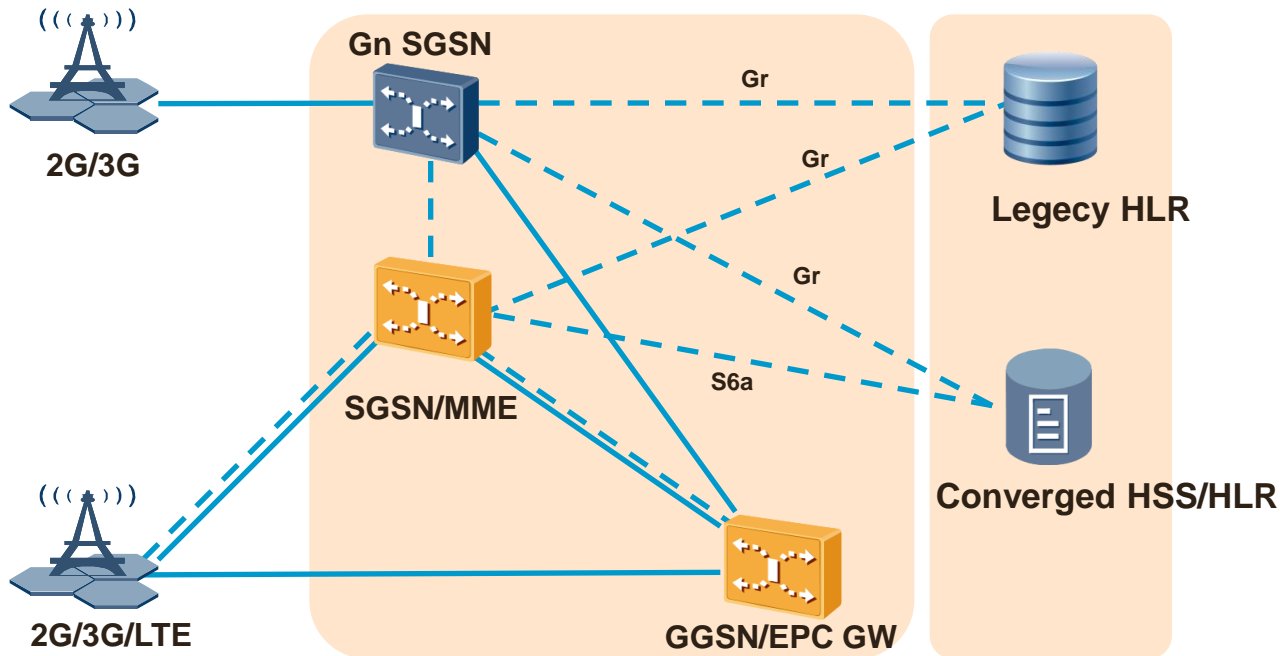
- No obvious gain from new features of S4 SGSN, independent S4 SGSN is not preferred
- Prefer to upgrade converged node to support S4 SGSN+MME with network convergence process

