



CHAPTER 1

Overview of the Cisco Mobile Wireless Home Agent

This chapter illustrates the functional elements in a typical CDMA2000 packet data system, the Cisco products that are currently available to support this solution, and their implementation in Cisco IOS Mobile Wireless Home Agent software.

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Feature Overview

Cisco's Mobile Wireless Packet Data Solution includes the Packet Data Serving Node (PDSN) with Foreign Agent (FA) functionality, the Cisco Mobile Wireless Home Agent (HA), Authentication, Authorization and Accounting (AAA) servers, and several other security products and features. The solution is standards compliant, and is designed to meet the needs of the mobile wireless industry as it transitions towards third-generation cellular data services.

The Home Agent is the anchor point for mobile terminals for which MobileIP or Proxy MobileIP services are provided. Traffic sent to the terminal is routed through the Home Agent. With reverse tunneling, traffic from the terminal is also routed through the Home Agent.

A PDSN provides access to the Internet, intranets, and Wireless Application Protocol (WAP) servers for mobile stations using a Code Division Multiple Access 2000 (CDMA2000) Radio Access Network (RAN). The Cisco PDSN is a Cisco IOS software feature that runs on Cisco 7200 routers, Catalyst 6500 switches, and Cisco 7600 Internet routers, and acts as an access gateway for Simple IP and Mobile IP stations. It provides FA support and packet transport for virtual private networking (VPN). It also acts as a AAA client.

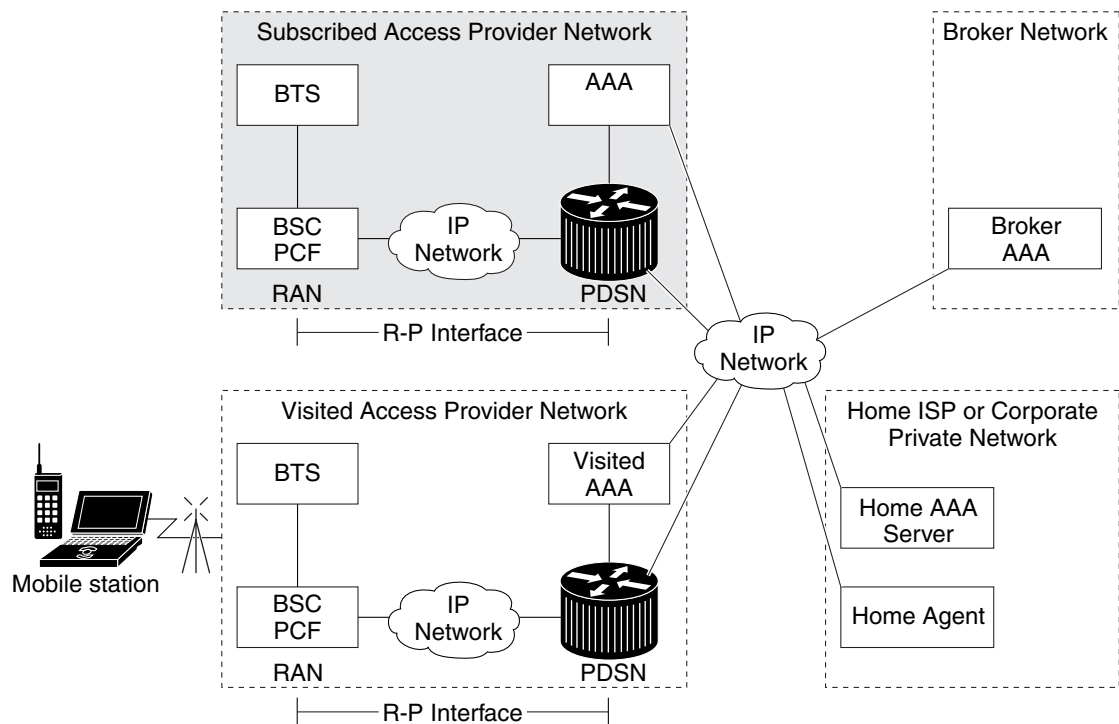
The Cisco PDSN and the Cisco Home Agent support all relevant 3GPP2 standards, including those that define the overall structure of a CDMA2000 network, and the interfaces between radio components, the Home Agent, and the PDSN.

