



Nomadix Service Engine™

Access from the Home

Copyright © 2001 Nomadix, Inc. All Rights Reserved.

Wednesday, August 17, 2005

1100 Business Center Circle
Suite 100
Newbury Park, CA 91320

www.nomadix.com

White Paper 230-1027-001

Introduction

Broadband Internet access in residential environments such as Multiple Dwelling Units (MDUs) continues to proliferate as mobile workers wish to duplicate their network experience in the office while they telecommute. Consumers wishing to take advantage of new applications and services over the web continue to consume increasingly more amounts of bandwidth and will continue to drive broadband penetration into the home.

Nomadix offers its Nomadix Service Engine™ (NSE) embedded software suite on our family of Access Gateways. The NSE offers a full suite of functionality that is tailored for deployment in large, residential (MDU) wired or wireless network deployments supporting up to 2,000 simultaneous users.

Multiple Dwelling Units (MDUs) that provide high-speed Internet access are rapidly becoming the residences of choice for tenants who need to stay connected from home. MDUs offering this service improve property value, create new revenue streams and increase tenant satisfaction.

Nomadix recommends the **AG 5000** running the NSE for deployment in large residential networks in MDUs such as apartments and condominium complexes. In addition to the NSE Core features, Nomadix offers a series of Modules to further enhance the service offering:

- **Wholesale Roaming:** Provides advanced NAI routing capabilities enabling multiple service providers to access an MDU location further supporting a Wholesale model. This allows the user to only interact with their chosen provider in a seamless, transparent manner.
- **High-Availability Module:** Provides enhanced network uptime and service availability when delivering high-quality service by providing Fail-Over functionality allowing a secondary Nomadix Access Gateway to be placed in the network that can take over if the primary device fails, ensuring service remains uninterrupted.
- **Credit Card Module:** Provides a secure interface over SSL to enable billing via a credit card. This Module also includes the Bill Mirror functionality for posting of billing records to multiple sources.

The AG 5000 running the NSE software is ideal for MDU-deployment placed in-building between the router and the point of aggregation for the premise's local area network. When an AG 5000 has been placed in the MDU network, service providers can quickly and cost effectively deploy broadband access to consumers without requiring the customer to make any configuration changes or load client-side software—dramatically reducing the cost of technical support and lowering product return rates.

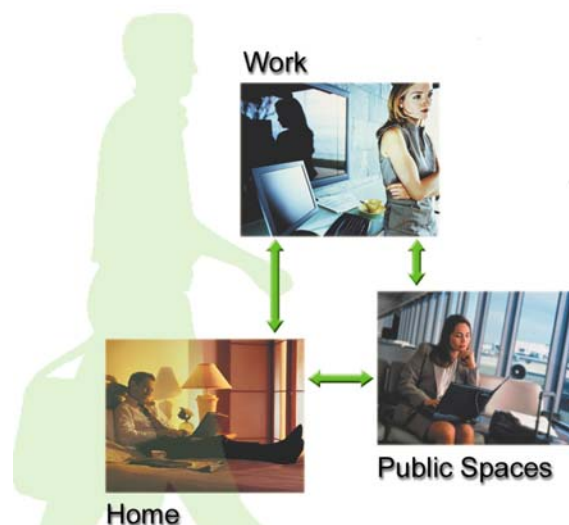
The Gateway allows the consumer to immediately create an account over the Internet and gain access to local content and services while passing all the necessary parameters for billing and authentication to occur. IT administrators won't need to manage two different configurations (home and the office) allowing their users to roam between home and the office transparently.

White Paper

How It Works

Transparent access and security are essential components to creating a seamless transition between the office, public access and home broadband networks.

1. The mobile worker returns home from the office and wishes to connect to the broadband network using their company-configured laptop computer.
2. The user opens up their browser and is redirected to their service provider's portal page.
 - a. A new user can use this portal to sign up for Internet access enabling the home Public Access Service Operator (PASO) to instantly acquire the new customer at no cost.
 - b. Existing customers simply supply their user name and password granting the user access to the Internet.
3. The AG 5000 passes necessary customer information for authentication, tracking and billing to the PASO.
4. The customer obtains open access to the Internet, where he can connect to the corporate network via a VPN link or surf the web as needed.



