

ISE and Nomadix solution description.

1 Introduction

This document describes the CerebusServer™ and Nomadix joint solution for public WLAN services market. The joint solution integrates the market-leading products of both companies and creates a unique combination of features. The product offers unmatched value for service providers worldwide, who look for the most cost-effective and reliable solution, and the fastest time to market. The solution consists of Nomadix access gateway products and CerebusServer™ backend system.

1.1 CerebusServer™

CerebusServer™ is a complete server-side software solution for broadband Internet service providers. CerebusServer™ integrates service creation, billing, rating, roaming, customer care, reporting, content delivery and value-added location-based services.

CerebusServer™ is a centrally managed all-in-one solution that streamlines rollout of hotspot services and minimises associated costs for any service provider, operator or venue owner. Services are available from day one, ensuring instant revenue generation and allowing service providers to implement their own business models.

CerebusServer™ offers clear benefits :

- **Maximises revenues with innovative pricing models**
With CerebusServer™'s advanced pricing options and billing engine service providers can centrally define and manage an unlimited number of pricing plans using any combination of time, volume and bandwidth. Pricing plans can be assigned to subscribers, locations or location groups. Payments can be made with credit cards, vouchers or directly to the PMS system and all are pre-paid.
- **Minimises costs while adding control and flexibility**
CerebusServer™'s centrally managed architecture reduces unnecessary operating and hardware costs, ensuring a streamlined hotspot network using existing infrastructure and equipment.
- **Carrier-grade solution**
CerebusServer™'s is based on tried and proven, robust Linux technology. Combining the power and flexibility of Postgresql and PHP 5, CerebusServer™ provides unprecedented speed and uptime.
- **Specialized architecture**
CerebusServer™ seamlessly integrates with the Nomadix range of gateways. Therefore CerebusServer™ is able to use the gateway's advanced XML and RADIUS features. This flexibility is not found on any other product available on the market today.

1.2 Nomadix Access Gateways

The Nomadix Public-access Internet gateways (referred to access gateways in this document) are stand-alone, dedicated network appliances placed at the network edge solving key issues of connectivity, security, billing and roaming in Public-access networks. A gateway is used in each hotspot between the Radio Access Point and the Access Router.

The Nomadix family of gateways includes several patented special features that are very crucial for this type of system like DAT™ and iNat™. These features will assure a complete transparent connection of the users without the need of any configuration changes in the user's laptop or PDA.

2 System Overview

The following picture presents the overall architecture of a wireless broadband system based on the CerebusServer™ platform.

