AGrandTech 4G EPC Product Description

1 System Description

1.1 LTE Architecture

LTE network System include UE, eNB, MME, Serving Gateway, PDN Gateway, HSS and PCRF etc. The figures 1-1 represent the LTE network architecture.
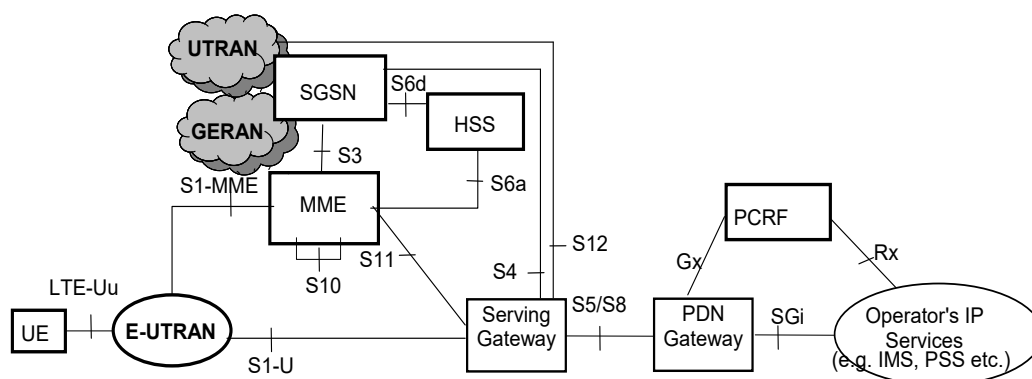

Figure 1-1

The EPC products provide the functions of MME, Serving GW, PDN GW, and HSS. All the interface and function are compliance to the 3GPP Standard.

MME: support NAS signaling and safety,Tracking Area list management, SGW and PGW option ,authentication、 roaming control and bearer management.

SGW: gateway ended to E-UTRAN interface,it is anchor of the turnover between eNodeBs,the mobile anchor for turnover for 3GPP different systems,implement legal detecting,front turning and switching of data placket,grouping label for up and down transmission layers, ECM-IDLE and charging.

PGW: gateway ended to SGi interface and facing to PDN. The tunnel packet point of LTE network data, it is the interface for data to access to LTE networks, packet filtering based on UE, UE IP address distribution, charging, QOS control and bearer control.

1.2 System Architecture

The EPC utilizes the Carrier Grade Linux as the base operating System. the EPC Platform is added on the top of Linux . The applications such as MME, SGW, PGW, HSS etc. are deployed on the platform.

The EPC products fully implement the functions of MME, SGW, PGW and HSS. Moreover, the S11, S5/8 etc. interfaces also be accessed after correctly configuration. Figure 1-3 show the interactions with EPC. So the roaming and handover with 2/3/4G network is supported.
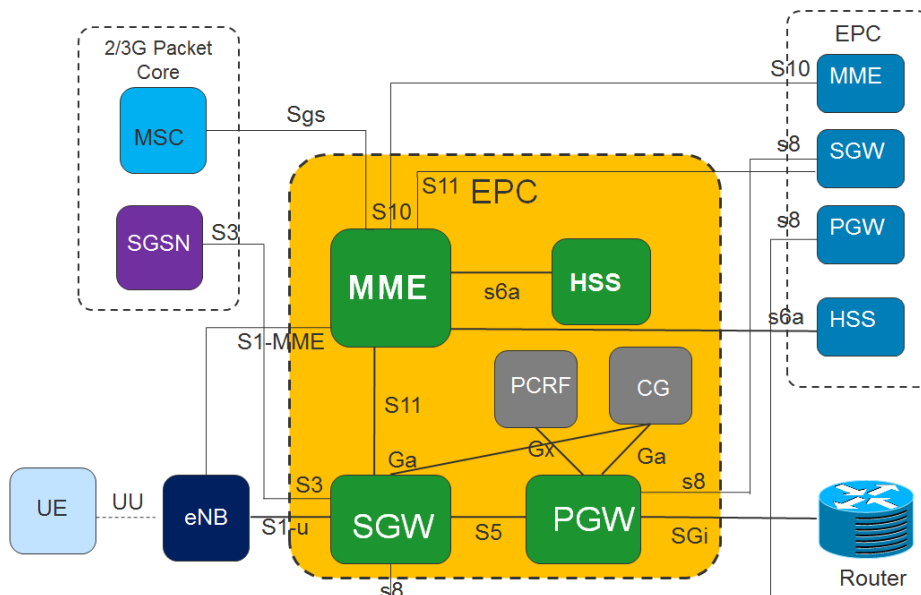