System Overview

terminal equipment, mobile termination, base transceiver stations (BTSs), base station controllers (BSCs), PDSNs, and other CDMA network and data network entities. The PDSN is the interface between a BSC and a network router.

Figure 1-1 illustrates the relationship of the components of a typical CDMA2000 network, including a PDSN and a Home Agent. In this illustration, a roaming mobile station user is receiving data services from a visited access provider network, rather than from the mobile station user's subscribed access provider network.

Figure 1-1 The CDMA Network



As the illustration shows, the mobile station, which must support either Simple IP or Mobile IP, connects to a radio tower and BTS. The BTS connects to a BSC, which contains a component called the Packet Control Function (PCF). The PCF communicates with the Cisco PDSN through an A10/A11 interface. The A10 interface is for user data and the A11 interface is for control messages. This interface is also known as the RAN-to-PDSN (R-P) interface. For the Cisco Home Agent Release 2.1 and above, you must use a Fast Ethernet (FE) interface as the R-P interface on the Cisco 7200 platform, and a Giga Ethernet (GE) interface on the Cisco Multi-Processor WAN Application Module (MWAM) platform.

The IP networking between the PDSN and external data networks is through the PDSN-to-intranet/Internet (P_i) interface. For the Cisco Home Agent, you can use either an FE or GE interface as the P_i interface.

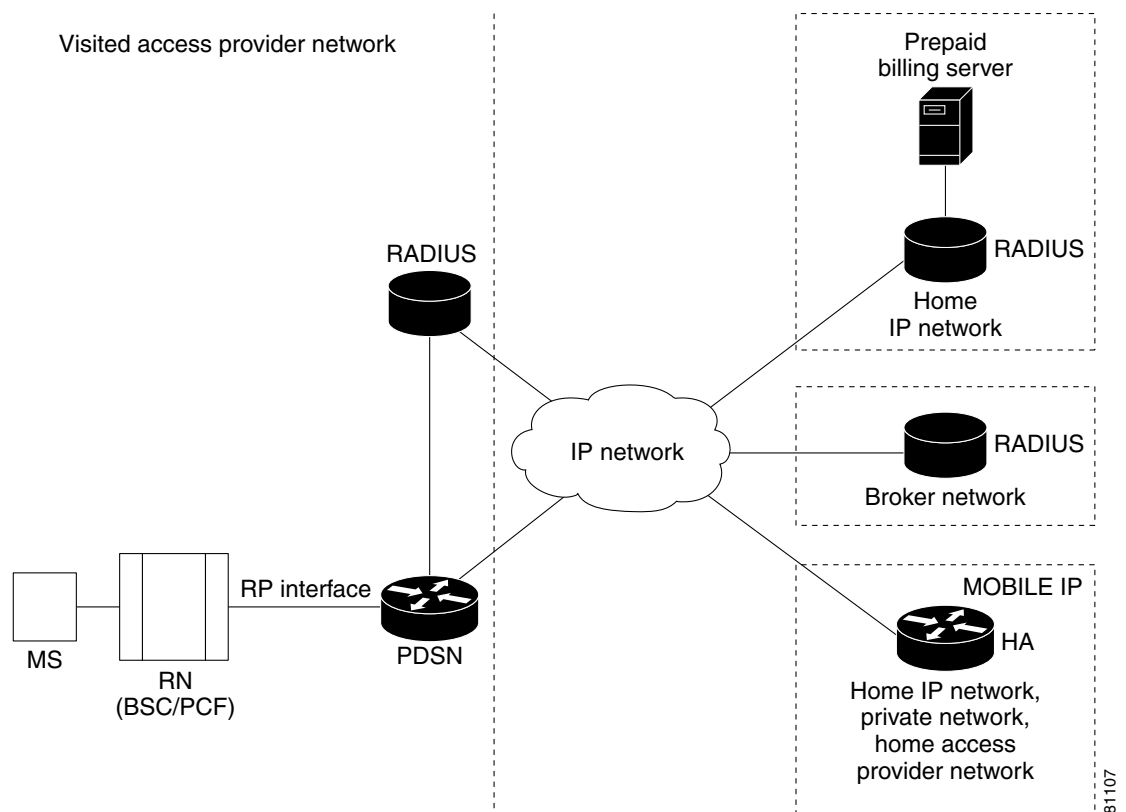
For “back office” connectivity, such as connections to a AAA server, the interface is media independent. Any of the interfaces supported on the Cisco 7206 can be used to connect to these types of services, but we recommend that you use either an FE or GE interface as the P_i interface.