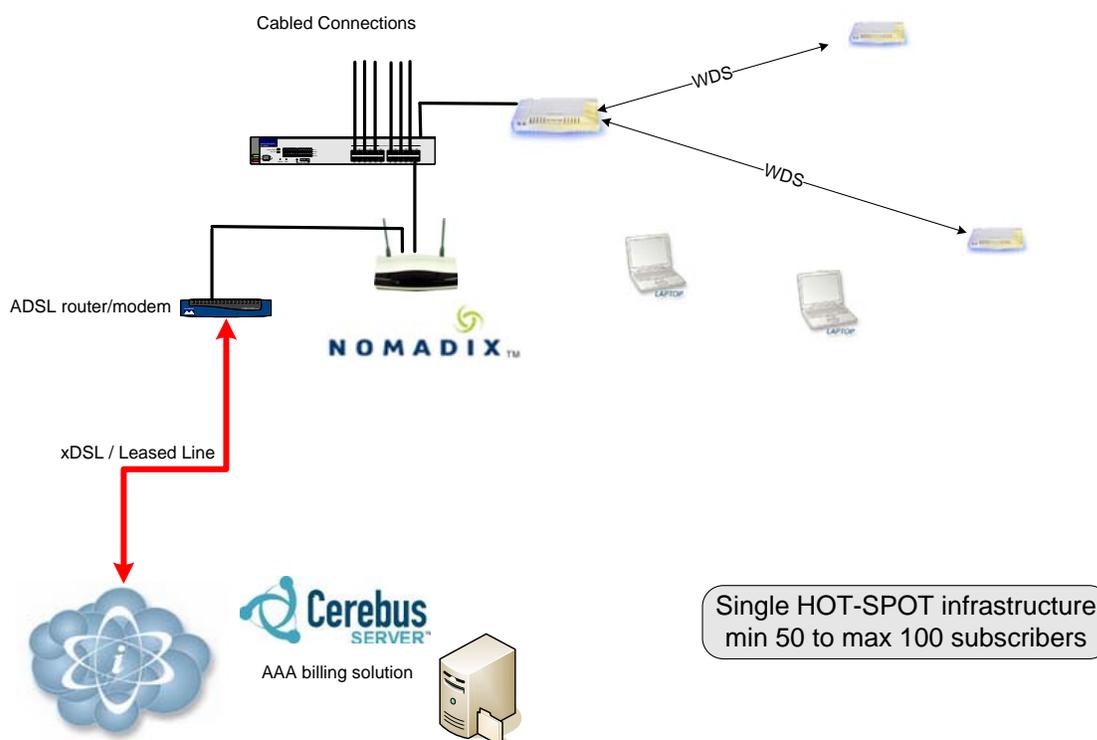


Figure 1. Overall architecture

Above diagram shows a conceptual representation of hotspots connected to a NOC with centralised authentication and billing systems. The system consists of the following components:

- **Local Access** in each hotspot can be wireless (Wi-Fi) or wired (Ethernet) or a mix of the two. Wireless networks can be built by using one or more Wi-Fi Access points.
- **Nomadix Access gateway** (access controller) connects the local network to the Internet backbone through an IP router. Typically one gateway is used in each hotspot between the access points and the access router.
- **IP Router** to Internet backbone can be for example an ADSL link or a leased line.
- **CerebusServer™** is the key component that enables centralised management of distributed hotspot services. It integrates service creation, billing, rating, roaming, customer care, reporting, content delivery and value-added location-based services.

The specialised architecture of CerebusServer™ makes it possible to use the leading access gateway products on the market from Nomadix. Combining Nomadix access gateways with CerebusServer™ offers a unique combination.

Access gateways provide seamless plug-and-play connectivity, access control and traffic management for hotspots. CerebusServer™ allows managing the distributed hotspot services centrally with an easy-to-use web based user interface. Access gateways communicate with CerebusServer™ through https and RADIUS protocols. The more detailed AAA process is described in section 5.

3 End-User Experience

3.1 Location Portal

Location portals are the end-user interface to the CerebusServer™. When a user opens a standard web browser in a hotspot the access gateway in that hotspot automatically redirects the user to the login page of the location portal. The portal contains different login and payment options as well as the customer self-care features. Service providers can also create and manage location-specific content, services and applications that are available on the location portals.

Location portals are completely customisable and they can be managed centrally from CerebusServer™. The content is located in a central content repository to which the service provider has access via a graphical user interface. Multiple portals can be setup for the same hotspot. The portal served will be determined by either the SSID that the user connects to or the VLAN id from the access point the user is connected to.

An example of a location portal is presented below:



Figure 2. Location Portal

The following main functions are provided to the end user on location portals:

Login and payment. User can select one of the available login and payment options that include credit card payment, subscriber login, login with voucher or pre-paid card and roaming user login

Subscriber account management. The subscriber can access his/her pre-paid account, review personal usage history and charge the pre-paid account.

Online subscription. Users can subscribe to the service online by filling out a web form. The service provider can configure which information will be collected from users as well as which products are available for online subscribers.

Online surveys. The service provider can conduct online surveys on location portals. Users fill the web-form questionnaire and the survey results are emailed to a configured email address.