Figure 1-3

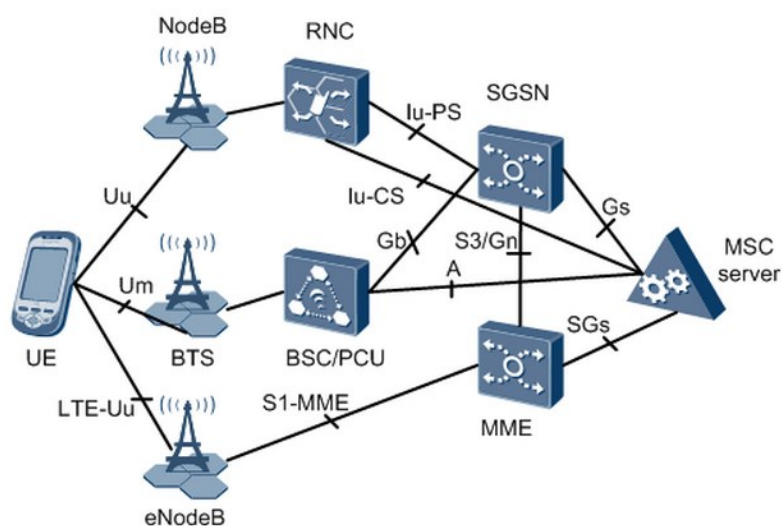Figure 1-3 shows the CSFB(Circuit Switched Fallback in EPS)   is also supported in The EPC products .

Figure 1-4

By deploying the IMS system, VoLTE is supported in The EPC products as show in figure 1-5 below.
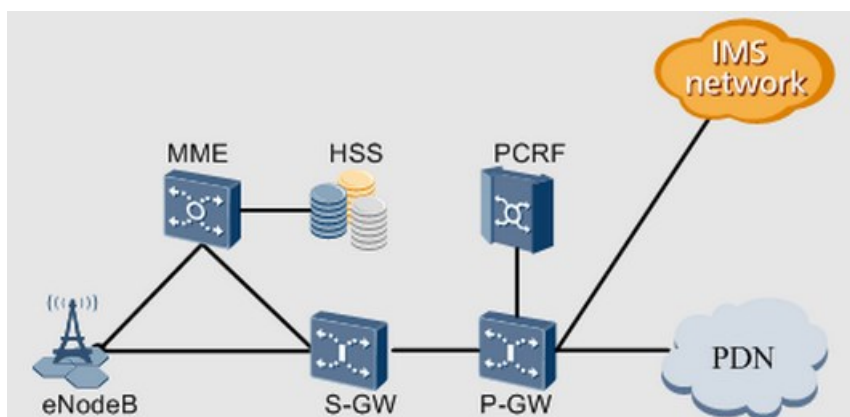

Figure 1-5

1.3   Product features

1.3.1 Comply to 3GPP protocol

The EPC products includes MME、SGW、PGW and HSS，which comply to 3GPP protocol，each one support the main interface for operators ,now support to R9 version.

MME、SGW、PGW and HSS have passed the IOT test with the primary eNB s manufactures in China, the test comply to 3GPP and is under the landslide of SPIRENT.

1.3.2 Design to meet the need of operators and industries

The EPC products comply to operators standard and utilize the high performance standard PC server hardware platform, added by Linux and middle ware to provide the platform to realize the MME,SGW,PGW and HSS with C++/C. The compact EPC is designed to the demand for industries like small to medium operators, Municipal, armed police, public security, electricity, coal, army, petrochemical.

1.3.5 United software platform

The lower software platform and high layer utilities are separated to ensure the high stability and reliability, as well as the upper software flexibility and convenience.