Nomadix Service Engine Overview

Nomadix Gateways running the NSE software provides the following functionality in an MDU network:

- ❑ Customer Acquisition
- ❑ Service Provisioning
- ❑ Access Control and Multi-mode Authentication
- ❑ Advanced Security
- ❑ Bandwidth Shaping
- ❑ Service Presentment

White Paper

Integration of the AG 5000 into the network greatly reduces the cost of technical support by removing troublesome configuration issues and improves time-to-revenue of the service provider by forcing an instant acquisition of new customers. Nomadix Gateways offer a unique set of security and connectivity features for service providers needing to provide universal connectivity and network-based authentication and service presentation.

Customer Acquisition

Nomadix' Dynamic Address Translation™ (Plug-and-Play)

Technical barriers have previously stood in the way of providing profitable, customer-friendly access. It has been expensive for a broadband Internet Service Provider (ISP) to do on-site set-up and maintenance on an apartment-by-apartment basis and having to configure every device for Internet access regardless of original configuration (typically by an Enterprise IT administrator).

Nomadix' patented Dynamic Address Translation™ (DAT™) function offers a true “plug-and-play” solution that provides transparent broadband network connectivity covering a variety of PC configurations (static IP, DHCP, DNS and proxies), ensuring everyone gets access to the Internet. Nomadix developed DAT to actively monitor every packet transmitted from each device to ensure each packet is correctly configured for the network that computer is expecting. If necessary, DAT will perform standard Network and Port Address Translation and supports Application Level Gateways (ALGs) for protocols such as FTP, H.323, PPTP, etc., to ensure the customer gains network access without having to reconfigure their PC or load client side software.

DAT™ also ensures that a DNS server is always available to a user through the DNS redirection function. The DNS redirection function redirects a user's DNS requests to a local DNS server closer to the customer's location. This improves the response time and enables true plug-and-play access when the subscriber's configured DNS server is behind a firewall or located on a private Intranet.

As part of Nomadix' “plug and play” technology, the proxy settings of the user's Internet browser are transparently detected and, if required, becomes its proxy server in order for the user to get connected without changing their proxy setting within the browser.

Service Provisioning

Home Page Redirection

Once connected to the Internet from home, a user needs to be directed to the service provider's portal page to login, or to establish an account and pay for services. This URL address can be pre-

White Paper

programmed into the NSE running on the AG 5000 for broad deployment by the service operator – customer gets immediately connected to the Internet without calling technical support and is automatically directed to a site to sign up for service.

The Home Page Redirect (HPR) feature of the NSE enables the network to intercept the Internet browser's home page setting and redirect it to a new portal page determined by the service provider. When redirecting the customer to a new home page, the original home page (Origin Server) is passed as a parameter to the new home page so the customer can still access their default home page after the portal page has been presented.

HPR can also allow a unique redirect on a per user basis determined by a RADIUS attribute stored in that customer's account. The Internal Web Server of the AG 5000 can deliver web pages, and while configurable by the service provider or equipment manufacture, cannot be radically changed. The administrator can select parameters to be displayed on the internal pages and becomes a convenient option when clients do not want to develop their own content or Web Server. A banner at the top of each Internal Web Server page is configurable and can contain the service provider or equipment manufacture's logo or any other image they desire.

Access Control and Authentication

The NSE running on the AG 5000 provides an additional layer of security for the residential network by blocking access to the Internet or allowing access to a pre determined "Walled Garden" area of the web until the user has been authenticated. The NSE also provides protection of the network against DoS attacks through its Session Rate Limiting and MAC address filtering capabilities complimenting a centralized provisioning system.

In addition to supporting the secure Browser-based Universal Access Method, Nomadix simultaneously supports Port-based Authentication using IEEE 802.1x and authentication mechanisms used by Smart Clients by companies such as Boingo Wireless, GoRemote and iPass. Nomadix products enable multiple authentication models providing the maximum amount of flexibility to the end user and to the operator by supporting any type of client entering their network and any type of business relationship on the back end.

By allowing selective access control to the network before the customer authenticates themselves, service selection and Web based self-provisioning can be provided in a standard, efficient, low cost and convenient way that doesn't depend on the transport technology (wireless or wired). This also overcomes the limitation of not having an authentication method standardized across multiple vendors.