3.2 Login

CerebusServer™ has flexible pricing options, offering unlimited combinations of flat rate, time, volume and bandwidth for pay-per-use and subscription models. The location portal enables the following types of login:

- **Post-paid subscribers** are charged periodically, e.g. monthly, based on their usage and selected pricing plan.
- **Pre-paid subscribers** have a pre-paid account, which they can charge. The account balance is checked in real-time during login transaction.
- **Pre-paid cards and vouchers** can be purchased at hotspots or directly from the service provider or other outlets. The pre-paid cards have been associated with a defined product (pricing item), specifying connection properties, time/volume limits and prices. CerebusServer™ has the most flexible voucher card system available.
- **Credit Card** can be used by ad-hoc users to purchase any available pay-per-use product online.
- **Roaming users** are subscribers of a roaming partner with whom the service provider has a roaming agreement.

In the login process the user enters his/her username and password, voucher number or credit card details. Based on the login credentials, CerebusServer™ determines the user type and the active product, pricing plan and connection type.

After successful login the logout console window is opened, containing information on the connection, such as remaining and used time/volume and logout button. In case the user utilises a popup blocker, CerebusServer™ will serve a page instead of a window. The user will be able to use this to logout from. The logout console window can be also customised by the service provider (Figure 4).



CerebusServer™ supports multi-lingual user interface enabling the end user to select one of the available languages on the location portal.

4 System Administration

4.1 Web Interface

CerebusServer™ has a central web-based administration interface that provides an easy-to-use graphical user interface to CerebusServer™ functionalities. An administrator account with username and password is required to access the system.

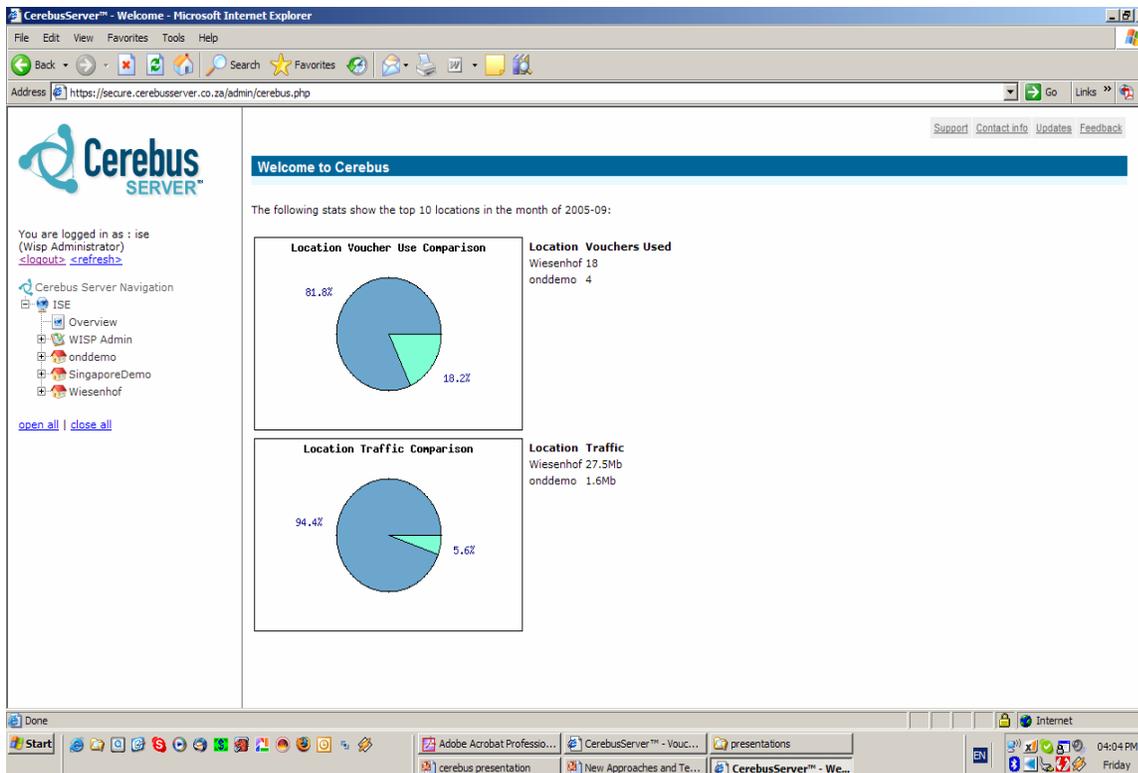
The username and password determines the administrator privileges. CerebusServer™ has three administrator privileges:

1. **Server Administrator** (Super User) can access all functions and data on the server. Server administrator can also access the CerebusServer configuration functionalities and manage different service providers and create new service provider accounts on the server in a multi-service provider environment (virtual WISP support).

2. **Service Provider** (WISP) can manage all the information related to its own subscribers, service locations, and billing. CerebusServer™ supports multiple service providers on the same server, enabling virtual WISP models. Different service providers cannot see each other's information.

3. **Service Location** (Hotspot owner) can access certain hotspot-specific functionalities and information, such as usage statistics and vouchers. Each administrator is able to manage administrator accounts within their administrative domain. The Server Administrator must create the initial entry for each service provider, which can then add other administration accounts with Service Provider or Service Location privileges.

After successful login the Cerebus administration user interface is opened. The user interface is intuitive and all the functions of the CerebusServer™ can be accessed easily with this web-based interface.



The user interface consists of two parts: the left toolbar and the main screen. The left toolbar contains the links to the main functions of the system:

- WISP Tools for creating login accounts, setting up locations, managing account tool assignment.
- Account Tools allow the administrator to setup account types, manage usernames, export accounts.
- Voucher Tools for creating voucher types, generating vouchers, exporting of created voucher batches, voucher status checking.
- Reporting functions allow the administrator to see usage statistics of the system, vouchers and user accounts.
- Billing and pricing functions include creating and managing pricing plans and billing options.
- Gateway Tools that allow the administrator to setup gateway connection details, view current users at the hotspot, check locked out MAC addresses and remove them, monitor the hotspot's uptime.
- Portal tools that will allow administrators to manage portal types and upload new portals to the system.
- System tools to determine the hotspot redirection scheme and to setup the logout console.
- When the administrator selects a link on the left toolbar, the related functions are displayed in the main screen.

4.2 Reporting and Statistics

CerebusServer™'s reporting capabilities allow service providers to preview usage information and export it into external systems. The reporting functions included in the CerebusServer™ provide following functionalities:

- View usage statistics showing the details of usage history according to defined filter criteria. CerebusServer™ provides a general tool for accessing and reviewing usage logs. The usage statistics can be reviewed by service provider, service location (hotspot), and per selected time frame. The location owners can also review usage logs in their own service location.
- List the active users that are currently using the service in any hotspot.

4.3 Multi Service Provider Support

CerebusServer™ supports multiple service providers on the same server enabling virtual WISP business models. Each service provider has its own private data, e.g. subscribers, hotspots, pricing plans, VSA's and portal content and layout. Server administrators can manage different service providers (WISPs), and access and configure the server related functions that are common to all service providers.

5 AAA Process

CerebusServer™ acts as the authentication server against which access gateways authenticate and authorise users. The CerebusServer™ AAA process uses two protocols: RADIUS and HTTPS. HTTPS is used to remotely control the access gateways from CerebusServer™.

RADIUS protocol is used to transfer actual user Authentication, Authorisation and Accounting (AAA) data. CerebusServer™ comprises a RFC2865/2866 compliant RADIUS server and Nomadix access gateways include a sophisticated RADIUS client. CerebusServer™ utilises the extensive set of Nomadix' VSA's (Vendor Specific Attributes).

End user receives an IP-address from the DHCP server in the access gateway when a Wi-Fi enabled laptop is opened in a hotspot. Alternatively, Nomadix' patented Dynamic Address Translation (DAT™) technology will allow users with either static IP setting and/or proxy settings to get network access. The Nomadix access gateway intercepts any connection requests from the user's laptop and redirects them to the location portal on the CerebusServer™.