1.3.6 High speed data transfer

SGW and PGW in the EPC is responsible for the data process，we adopt the cavium multi-core and intel DPDK to ensure the high speed data transfer.

1.4 Hardware Description

The EPC uses the general X86 standard server to deploy MME、SGW and PGW.

2 Feature List

2.1 MME Function

Feature	Descriptions
Interface	- S1-MME - S6a - S11 - S10 - S3/Gn - Sgs
Access Control	• Security - Authentication - GUTI allocation function - User equipment identification function - AS security context distributed function - Confidentiality and integrity protection of the NAS signaling - 3G security parameters and EPC security context mapping function • Admission control - on the capacity of system - on the CPU and Memory resource consumption
Mobility management functions	• State model • Attach • Detach • Handover • TAU • Tracking area management • Tracking area update • Paging and service request • Purge UE • Access Restriction function • Multi-PDN connection • ODB function
Session Management	• EPS bearer activation • EPS bearer modification • EPS bearer deactivation • UE AMBR management
Selection Function	• PDN GW selection • Serving GW selection • MME selection function • SGSN selection function
Network management function	• MME Pool function with Load balancing between MMEs • Overload control
APN correction Function	APN correction
Capacity	100-100,000 subscribers 1-500 eNBs

Table 1 MME function

2.2 PGW Function

Feature	Descriptions
Interface	- S5/8 - S11 - Gx - Gy - S5/S8 - Ga - Gn - SGi - Rx
Session Management	Supports the establishment, modification, release of EPS bearers
IP address allocation	Support IPv4 address allocation function through local resource pool
Data forward and route path selection	Downlink data packets are GTP-encapsulated and forwarded to the S-GW, and uplink packets are decapsulated and routed to the external network through the SGi interface.
Charging function	Support online charging function.
QOS control	Support EPS main QoS parameters, such as QCI, ARP, etc.; Support bearer modification for QoS update; Support modification of default bearer QoS based on APN configuration; Support local configuration PCC, and initiate the establishment of proprietary bearers based on local static PCC; Support the establishment and modification of the proprietary bearer initiated by the terminal or the network side, and the QoS is determined by the EPC; Supports bear-level GBR management and beare-level DSCP marking; Support non-GBR APN-AMBR management and other functions.
PCEF function	PCEF function
PCRF Function integrated with PGW	PCRF Function integrated with PGW
Overload control	Overload control
Capacity	100-100,000 subscribers 10Gbps data throughput

Table 2 PGW function

2.3 SGW Function

Feature	Descriptions
Interface	- S1-U - S11 - S5/S8 - Ga - S4/Gn
Session Management	Supports the establishment, modification, release of EPS bearers, and bearer establishment functions that trigger service requests on the network side.
Mobility Management	- Termination of user plane packets due to paging - Support for user plane handover due to UE mobility
Data forward and route path selection	GTP-U datagrams are forwarded between the eNodeB and the P-GW; when switching between eNodeBs, the 'end marker' is used to help achieve packet rearrangement.
QOS control	- Support EPS main QoS parameters, such as QCI, ARP, etc .; - Support terminal and network initiated QoS modification; - Support bear-level GBR management and beare-level DSCP marking function.
Charging function	Charging function
Overload Control	Overload Control
S-GW Pool function	S-GW Pool function
Capacity	100-100,000 subscribers 10Gbps data throughput

Table 3 SGW function

2.4 HSS Function

Feature	Descriptions
Interface	- S6a - Cx - Sh
EPS subscriber Data Management	- Create a Subscriber - Delete a Subscriber - Define and Manage a subscriber template - Modify a subscriber
Authentication Center	- EPS-AKA function - KI/OP/OPC management
Mobility Management	- LTE subscriber mobility management - UE reachable management - Subscriber area roaming restriction - Local Breakout for Roaming
Admission control with	Admission control with Access Type

Access Type	
IMS HSS subscriber data management	IMS HSS subscriber data management
SNMP function	Parameter management State management User data management
Capacity	100-100,000 subscribers

Table 4 HSS function