Billing Plan Enablement

White Paper

A Nomadix-enabled network can automatically authenticate, authorize, track, and bill users for access. Users can be identified and billed according to their Media Access Control (MAC) address, username/password, and/or port identification number.

The NSE supports a wide variety of billing models enabling the deployment of profitable residential networks. Our solutions allow the creation of billing plans using credit cards or ones that provide monthly subscriptions—and can bill by a host of different parameters including time, volume, or bandwidth.

RADIUS

Nomadix offers an integrated RADIUS client with the NSE allowing the service provider to track or bill based upon the number of connections, location of the connection, bytes sent and received, connect time, etc. The customer database can exist in a central RADIUS Server, along with associated attributes for each user. When a customer connects into the network, the RADIUS client authenticates the customer with the RADIUS Server, applies associated attributes stored in that customer's profile, and logs their activity (including bytes transferred, connect time, etc.).

Credit Card Billing

As an added Module to the NSE, integration with on-line secure credit card based self-provisioning services are offered, allows the user to set up a credit or time based dynamic account. Also, an integrated Billing Mirror capability is provided that performs logging of customer's billing activities to more than one server.

XML Interface

Nomadix provides a secure XML Application Programmer's Interface (API) with the NSE allowing the AG 5000 to accept and process XML commands from an external source for integration with OSS, provisioning, and other network management elements for subscriber management and location/port management. XML commands are sent over the network via an SSL tunnel in the form of an encoded query string. The XML interface enables solution providers and integrators to customize and enhance the installations with value added capabilities and services.

Service Awareness

The AG 5000 can drive an HTML-based window down to each customer's Internet browser providing them with the ability to self-select services and upgrade their bandwidth and billing options in real-time.

White Paper



Nomadix' patented Information and Control Console (ICC) also allows the service operator or management company to send custom messages and advertising directly to the screen of the user. For credit card usage, the ICC displays a dynamic "time" field to inform customers of the time remaining or expired on their account.

Advanced Security

The NSE enhances today's standards, enabling the secure deployment of large scale residential networks, regardless of the standards supported at the client, enabling a solution that covers the wide variety of clients that will roam into the location.

VPN tunneling (PPTP, IPSec) remains the recommended method for residential users when connecting back to their corporate headquarters. Nomadix' products feature its patent-pending iNAT functionality that creates an intelligent mapping of IP Addresses and their associated VPN tunnels allowing multiple tunnels to be established to the same VPN server creating a seamless connection for all the users. The NSE also allows tracking logs to support Lawful Intercept initiatives.

Policy-based Traffic Shaping

The Bandwidth Management feature comes standard with the NSE and enables service providers to limit bandwidth usage on a per device (MAC Address/User) basis. This ensures every user has a quality experience by placing a bandwidth ceiling on each device accessing the network so every user gets a fair share of the available bandwidth.

The bandwidth for each device can be defined asymmetrically for both upstream and downstream data transmissions. The service provider can also allow the individual user to increase or decrease their bandwidth by the minute—or on an hourly, daily, weekly, or monthly basis—without having to disconnect or re-establish a new session.

The AG 5000 can also manage the WAN Link traffic providing complete bandwidth management through the MDU. Bandwidth Management shapes traffic going over the WAN Link to prevent its over-utilization. The AG 5000 queues traffic from overly busy instances in time and sends the packets over the WAN Link when a lull in traffic occurs.

White Paper

AG 5000

The AG 5000 is a stand-alone, high performance dedicated network appliance placed at the edge of the network providing transparent connectivity, advanced security and billing enablement in large scale wired or wireless residential networks. The AG 5000 handles customer acquisition, service provisioning, access control and authentication, advanced security, bandwidth shaping, and service placement in a broadband-enabled residential environment servicing up to 2,000 simultaneous users.



Summary

The AG 5000 running the NSE in an MDU allows end users to bring their enterprise configured computers home and get transparent broadband connectivity, then return to the office without having to worry about disrupting the corporate network. The AG 5000 allows a service provider to quickly and cost effectively provision broadband Internet access to consumers that requires no client-side software or configuration changes—then allows them to self-provision services and gain access to local content and services while integrating into the widest range of existing back-end systems for billing and authentication.