Cisco Home Agent Network

products that are currently available to support this solution. The Home Agent, in conjunction with the PDSN and Foreign Agent, allows a mobile station with Mobile IP client function, to access the Internet or corporate intranet using Mobile IP-based service access. Mobile IP extends user mobility beyond the coverage area of the current, serving PDSN/Foreign Agent. If another PDSN is allocated to the call (following a handoff), the target PDSN performs a Mobile IP registration with the Home Agent; this ensures that the same home address is allocated to the mobile station. Additionally, clients without a Mobile IP client can also make use of these services by using the Proxy Mobile IP capability provided by the PDSN.

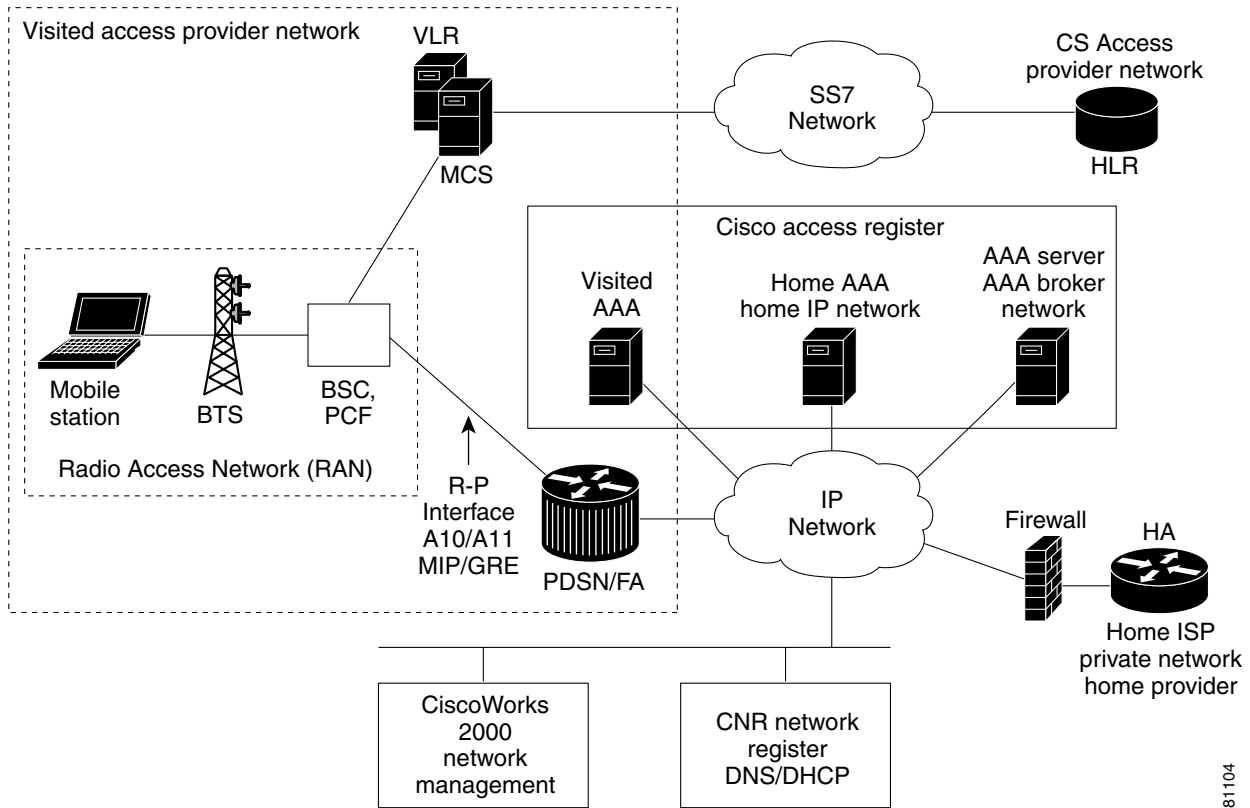
The Home Agent, then, is the anchor point for mobile terminals for which Mobile IP or Proxy Mobile IP services are provided. Traffic is routed through the Home Agent, and the Home Agent also provides Proxy ARP services. In the case of reverse tunneling, traffic from the terminal is also routed through the Home Agent.