Service Driven Hierarchical EPC GW Deployment



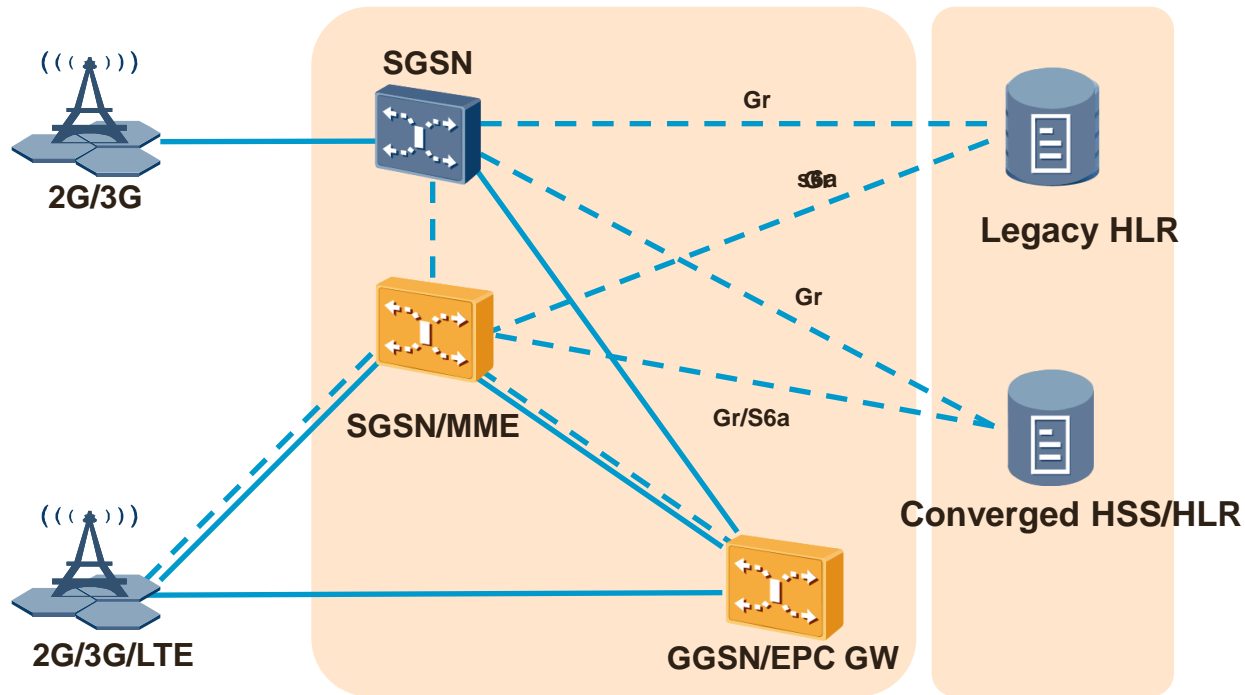
- Distributed GW Deployment will be the main trend
 - ✓ GW together with IDC move to edge for better QoE and lower transport cost
 - ✓ Local switching services, e.g. VoLTE and P2P, require GW to move to edge for higher transport efficiency
- Centralized GW deployment still important in future
 - ✓ To support legacy centralized deployment and operation mode in early LTE deployment stage
 - ✓ To support centralized control for some special services, e.g. VPN

HSS with New Number Segments in Early LTE Deployment



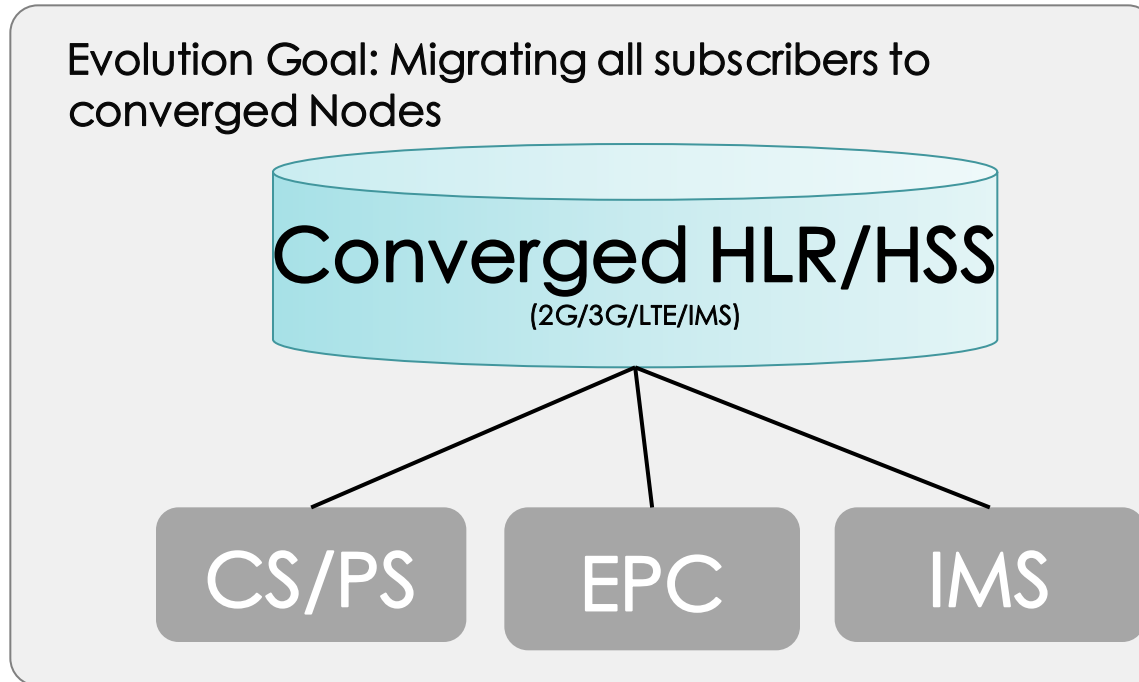
- For early Dongle service oriented LTE deployment, independent HSS with new number segments for subscribers is preferred. But, converged HSS/HLR can be deployed, if inter-RAT HO is required;
- Less impact to legacy HLR and other nodes with independent HSS, and easy for new service deployment

