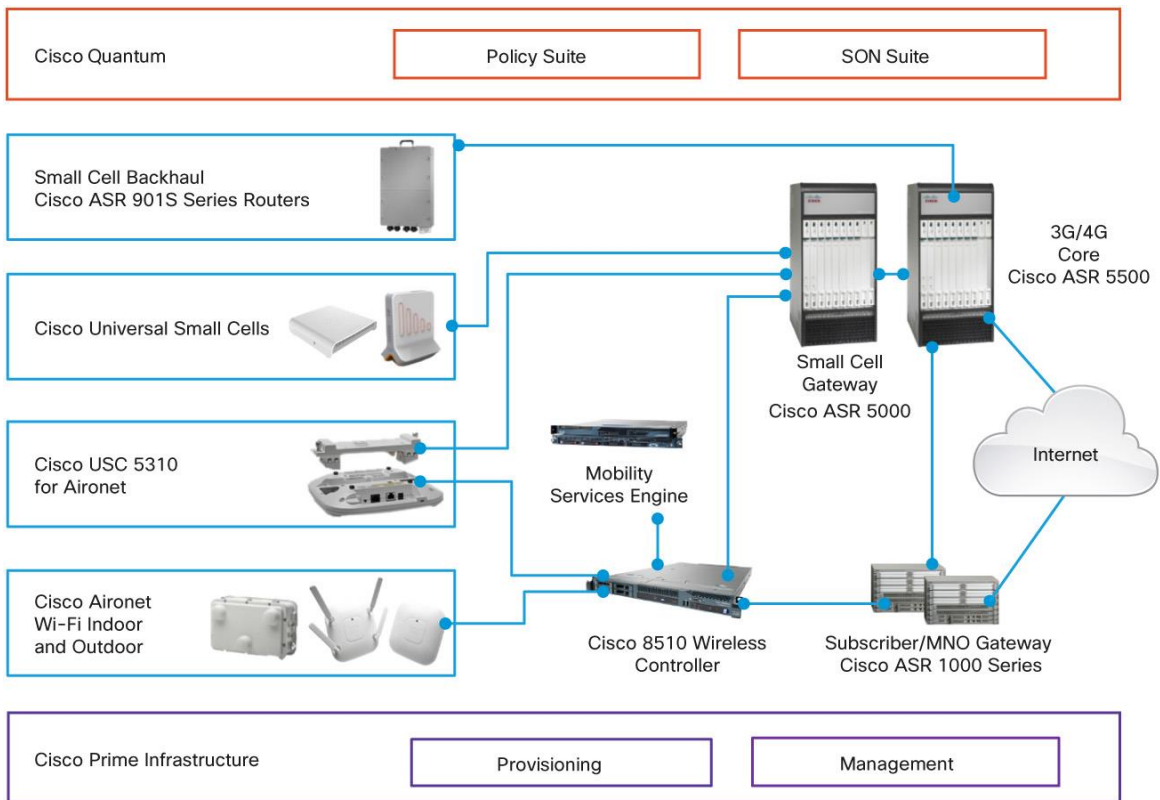


Cisco ASR 5000 Series Small Cell Gateway

Mobile subscribers are accessing the network at home, work, hotspots, and everywhere in between. Mobile operators globally are adopting a coverage and capacity strategy that uses both licensed and unlicensed small cells to meet this growing demand, particularly indoors where 80 percent of traffic occurs. Indoor small cells also provide new service opportunities based on their rich location and context information.

The Cisco® ASR 5000 Series Small Cell Gateway is an integral element in both the Cisco Service Provider Wi-Fi Solution and the Cisco Licensed Small Cell Solution (Figure 1). The Cisco Small Cell Gateway gives subscribers easy access as they transparently roam between third and fourth generation (3G/4G) macro, small cell and Wi-Fi networks.