The bandwidth and time limits are calculated and communicated to the Nomadix access gateway during login phase. Support for different limits (and the method of usage) depends on the Nomadix access gateway used.

Volume and bandwidth limits are provided as URL parameters, or as RADIUS AV pairs. The time-related limits are provided as RADIUS AV pairs. The connection is terminated automatically by the access gateway, when one of the limits has been reached.

6 Hotspot Management

6.1 Overview

With CerebusServer™ rolling-out new hotspots is both fast and easy. Once the wireless network and the access gateway are installed physically in the hotspot, everything else can be managed centrally via CerebusServer™'s web-based interface. As described in section 2, typically one access gateway is used in each hotspot.

Setting up a hotspot on the CerebusServer™ involves the following steps:

- Enter the basic information such as name, address, category etc.
- Configure networking and access gateway settings.
- Configure the hotspot with one or more pricing plans that will be made available to users in that hotspot.
- Set up the branded location portal for the hotspot.

6.2 Basic Information

Basic information (Hotspot name, Address, Contact details and Gateway id, etc) identifies the hotspot.

6.3 Networking and Nomadix Access Gateway Settings

Access gateway settings include IP address of the gateway (if available), administrator username / password and certain other networking related parameters. If a static public IP address is not available for the hotspot, CerebusServer™ will automatically detect the IP address used by the hotspot; every time a user connects.

6.4 Pricing Information

Hotspots can be associated with one or more products (pricing plans) defined by the service provider. This defines the tariffs available in each hotspot for pay-per-use users, i.e. ad-hoc users that are not subscribers or roaming users. One or more pricing plans can be configured for use at each Hotspot or a group of Hotspot's.

Example: A hotel guest, who is not a subscriber or roaming user, opens a web browser in Hotel A. He is redirected to the branded location portal of the Hotel Group that Hotel A belongs to. The guest is presented two connection options from which he can choose: 1 day access for \$ 350 or 1h access for \$ 90.

Since the pricing is defined centrally for all the hotspots and one pricing plan can be mapped to many hotspots, it is very easy and fast to apply new tariffs for multiple hotspots. One or more pricing plans can be associated with a hotspot, including the validity time of the pricing plan in each location.

6.5 Location Portal

As described in section 3, each hotspot can have a dedicated branded location portal that includes different login, payment and customer self-care functionalities as well as location-specific content, services and applications.

Location portal customisation is described later in this document in section 12.

7 Rating and Billing

7.1 Overview

WLAN pricing models evolve rapidly according to market needs and the backend system needs to support this environment by providing flexible pricing and rating options. With CerebusServer™ service providers can centrally define and manage unlimited number of products (pricing plans) using any combination of time, volume, and bandwidth. Pricing plans can be assigned to subscribers, locations or location groups. Payment methods include credit cards, vouchers, scratch cards, pre-paid cards, and subscriptions.

All billing related information includes all the relevant data to enable billing, such as billing type, volume, session duration, class of service, etc. This information is stored in the CerebusServer™ database and is available in real-time for rating and billing.

CerebusServer™ provides tools for accessing usage logs. Service providers can review the usage statistics during a selected time frame. The hotspot owners can also review usage logs related to their own hotspots.

CerebusServer™ has different pricing plans supporting all types of end users. A pricing plan is a product bundle that consists of one or more pricing items, defining different service options available for end users. Pricing plans can be assigned to subscribers, locations or location groups. If a pricing plan contains multiple pricing items the end user is presented a service selection screen during the login phase, where the user can choose one of the available options.

For the online subscribers (the users that subscribe online on the location portal) the service provider can specify which pricing plans are available during online subscription.