Converged HLR/HSS for Migration to LTE



- To migrate LTE subscribers to normal mobile phone, upgrade legacy HLR to support HSS, to support smooth migration to LTE with no phone number/SIM change
- Converged 2G/3G/4G subscriber data convergence, united charging, easy service provision and management

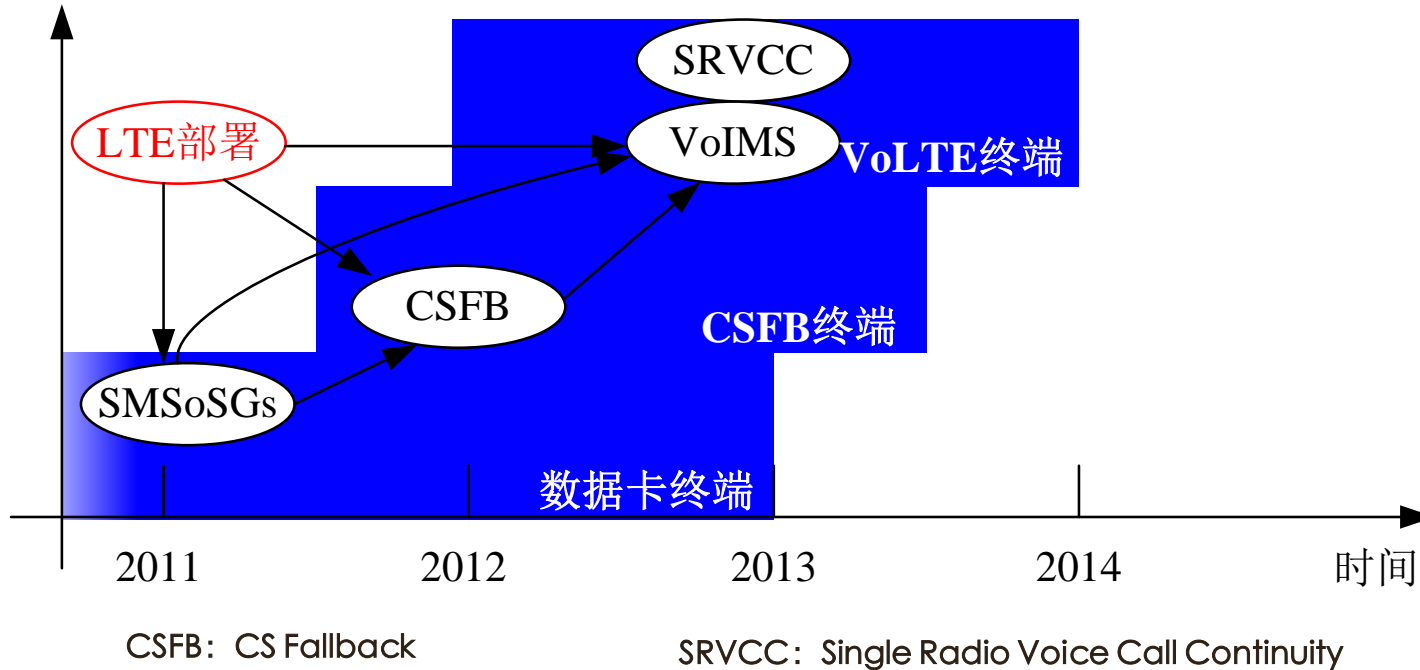
VoLTE is Driving Convergence of HLR/EPC HSS and IMS HSS



Features Provided by Converged Nodes for VoLTE:

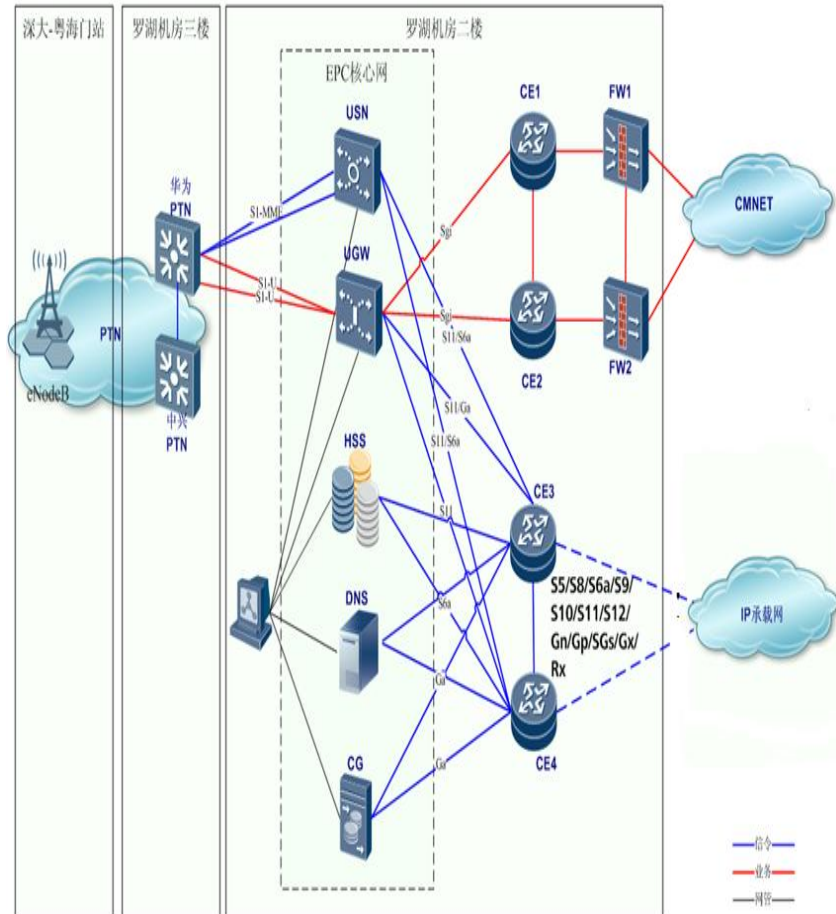
- Inter PS/EPS HO
- Shared Authorization
- System selection for mobile terminated call
- Service Continuity
- Consistence of CS, IMS supplementary services






LTE Voice Deployment based on Terminal Industry Maturity



- Dongle based service in early LTE stage
- CSFB is used as transition approach with Global-scale pre-/commercial LTE deployment
- Single Chip based Large-scale commercial VoLTE terminal

HUAWEI is Promoting EPC Deployment in China



-  Mobile HD Video Conference
-  HD Online Video
-  Mobile Monitoring
-  VOD
-  High Speed Internet
-  Real Time Video Upload



HUAWEI is one of main suppliers for 2010 Shanghai EXPO



HUAWEI provided network converge for CMCC for Guangzhou 2010 ASIA Games



HUAWEI provides network coverage for CMCC for Shenzhen Universiade 2011

HUAWEI deployed pre-commercial TD-LTE networks for CMCC in Hangzhou and Shenzhen in 2012

Summary of EPC Deployment

1 Converged EPC Deployment is Preferred by Main Stream Operators

- Good for CAPEX, OPEX and Network Performance
- For legacy networks with IP based Gb and centralized SGSNs, converged EPC can be implemented based existing geographic sites distribution

2 No Strong Requirements for Moving GW to Edge, future Cache/IDC Deployment will be the Key Factor for Decision

- Moving GW to edge will be based on compromise of CAPEX saving on backbone with distributed GW and OPEX saving with centralized GW
- Local cache is key factor for routing efficiency improvement, when GW is moved to edge

