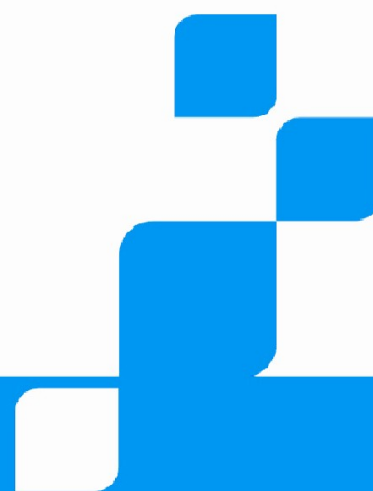




Operator Logo

ZXUN xGW Configuration Guide



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Version	Date	Author	Approved By	Remarks

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1 Overview

1.1 Location of ZXUN xGW in EPS Network

Integration of core network and access agnostic is the trend of mobile network. According to this trend, ZTE provides an integrated core network gateway product, ZXUN xGW (extendable Gateway) which could support 2G, 3G, LTE and non-3GPP access. ZXUN xGW could be deployed as a PDSN, AGW, GGSN, SAE-GW, HA and combo function node to satisfy different scenarios during the evolution to pure LTE/EPC network.

ZXUN xGW is a mobile node connecting EPS backbone network to the external data network and EUTRAN. It could serve as the Serving GW connecting with eNodeB in EUTRAN and/or the PDN GW for subscribers to access the external networks.

ZXUN xGW could also be deployed as GGSN for existing G/U PS network connecting PS backbone network to the external data network.

ZXUN xGW could be deployed as PDSN for existing CDMA/EVDO network connecting the network to the external data network.

ZXUN xGW could be deployed as MIP HA function to support seamless mobility between different networks.

The xGW-GTP is one of main service processing modules in xGW subsystem, responsible for establishing bearer channels between the S1/S5(GTP based)/S4/Gn interfaces, transmitting data on the EPS backbone network and routing and transferring them to external PDN networks for GPRS, UMTS and LTE network. By service features, xGW-GTP has two parts: GTP-C and GTP-U. GTP_C processes signaling of all the signaling planes at the S1/S5 (GTP based)/S11/S4/Gn interface, and is responsible for establishing, updating and deleting the GTP tunnels and triggering reverse PDP activation. GTP_U is responsible for fast routing and forwarding data at the S1/S5 (GTP based)/S4/Gn and SGi interfaces and transmitting packet data. Its position in the EPS systems is shown in Figure 1.

Figure 1 Location of ZXUN xGW in the EPS supporting 3GPP access

The xGW-MIP is another main service processing modules in xGW subsystem, responsible for establishing bearer channels between the S2a/S2b and S5(based on PMIP protocol) interfaces, mainly for transmitting data on the non-3GPP (such as CDMA2000, WiFi...) network and routing and transferring them to external PDN networks. The xGW-PMIPv6 has three parts: PMIPv6 MAG, HA (include PMIPv6 LMA and MIPv4 HA). PMIPv6 MAG function locating in SGW to support PMIPv6 based S5 interface to PGW manages the mobility related signaling for a mobile node that is attached to its access link. It is responsible for tracking the mobile node's movements to and from the access link and for signaling the mobile node's local mobility anchor. MAG is also in charge of encapsulate and de-capsulate package between MAG and PMIPv6 LMA. The xGW-HA (PMIPv6 LMA and MIPv4 HA) is the home agent for the mobile node. It is the topological anchor point for the mobile node's home network prefix (es) and is the entity that manages the mobile node's binding state. Its position in the EPS systems support non-3GPP access is shown in Figure 2.

Figure 2 Location of ZXUN xGW in the EPS supporting non-3GPP

1.2 Interfaces and Protocols of ZXUN xGW

ZXUN xGW has a modular distributed processing structure and executes different functions through different modules. With different combinations of modules, ZXUN xGW conducts the establishment and maintenance of the LTE GTP tunnel or MIP session and routing and forwarding of data between the EPS backbone network and external PDNs. ZXUN xGW also integrates such functions as RADIUS authentication, dynamic address allocation of DHCP, establishment of VPN tunnel, NAT/NAPT private/public address translation, online charging, offline charging, etc. The related interfaces, protocols and functions of ZXUN xGW are listed in Table 1.