7.3 Pre-Paid Billing

Pre-paid services are crucial components of an operator's portfolio of services. CerebusServer™ includes a proven pre-paid system, including real-time processing. CerebusServer™'s pre-paid system enables the services provider to check vital information such as credit limits in the database in real-time. CerebusServer™ pre-authorises service usage during authentication and authorisation phase and tracks transactions in real-time and rates them accordingly. CerebusServer™ maintains all customer data in one database, eliminating potential revenue leakage.

The pre-paid products can be purchased using pre-paid cards (scratch cards, vouchers, etc.), rechargeable prepaid accounts or online credit-card payments.

In CerebusServer™ pre-paid subscriber model, the subscriber has a pre-paid account on which he can deposit money, e.g. using the online credit card payment. The system ensures that the account has to have enough balance before granting a connection. Customer self-care features include the possibility for

the user to manage his pre-paid account online. The user can view his account information and balance, add more money to the prepaid account and view the usage history. Pre-paid accounts can be charged in the location portals.

If a pre-paid pricing plan is associated with a hotspot, it defines the tariffs that are available for ad-hoc users in that hotspot.

A pre-paid pricing item consists of the following main components that can be configured by the service provider:

Date Valid From / To

- The voucher will only work between specified dates.

Expire After Days

- The voucher will stop working after a specified amount of days after first use.

Bandwidth Up / Down

- This will limit the bandwidth speed (e.g. 512 kbps) of the voucher.

Max Bytes Up / Down

- This will limit the amount of bytes the user may move.
- The voucher will be 'capped' after this limit is reached.

Expire At Midnight / Midday

- The voucher will stop functioning after midday or midnight of same day first used.
- This is useful for hotels eg: set to expire after checkout time.

X-over-Y

- When set, a voucher may carry time over for any defined period of time.

Time Valid For

- How many minutes the voucher is valid for ie: 30 mins, 60 mins etc

Available to Location or Location Group or entire WISP

- This determines at which locations the voucher may be used.

Idle-Timeout

- The session will logout after a certain amount of idle time. This is required to protect unused time when users fail to logout of the session. Length of idle time prior to session logout is determined by the WISP

Concurrent Users

- This determines the amount of users that are allowed to use a voucher simultaneously. When the limit is reached, the first user will be logged out

8 Payment Options

8.1 Overview

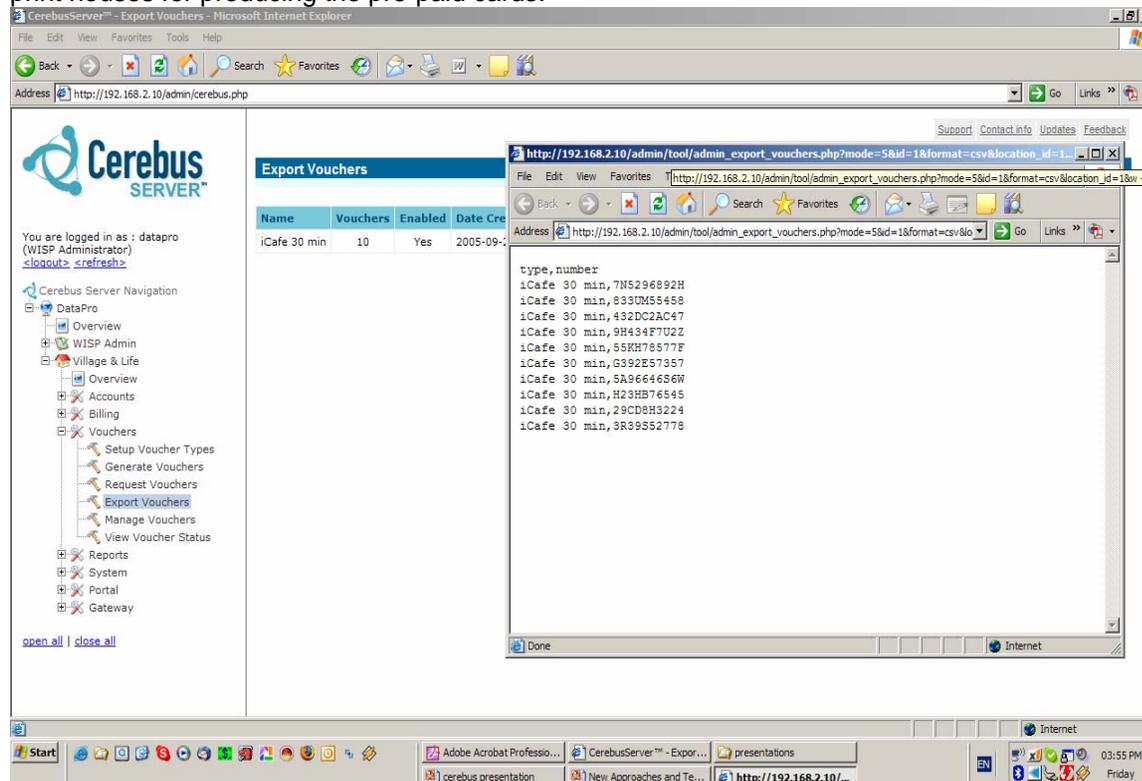
End users of hotspot services demand multiple and flexible payment options and service providers need to offer many options to attract a wider user base. CerebusServer™ offers multiple payment methods available out of the box. CerebusServer™ supports pre-paid users and allows adding new payment methods in the future.

