The Polaris Networks Home eNodeB Gateway is based on an innovative, enterprise in-building architecture that provides the control capabilities necessary to manage large clusters of femtocells. The primary function of this gateway is to enable simple, seamless, highly secure access to subscribers as they roam between trusted mobile networks and untrusted public networks.

The Home eNodeB Gateway provides an aggregation or concentration functionality for a group of Femtocell Access Points (FAPs). This preserves the hierarchical architecture of the current generation of the Core Network as it does not expose a large number of eNodeBs to the Core Network elements.

The Home eNodeB Gateway is a standards based implementation based on the 3GPP TR 23.830 architecture. It supports both 3GPP Release 9 and Release 10 specifications.

**CONTROL PLANE AGGREGATION**

The Polaris HeNB-GW offers a comprehensive set of control-plane aggregation functions. It supports the ability to register and route the S1-MME signaling traffic from a large cluster of FAPs where multiple user devices are registered. It enables the MME to view the cluster of femtocells as a single entity. The HeNB-GW provides Paging Optimization – a mechanism for filtering paging messages in order to avoid paging distribution to HeNB/CSG cells where the UE is not registered. It also provides the NAS Node Selection Function (NNSF) to support S1-Flex or multiple S1-MME connections towards the EPC from any one HeNB.

**USER PLANE AGGREGATION**

The HeNB-GW offers a user-plane concentration function along with the control-plane concentration function. This allows the S-GW to view the cluster of femtocells as a single entity. The HeNB-GW may be used only for user-plane aggregation, with the femtocells connected directly to the S-GW. The user-plane aggregation functionality provides support for both GTP-u and PMIP traffic.

**SECURITY GATEWAY**

The HeNB-GW can be used with an external Security Gateway (Se-GW). Optionally, the HeNB-GW can also provide an integrated Security Gateway that authenticates each femtocell and terminates the encrypted IPsec data connection from the femtocell. The Se-GW implements a Denial of Service (DoS) shield to protect the EPC (MME and SGW) by detecting and filtering out the attack traffic while maintaining the QoS of useful traffic.

**BENEFITS & FEATURES**

- The HeNB-GW provides
  - Standards-based S1-MME & S1-U Network Interfaces
  - An integrated Security Gateway (Se-GW) to secure the communication between the HeNB and the HeNB-GW using IPsec tunnels
  - Paging Optimization – a mechanism for filtering paging messages in order to avoid paging distribution to HeNB/CSG cells where the UE is not registered
  - NAS Node Selection Function (NNSF) - to support S1-Flex or multiple S1-MME connections towards the EPC from any one HeNB
  - Selected IP Traffic Offload (SIPTO) by implementing Local SGW and P-GW functionality within the HeNB-GW
  - Denial of Service (DoS) shield to protect the EPC (S-GW and MME) by detecting and filtering out the attack traffic while maintaining the QoS of useful traffic
  - Easy-to-integrate configuration and management solution with an SNMP interface and a browser-based GUI

- Superior performance – rapid tunnel setup rates, exceptional throughput, low memory footprint of 10 KB per HeNB
- Support for Signaling traffic for up to 64,000 Femto Access Points
Traffic Offload

The Home eNodeB gateway from Polaris helps to reduce traffic in the Core Network by offloading users from the cellular network. It supports Selected IP Traffic Offload (SIPTO) by implementing Local S-GW and P-GW functionality within the HeNB-GW.

Hardware & Platforms

Hardware

The Polaris HeNB-GW is available on several carrier-class, high-availability hardware platforms, including single-node 1U rack-mountable chassis and multi-node ATCA and MicroTCA bladed systems.

Operating System

The Polaris HeNB-GW is implemented on the Linux operating system and is supported on various Linux distributions, such as RedHat Enterprise Linux, WindRiver Carrier Grade Linux, MontaVista Linux Carrier Grade Edition and Debian CGL.

Interfaces

Physical Interfaces
- 10 Gigabit Ethernet
- Gigabit Ethernet
- Fast Ethernet

3GPP Interfaces
- S1-MME
- S1-U (GTP)
- S1-U (PMIP)

Management Interfaces
- Simple Network Management Protocol (SNMP) versions 1, 2, 3
- TR-069

Technical Specifications

- 3GPP TS 36.413 Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol (S1AP)
- 3GPP TS 29.281 General Packet Radio System (GPRS) Tunneling Protocol User Plane (GTPv1-U)
- 3GPP TR 23.830 Architecture aspects of Home NodeB and Home eNodeB
- 3GPP TR 23.829 Local IP Access and Selected IP Traffic Offload
- IETF RFC 4960 Stream Control Transmission Protocol
- IETF RFC 5213 Proxy Mobile IPv6

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