Table 1 Related interfaces and protocols of ZXUN xGW for 3GPP function

Interworking NE	Name of interface	Protocol	Interface function
GGSN- Gn/Gp SGSN	Gn	GTPv0/v1	Transmitting GTP signaling/data
GGSN - HLR	Gc	MAP	Location management
GGSN - CG	Ga	GTP'	Charging
GGSN - Internet	Gi	IP	Forwarding data to the external network

Interworking NE	Name of interface	Protocol	Interface function
SGW - MME	S11	GTP-Cv2	Transmitting GTP signaling
SGW -EUTRAN	S1-U	GTPU	Transmitting GTP data
SGW - SGSN	S4	GTPv2	Implementing mobility management between xGW and SGSN
SGW - UTRAN	S12	GTPU	Transmitting GTP data
SGW - PGW	S5/S8	GTPv2	Implementing mobility management and transmitting package between SGW and PGW.
SGW - PGW	S5/S8	PMIPv6	Implementing mobility management and transmitting package between SGW and PGW.
PGW-Gn/Gp SGSN	Gn/Gp	GTPv1	Transmitting GTP signaling/data
PGW - PCRF	Gx	Diameter	Transfer of (QoS) policy and charging rules
SGW - PCRF	Gxc	Diameter	Transfer of (QoS) policy information from PCRF to the Serving Gateway
SGW/PGW - CG	Ga	GTP'	Charging
PGW- trusted non-3GPP	S2a	PMIPv6/MIPv4	Implementing mobility between 3GPP and non-3GPP
PGW-ePDG	S2b	PMIPv6	Implementing mobility between 3GPP and non-3GPP
PGW-AAA	S6b	Diameter	Mobility related authentication
PGW - Internet	SGi	IP	Forwarding data to the external network

2 System Architecture

2.1 ZXUPP 812 Platform Hardware Architecture

ZTE develops next-generation equipment hardware platform: ZXUPP 812 platform oriented to EPC services and control NEs, for example PDSN, AGW, GGSN, SAE-GW, HA and combo function node products.

ZXUN xGW architecture cabinet adopts international standard 19-inch cabinet, in the dimension of 2200mm * 600mm * 800mm (H * W * D).

ZXUN xGW provides products oriented to Middle and Low capacity ZXUPP 812-8(T4000) (1 layer subcabinet, 27U) and products oriented to large capacity ZXUPP 812-16(T8000) (2 layer subcabinet, 38U). ZXUPP 812-8(T4000) and ZXUPP 812-16(T8000) could share the physical boards.

Figure 3 Boards in ZXUPP 812-16(T8000):

Figure 4 Boards in ZXUPP 812-8(T4000)

Figure 5 ZXUN xGW Hardware Diagram

ZXUN xGW system is divided into following parts: interface unit, main control and routing unit, switching unit and service processing unit.

- 1 PFU: Packet Forwarding Unit: This unit is mainly used to implement all kinds of interfaces to the outside, and processes L3 protocol. Generally, the interface unit consists of L1 physical interface, its relevant L2 protocol processing and also IP layer processing. ZXUN xGW provides IP (physically adopts GE/10GE/POS interface types). Interface unit supports working in load-sharing mode and 1+1 active-standby mode.

- 2 MPU: Main Process Unit: This unit is mainly used for control and routing to fulfill the whole system management and routing engine. The main processing unit is working in 1+1 active-standby.
- 3 GSU: General Service Unit: This unit is mainly used for gateway service processing to fulfill the upper layer services and processing of signaling protocols of ZXUN xGW. The general service unit works in 1+1 hot backup mode to support subscribers' session resilience and also N+1 load sharing mode.
- 4 SFU: Switch Fabric Unit: This unit is mainly used for internal switching to make the interconnection between interface unit (PFU) and service processing unit (GSU), and also the interconnection between the different racks. The switching unit supports working in N+1 load-sharing mode.
- 5 CSU: Control and Storage Unit: The CSU includes Load balance unit (LBU) and Charging unit (CU).
 - i LBU: Load Balance Unit: This unit is used for load control of service unit. For each access request from UE (PDP activation request as example), the LBU will calculate the current resource such as CPU load of all available Service Unit (GSU) and make the selection of Service Unit (GSU) for UE.
 - ii CU: Charging Unit: This unit is used for charging data storage such as CDR in abnormal scenario when communication link with external charging system is broken.