Figure 1-2 Cisco Products for CDMA2000 Packet Data Services Solution



For Mobile IP services, the Home Agent would typically be located within an ISP network, or within a corporate domain. However, many ISPs and/or corporate entities may not be ready to provision Home Agents by the time service providers begin rollout of third-generation packet data services. As a remedy, Access service providers could provision Home Agents within their own domains, and then forward packets to ISPs or corporate domains using VPDN services. [Figure 1-3](#) illustrates the functional elements that are necessary to support Mobile IP-based service access when the Home Agent is located in the service provider domain.

Figure 1-3 Cisco Mobile IP-Based Service Access With Home Agent in Service Provider Network

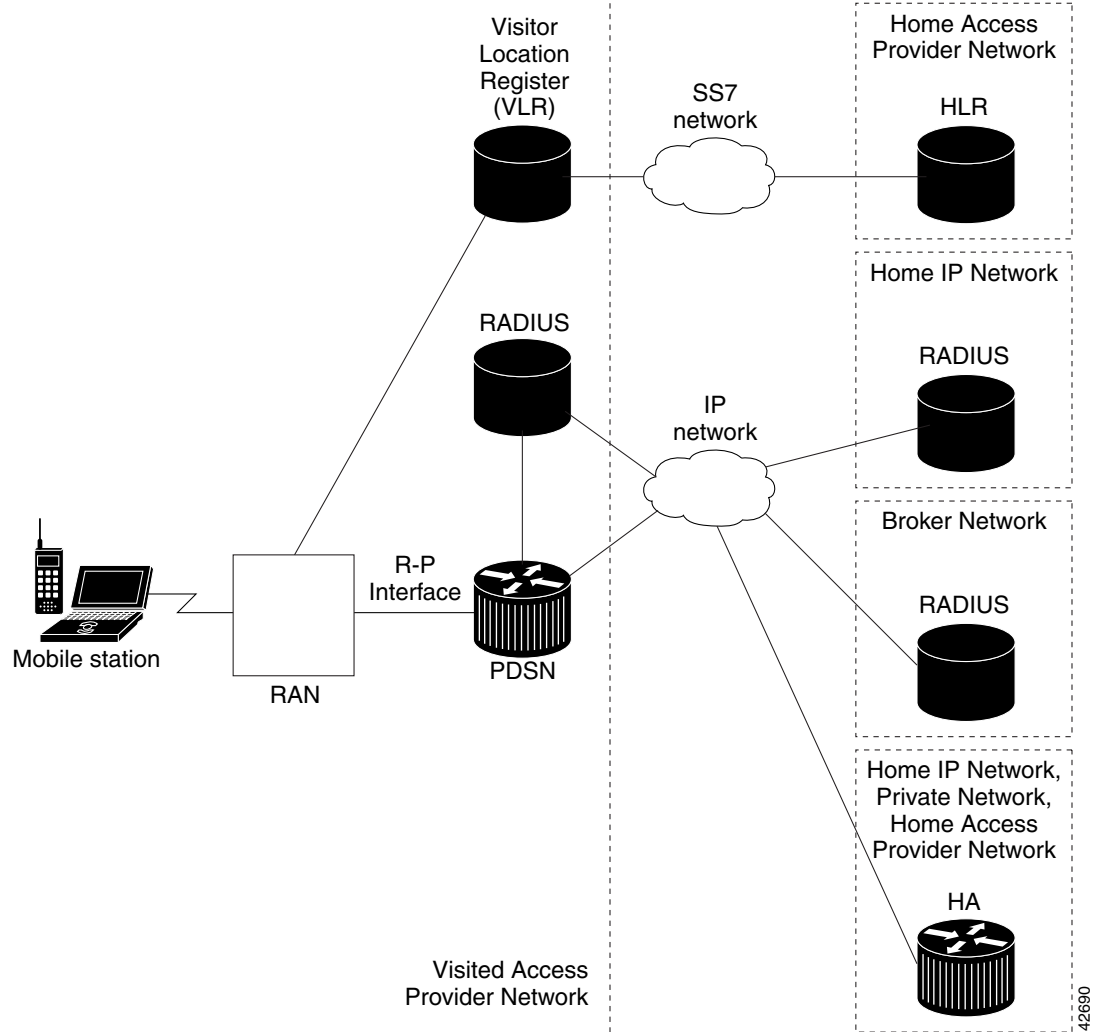


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Packet Data Services

Cisco Mobile IP Service

Figure 1-4 CDMA Network—Mobile IP Scenario



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**Note**

Cisco IOS IP Configuration Guide and *Cisco IOS IP Command Reference* provide the detailed specification in detail. TIA/EIA/IS-835-B also defines how Mobile IP is realized in the Home Agent.