8.2 Pre-Paid Cards

A pre-paid card (e.g. voucher, scratch card) can be purchased at hotspots or from the service provider or other outlets. A pre-paid card can be associated with a pre-paid pricing item that defines the connection properties for the pre-paid card user. A pre-paid card includes a voucher number that can be used to login on location portals.

CerebusServer™ has a built-in management system that enables service providers to generate voucher number batches and associate them with a pre-defined voucher type.

Voucher batches can be exported to a CSV, HTML, Excel or PDF format, from which they can be sent to print houses for producing the pre-paid cards.



8.3 Credit Card Payment

CerebusServer™ includes built-in support for online credit card payments that enables ad-hoc users to purchase connection products directly in hotspots on the location portal using their credit card. Credit card payment can also be used to charge the subscriber's pre-paid account.

Credit card payments can generate a temporary username and password for the user that can be used to login later when the purchased product enables multiple logins.

CerebusServer™ has also a built-in support for Iveri and WorldPay credit card gateways. CerebusServer™'s payment gateway support is developed modularly and new payments gateways can be added easily.

All the credit card transactions like any other transaction with CerebusServer™ are SSL encrypted and completely secure.

9 Network Management

With CerebusServer™, the service provider can centrally monitor the NAS (access gateway) availability (reachability). For NAS configuration changes, CerebusServer™ includes a quick link for direct administration of a NAS via a Web browser.

All Nomadix public access gateways contain the ability for secure, carrier-class network management. Device management can be done via SSHv2, as well as serial CLI, telnet and Web Access. Seamless integration into NMS systems can be done using Nomadix private SNMPv2c-compliant MIB. Naturally, SNMP traps are supported.

In addition, differentiated access can be provided to operators (e.g. help desk personnel) and managers (e.g. network administrators). With the exception of the serial connection, each remote management interface can be administratively disabled. For all interfaces, source IP address-based access control policies can be defined.

10 Access and Traffic Control

The Nomadix public access gateway (access controller) connects the local network to the Internet backbone through an IP router. Access gateways provide seamless, patented plug-and-play connectivity (DAT™, iNAT™), access control and traffic management for hotspots. A Nomadix public access gateway controls the access to the Internet allowing only authorised users to connect. Typically access gateways include a RADIUS client, which communicates with the RADIUS server during the AAA process. After the user is authorised the access gateway opens the connection for the user, and based on user's connection properties, disconnects user when his maximum connection time has elapsed, volume is exceeded or the connection has been idle for a certain period of time. (typically 20 minutes)

Typically one gateway is used in each hotspot between the access points and the access router.