Network Evolution in Next Step

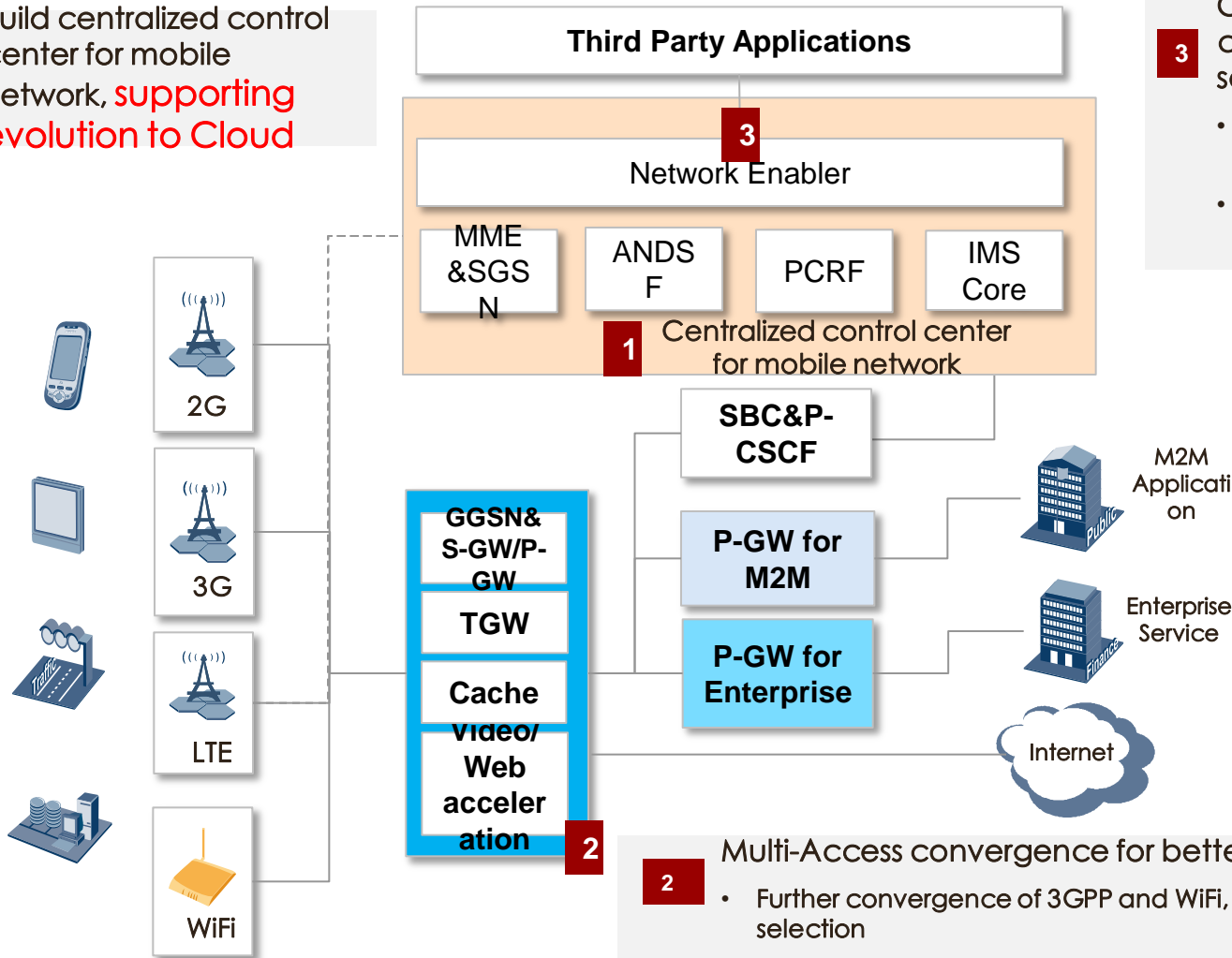
1

Build centralized control center for mobile network, supporting evolution to Cloud

3

Open network capability to support service innovation

- Service based QoS guarantee
- Subscriber based service control



2

Multi-Access convergence for better user experience

- Further convergence of 3GPP and WiFi, intelligent network selection
- Dedicated service GW to support optimization deployment
- Cache and service acceleration to improve user experience

A scenic landscape featuring a railway track that recedes into the distance, flanked by golden-brown fields. In the background, there are rugged mountains under a bright blue sky with scattered white clouds. The overall mood is peaceful and expansive.

Thank You