Figure 1. Cisco Small Cell Solution



The Cisco ASR 5000 Series Small Cell Gateway (Figure 2) provides:

- Exceptional levels of security
- Seamless mobility between network types, including 3G/4G macro and small cells and Wi-Fi
- Market-leading IP Security/Internet Key Exchange Version 2 (IPsec/IKEv2) tunnel performance
- Integration of multiple network functions into a single platform for the lowest possible total cost of ownership
- A single platform for common services across Wi-Fi, 3G, 4G Packet Core and Small Cells
- Voice-grade reliability
- Smooth upgrade to 4G

Deployed on the Cisco ASR 5000 multimedia core platform, the Cisco ASR 5000 Series Small Cell Gateway supports multiple standards-based functions including:

- Standalone 3G and 4G licensed small cells (for residential and small and medium-sized businesses)
- Indoor Wi-Fi
- Indoor Wi-Fi plus licensed small cells
- Outdoor Wi-Fi plus licensed small cells

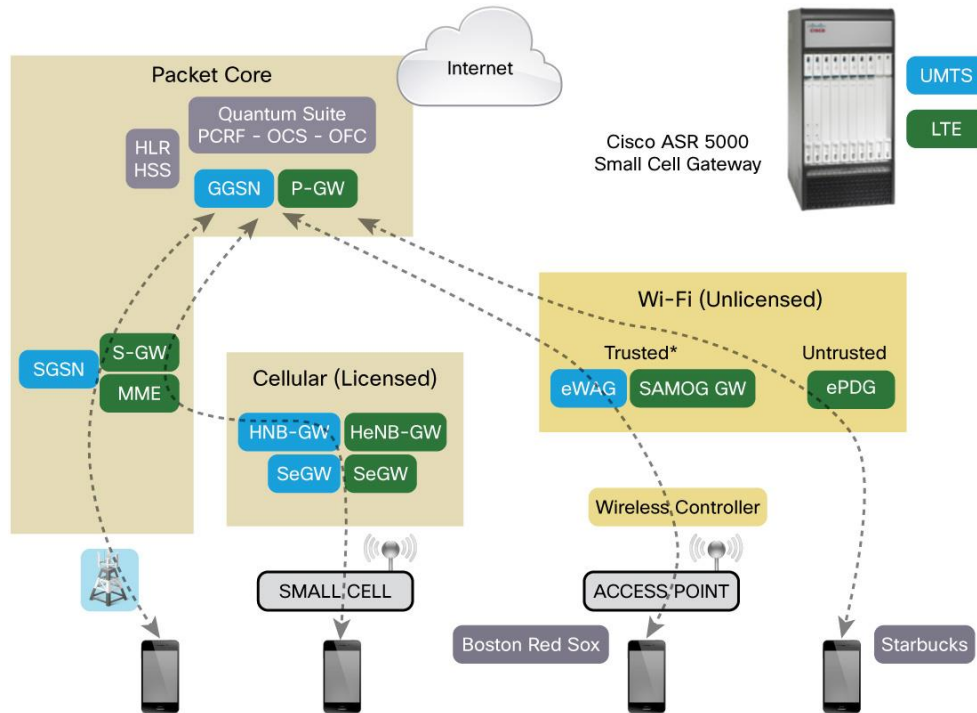
Figure 2. Cisco ASR 5000 Series Small Cell Gateway



Service Provider Wi-Fi Gateways

Service provider Wi-Fi has emerged as a popular and low-cost method for offloading data traffic from licensed spectrum. The Cisco ASR 5000 Series Small Cell Gateway supports service provider Wi-Fi gateway functions for both trusted and untrusted deployments (Figure 3).

Figure 3. Cisco ASR 5000 Series Small Cell Gateway Support for Licensed and Unlicensed Small Cells



*Trusted Access is operator decision based on security aspects of WiFi network.

When the mobile network operator owns, deploys, and controls Wi-Fi network access elements and the backhaul to the core, the deployment is considered trusted. The Cisco ASR 5000 Series supports two types of trusted Wi-Fi gateways:

- Evolved wireless access gateway (eWAG) for Universal Mobile Telecommunications Service (UMTS) access to the gateway GPRS support node (GGSN)
- S2a-based Mobility on GTP (SaMOG) gateway for LTE access to the PDN gateway (PGW)

Both the eWAG and SaMOG receive data traffic from the wireless LAN controller (WLC) that controls the access points that provide Wi-Fi connectivity to the mobile device. Main features include:

- Extensible Authentication Protocol Subscriber Identity Module (EAP-SIM), EAP-AKA authentication
- STa (Diameter) and Radius interface to authentication, authorization, and accounting (AAA) server
- S2a GPRS Tunneling Protocol (GTP) Version 2 interface to PGW, GTPv1 interface to GGSN
- Ethernet over GRE (EoGRE) interface to the WLC
- PMIPv6 interface to the WLC
- Web authorization for non-EAP-SIM access (such as tablets)

- Call detail record generation
- Lawful Intercept support
- Local breakout for direct access to Internet
- Multiple Packet Data Protocol (PDP) session support

When the mobile network operator does not control the WLAN access, the deployment is considered untrusted. A typical example is a Wi-Fi connection to the Internet in a coffee shop. In this case, the mobile user needs to have an IPSec client and needs to establish a secure tunnel to the gateway. The Cisco ASR 5000 Series supports evolved Packet Data Gateway (ePDG) for LTE access to the PGW.

Key features of ePDG are:

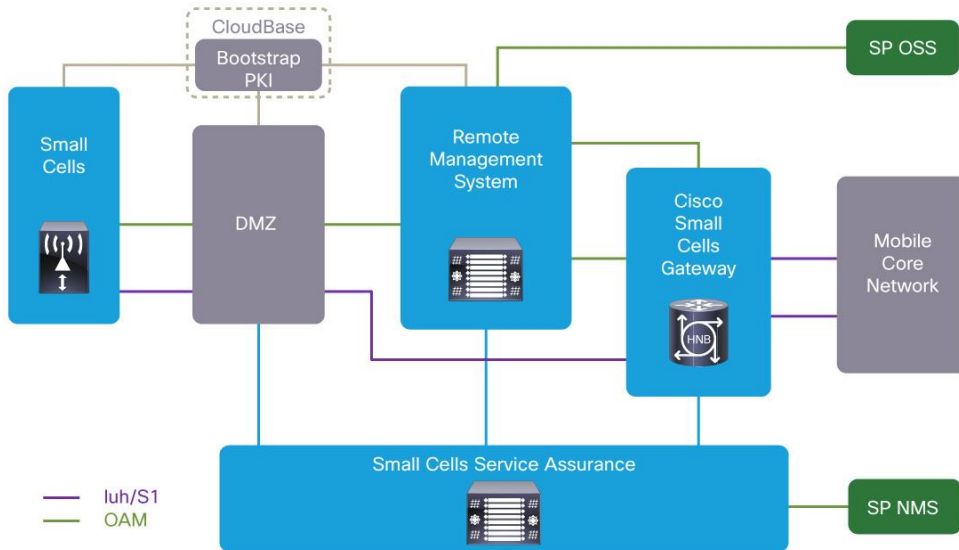
- IKEv2 and IPSec encryption
- S2b GTPv2 interface to the PGW
- Multiple PDP session support

Small Cell Gateway Solutions

The Cisco ASR 5000 Series Small Cell Gateway provides a complete solution for 3G and 4G small cells or Home Node-B (HNB) and Home eNode-B (HeNB) aggregation. Figure 4 illustrates the use of the Cisco ASR 5000 Series Small Cell Gateway in a 3G or 4G small cell architecture with the following main features:

- 3GPP standard compliance on all interfaces (Iuh, Iurh, IuCS, IuPS, IuBC, S1-MME, and S1-U, X2)
- Iu-Flex and S1-Flex for multicore network connectivity
- Full idle and active mode mobility between macro and small cells and small cell to small cell
- Open, closed, and hybrid access mode
- Home, small and medium-sized business, and enterprise deployments
- Intelligent paging
- Overload and congestion control
- Stream Control Transmission Protocol (SCTP) multihoming
- Cell Broadcast Service, also known as Commercial Mobile Alert System (CMAS)
- Integrated Security Gateway (SeGW)
- Multiple authentication (X.509 and EAP-SIM/AKA)
- Zonal Presence and Services API

Figure 4. Cisco ASR 5000 Series Small Cell Gateway: HNB-GW, HeNB-GW



Whether used for WLAN, small cell, or other emerging technologies, the gateway supports increasingly comprehensive and highly secure mobile services for subscribers while helping to reduce the mobile operator's capital and operational expenditures.