2.2 Configuration Principle

The detail of hardware introduction is listed in following table:

2.2.1 Subcabinet

Mandatory, the shelf quantity is decided by the actual capacity.

Table 2 Boards in Service shelf Description(1)

Type	Configuration principle for board	Function	Backup mechanism
MPU	Mandatory; one pair for each office immovably.	Main Process Unit: This unit is mainly used for main control and routing to fulfill the whole system management and routing engine.	1+1 active/standby

Type	Configuration principle for board	Function	Backup mechanism
SFU	Mandatory; Quantity is decided by the actual capacity. One pair for each office immovably when PFU board's flow less than 30Gbps. Otherwise 3 pieces for each office. Each blade provides 480Gbps data throughput.	Switch Fabric Unit: This unit is mainly used for internal switching to make the interconnection between interface unit (PFU) and service processing unit (GSU), and also the interconnection between the different racks.	N+1 load-sharing mode
PFU	Mandatory; Quantity is decided by the actual data flow. Data flow for each piece of PFU is up to 40Gbps. It is also depending on the exact quantity of different types of interfaces.	This unit is mainly used to implement all kinds of interfaces to the outside, and complete the processing to the L3 protocol. It provides IP (physically adopts GE/10GE/POS interface types).	Interface unit supports working in load-sharing mode and 1+1 active-standby mode.
CSU-1	Mandatory; One pair for each office immovably when content charging function is provided.	Control and Storage Unit: The CSU includes Load balance unit (LBU), LIG unit and Charging unit (CU).	1+1 active/standby

Table 3 Boards in Service shelf Description(2)

Type	Configuration principle for board			Function	Backup mechanism
	Mandatory for NE	Without content charging function.	DPI(With content charging function)		
GSU-0	Mandatory for GGSN/SGW/P GW. Quantity related to data flow and users capacity.	400K PDP/EPS bearer/PPP	300K PDP/EPS bearer/PPP	General Service Unit: This unit is mainly used for gateway service processing to fulfill the upper layer services and processing of signaling protocols of ZXUN xGW(GGSN/SGW/P GW).	1+1 hot backup mode and N+1 load-sharing mode(N<=5)
		5Gbps data throughput	3Gbps data throughput		
	Mandatory for PDSN. Quantity related to data flow and users	300K PDP/EPS bearer/PPP	N/A	General Service Unit: This unit is mainly used for gateway service processing to fulfill the upper layer services and	1+1 hot backup mode and N+1 load-sharing

Type	Configuration principle for board			Function	Backup mechanism
	Mandatory for NE	Without content charging function.	DPI(With content charging function)		
	capacity.	3Gbps data throughput.	N/A	processing of signaling protocols of ZXUN xGW(PDSN).	mode(N<=5)
	Mandatory for HA. Quantity related to data flow and users capacity. Without content charging function.	400K PDP/EPS bearer/PPP	300K PDP/EPS bearer/PPP	General Service Unit: This unit is mainly used for gateway service processing to fulfill the upper layer services and processing of signaling protocols of ZXUN xGW(HA).	1+1 hot backup mode and N+1 load-sharing mode(N<=5)
		5 Gbps data throughput	3 Gbps data throughput		
GSU-1	Mandatory for GGSN/SGW/P GW. Quantity related to data flow and users capacity.	800K PDP/EPS bearer/PPP	600K PDP/EPS bearer/PPP	General Service Unit: This unit is mainly used for gateway service processing to fulfill the upper layer services and processing of signaling protocols of ZXUN xGW(GGSN/SGW/PGW).	1+1 hot backup mode and N+1 load-sharing mode(N<=5)
		10 Gbps data throughput	6 Gbps data throughput		
	Mandatory for PDSN.	600K PDP/EPS bearer/PPP	N/A	General Service Unit: This unit is mainly used for gateway service processing to fulfill the upper layer services and processing of signaling protocols of ZXUN xGW(PDSN).	1+1 hot backup mode and N+1 load-sharing mode(N<=5)
		6 Gbps data throughput.	N/A		
	Mandatory for HA. Quantity related to data flow and users capacity.	800K PDP/EPS bearer/PPP	600K PDP/EPS bearer/PPP	General Service Unit: This unit is mainly used for gateway service processing to fulfill the upper layer services and processing of signaling protocols of ZXUN xGW(HA).	1+1 hot backup mode and N+1 load-sharing mode(N<=5)
		10 Gbps data throughput	6 Gbps data throughput		
GSU-2	Mandatory for GGSN/SGW/P GW. Quantity related to data	1200K PDP/EPS bearer/PPP	900K PDP/EPS bearer/PPP	General Service Unit: This unit is mainly used for gateway service processing to fulfill the	1+1 hot backup mode and N+1 load-