Cisco Proxy Mobile IP Service

While PPP, which is widely used to connect to an Internet Service Provider (ISP), is ubiquitous in IP devices, certain service providers lack commercially available Mobile IP client software. As an alternative to Mobile IP, you can use Cisco's Proxy Mobile IP feature. This capability of the Cisco PDSN, which is integrated with PPP, enables the PDSN (functioning as a Foreign Agent) and a Mobile IP client, to provide mobility to authenticated PPP users.

The communication process occurs in the following order:

1. The Cisco PDSN (acting as an FA) collects and sends mobile station authentication information to the AAA server (specifically, PPP authentication information).
2. If the mobile station is successfully authorized to use Cisco PDSN Proxy Mobile IP service, the AAA server returns the registration data and an HA address.
3. The FA uses this information, and other data, to generate a registration request (RRQ) on behalf of the mobile station, and sends it to the Cisco HA.
4. If the registration is successful, the Cisco HA sends a registration reply (RRP) that contains an IP address to the FA.
5. The FA assigns the IP address (received in the RRP) to the mobile station, using IP control protocol (IPCP).
6. A tunnel is established between the Cisco HA and the FA, or PDSN. If reverse tunneling is enabled, the tunnel carries traffic to and from the mobile station.

**Note**

The PDSN takes care of all Mobile IP re-registrations on behalf of the Proxy-MIP client.

Features

New Features in IOS Release 12.3(14)YX1

Release 12.3(14)YX1:

- [Mobile Equipment Identifier \(MEID\) Support, page 14-5](#)

This section describes features that were introduced or modified in Home Agent Release 3.0:

- [Home Agent Accounting Enhancements](#)
 - Home Agent Accounting in a Redundant Setup
 - Packet count and Byte count in Accounting Records
 - Additional Attributes in the Accounting Records
 - Additional Accounting Methods—Interim Accounting is Supported.

[VRF Mapping on the RADIUS Server](#)

[Conditional Debugging Enhancements](#)

[Home Agent Redundancy Enhancements](#)

- [Geographical Redundancy](#)
- [Redundancy with Radius Downloaded Pool Names](#)

[SNMP Traps to Track Utilization of Local IP Pool](#)

[Support for Supervisor 720 and 1GB MWAM in Supported Platforms](#)

[Mobile-User ACLs in Packet Filtering](#)

[IP Reachability](#)

[DNS Server Address Assignment](#)

[Mobile IP MIB Enhancements in SNMP, MIBs and Network Management](#)

This section lists features that were introduced or modified in previous releases of the Cisco Mobile Wireless Home Agent:

[Mobile IPv4 Registration Revocation, page 7-1](#)

[HA Server Load Balancing, page 6-1](#)

[Home Agent Accounting, page 11-1](#)

[Skip HA-CHAP with MN-FA Challenge Extension \(MFCE\), page 4-2](#)

[VRF Support on HA, page 12-1](#)

[Hot-lining, page 13-1](#)

[Radius Disconnect, page 7-4](#)

[Conditional Debugging, page 15-3](#)

[Home Address Assignment, page 3-1](#)

[Home Agent Redundancy, page 5-1](#)

[Virtual Networks, page 5-6](#)

[On-Demand Address Pool \(ODAP\), page 3-6](#)

Mobile IP IPSec, page 10-2
Support for ACLs on Tunnel Interface, page 14-1
Support for AAA Attributes MN-HA-SPI and MN-HA SHARED KEY, page 14-3
3 DES Encryption, page 10-1
User Profiles, page 14-3
Mobility Binding Association, page 14-4
User Authentication and Authorization, page 4-1
HA Binding Update, page 14-4
Per User Packet Filtering, page 9-1
Security, page 10-1

Feature Support

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Benefits

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The Home Agent