Features and Benefits

The Cisco ASR 5000 Series Small Cell Gateway offers:

- **Superior performance and security**, including IPsec tunnels, rapid tunnel setup rates, exceptional throughput, and deep packet inspection (DPI)

Benefit: Provides an exceptional customer experience, which helps increase revenue and foster customer loyalty
- **Distributed architecture** that facilitates integration of multiple access gateway functions on the same platform with the mobile packet core and Evolved Packet Core, such as service GPRS support node (SGSN), GGSN, Mobility Management Entity (MME), Serving Gateway (SGW), and PGW functions

Benefit: Reduces the number of components in the network, decreasing the number of potential points of failure and promoting lower capital and operational expenditures
- **Fully standards-based, highly secure access** for multiple access applications: Wi-Fi (eWAG, SAMOG, and ePDG) and 3G/4G small-cell (HNB-GW and HeNB-GW) solutions

Benefit: Gives operators greater security and freedom to choose the right access application for their specific needs, without the requirement to design an access solution around the limitations of multiple diverse products

Summary

The Cisco ASR 5000 Series Small Cell Gateway provides a highly secure communications gateway between external untrusted networks and trusted networks. This solution supports multiple security standard functions, including ePDG, eWAG, SAMOG GW, HNB-GW, and HeNB-GW. With superior performance, reliability, and the capability to integrate the security gateway function into existing SGSN, SGW, GGSN, and PGW packet data nodes, this solution reduces both capital and operational expenditures. Whether used for Wi-Fi, licensed small cells, or other emerging technologies, the gateway helps you provide an outstanding mobile experience for your subscribers.

Table 1. Cisco ASR 5000 Series Small Cell Gateway Specifications

Description	Specification
Wi-Fi functions	<ul style="list-style-type: none"> • eWAG • ePDG • SAMOG
3G/4G small cell functions	<ul style="list-style-type: none"> • HNB-GW • HeNB-GW
Interfaces	<ul style="list-style-type: none"> • 10 Gigabit Ethernet • Gigabit Ethernet • Fast Ethernet
Connectivity	<ul style="list-style-type: none"> • Iuh, Iurh • IuCS, IuPS, IuFlex, • IuBC • S1 MME, S1 U, S1 Flex • X2
IPsec tunneling	<ul style="list-style-type: none"> • Encapsulating Security Payload (ESP) tunnel mode • ESP anti-replay protection • Perfect Forward Secrecy (PFS)
IKEv2 and IPv4/v6	<ul style="list-style-type: none"> • RFC 4306-compliant • Multiple Child SA support • NAT Traversal (RFC 3947), NAT Keepalive, and ACL • Configurable Dead Peer Detection (RFC 3706) timer support • Diffie-Hellman Groups 1, 2, 5, and 14 • DoS protection including thresholds for control plane attacks
Encryption and authentication algorithms	<ul style="list-style-type: none"> • HMAC-MD5-96 (RFC 2403) NULL Encryption (RFC 2410) • HMAC-SHA1-96 (RFC 2404) • AES-128-CBC (RFC 3602) • DES-CBC (RFC 2405) • AES-192-CBC • 3DES-CBC (RFC 2451) • PRF_AES-128-XCBC
Authentication, authorization, and accounting (AAA)	<ul style="list-style-type: none"> • RADIUS AAA client support <ul style="list-style-type: none"> ◦ Dynamic authorization extensions to RADIUS • EAP authenticator <ul style="list-style-type: none"> ◦ Single EAP, user, device, or user/device authentication ◦ EAP-AKA, EAP-SIM ◦ Fast reauthentication • RADIUS accounting: per-session, per-R6 bearer connection, or per-application service flow • RADIUS AAA server groups • RADIUS custom dictionaries

Description	Specification
IP address allocation	<ul style="list-style-type: none"> • AAA assignment • Local pools (dynamic or static) • Overlapping private IP address pools • Dynamic home-agent address allocation • DHCP proxy server
Quality of service (QoS)	<ul style="list-style-type: none"> • Network admission control • Multiflow QoS traffic classification • DiffServ Code Point (DSCP) marking/re-marking

For More Information

Please visit <http://www.cisco.com/go/mobileinternet> or <http://www.cisco.com/go/smallcell>.



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