Type	Configuration principle for board			Function	Backup mechanism
	Mandatory for NE	Without content charging function.	DPI(With content charging function)		
	flow and users capacity.	15Gbps data throughput	9Gbps data throughput	upper layer services and processing of signaling protocols of ZXUN xGW(GGSN/SGW/PGW).	sharing mode(N<=5)
	Mandatory for PDSN.	900K PDP/EPS bearer/PPP	N/A	General Service Unit: This unit is mainly used for gateway service processing to fulfill the upper layer services and processing of signaling protocols of ZXUN xGW(PDSN).	1+1 hot backup mode and N+1 load-sharing mode(N<=5)
		9 Gbps data throughput.	N/A		
	Mandatory for HA. Quantity related to data flow and users capacity.	1200K PDP/EPS bearer/PPP	900K PDP/EPS bearer/PPP	General Service Unit: This unit is mainly used for gateway service processing to fulfill the upper layer services and processing of signaling protocols of ZXUN xGW(HA).	1+1 hot backup mode and N+1 load-sharing mode(N<=5)
		15 Gbps data throughput	9 Gbps data throughput		

3 Configuration Example

3.1 Configuration Example

3.1.1 ZXUPP 812-16 40G Typical Commercial Configuration

Typical configuration in single logical network element:

- GGSN (without DPI): 45Gbps, 3600K PDP;
- GGSN (With DPI): 27Gbps, 2700K PDP;
- HA (without DPI): 45Gbps, 3600K PDP;
- HA (With DPI): 27Gbps, 2700K PDP;
- PDSN: 27Gbps, 2700K PPP;

Figure 6 ZXUPP 812-16 40G typical commercial configuration

Explanation:

MPU unit: 2 pieces;

SFU unit: 3 pieces, which provide 60Gbps switching capacity for each slot (30Gbps redundancy).

PFU unit: 2 pieces, full-load operation, which can provide 80Gbps forward capacity (40Gbps redundancy), different interface sub cards such as GE/10GE/electrical/optical could be configured according to specific requirements;

CSU-1 unit: 2 pieces;

Primary GSU-2: 3 pieces, which provide 45Gbps processing capacity; (5Gbps redundancy);

Spare GSU-2: 1 piece, which adopts 3+1 hot back-up mode to back up the user's PDP context of primary GSU-2.

3.1.2 ZXUPP 812-16 Minimum Capacity Commercial Configuration

Capacity Explanation:

GGSN (without DPI): 5Gbps, 400K PDP;

GGSN (With DPI): 3Gbps, 300K PDP;

HA (without DPI): 5Gbps, 400K PDP;

HA (With DPI): 3Gbps, 300K PDP;

PDSN: 3Gbps, 300K MIP PPP.

Figure 7 ZXUPP 812-16 40G minimum capacity commercial configuration

MPU unit: 2 pieces;

SFU unit: 2 pieces, which provide 30Gbps switching capacity for each slot (30Gbps redundancy).

PFU unit: 2 pieces, full-load operation, which can provide 80Gbps forward capacity (40Gbps redundancy), different interface sub cards such as GE/10GE/electrical/optical could be configured according to specific requirements;

CSU-1 unit: 2 pieces;

Primary GSU-0: 1 piece, which provides 5Gbps processing capacity;

Spare GSU-0: 1 piece, which adopts 1+1 hot back-up mode to back up the user's PDP context of primary GSU-0.

Abbreviations

Board name	Board meanings
PFU	Packet Forwarding Unit
MPU	Main Process Unit
GSU	General Service Unit
SFU	Switch Fabric Unit
CSU	Control and Storage Unit