The specialised architecture of CerebusServer™ makes it possible to use leading access gateway products on the market from Nomadix. Combining Nomadix™ with CerebusServer™ offers a unique combination that cannot be found in other products on the market.

Nomadix gateways are stand-alone, dedicated network appliances providing multiple industry-leading features such as:

- **Web Server.** Access gateway includes a web server in order to facilitate http redirection and http command interface to the CerebusServer™.
- **External Home Page Redirection.** Once connected to the wireless network the access gateway automatically redirects the user to the CerebusServer™'s location portal.
- **RADIUS Client.** The Authentication, Authorisation and Accounting data is transferred between access gateways and CerebusServer™ using the RADIUS protocol. The access gateway acts as a Network Access Server (NAS) with a RADIUS client that communicates with RADIUS server.
- **DHCP Server.** Normally the client computers receive IP addressing from a DHCP server that is running on the access gateway. The user IP addresses can be either public or private. If private addresses are chosen, the IP addresses are assigned from a private network address range, and Network Address Translation (NAT) is used to map the users into a routable (public) IP address (the public IP address of the Gateway). If a public addressing is required, the access gateway can be configured to allocate addresses from a subnet of the network in which the access gateway is connected into.
- **Transparent Plug-and-Play Connectivity.** Access gateways provide transparent broadband network connectivity without requiring any changes to users' computer's settings or special client-side software by enabling the network to adapt to the user's laptop settings. Every user can get access to the network without having to reconfigure his computer, PDA or other Internet access device or load clientside software.
- **VPN Support.** Access gateways support VPN connections through certain protocols such as PPTP and IPSec. The end users can use their VPN client applications in hotspots to connect to their corporate networks.
- **Transparent Proxy.** The user gets connected transparently regardless of whether the proxy is enabled on his/her laptop.

- **SMTP Intercept.** Access gateways include an SMTP intercept function that performs local relaying of user traffic destined to SMTP servers allowing the user to send e-mails even if their home SMTP server does not allow mail relaying from unknown addresses.
- **Bandwidth Management.** Enables the service provider to limit bandwidth usage on a per device 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. Bandwidth is a component in CerebusServer™'s pricing plans and the access gateway is in charge of providing the specified bandwidth to end users.
- **Walled Garden.** Access gateways support “walled garden,” i.e. allowing the user to access predefined websites before authentication. Also referred to as white-listed addresses.
- **URL Filtering.** Access gateways can restrict access to specified websites based on URLs defined by the administrator. Also referred to as black-listed addresses.

11 Customer Management

Customer management includes two parts: account creation and associating the account with an account type. CerebusServer™ includes real-time activation of users that is critical for acquiring ad-hoc users who want to try the service before engaging in long-term subscription relationships. The real-time activation capabilities of CerebusServer™ can also be used to support infrequent and pre-paid users.

With CerebusServer™ the service provider can create new accounts, modify accounts and delete accounts. A subscriber can be associated with a pre-paid pricing plan that defines the billing and connection properties for that subscriber.

A subscriber that is associated with a pre-paid pricing plan has a pre-paid account on which he/she can deposit money, e.g. using the online credit card payment. The system ensures that the account has to have enough balance before granting a connection.

To minimise the costs of customer management, CerebusServer™ includes several customer self-care features in its location portal, including

- Subscriber account management. The subscriber can access his/her pre-paid account, review personal usage history and charge the pre-paid account.
- Online subscription to service provider. User can subscribe to the service online by filling out a web form. The service provider can configure which information will be collected from users as well as which plans are available for online subscribers.
- Online surveys. The service provider can conduct online surveys on location portals. Users fill the webform questionnaire and the survey results are emailed to a configured email address.

12 Content Management

CerebusServer™ provides easily brandable and customisable web-based login portal's and location-specific content, including content delivery.

Please see the portal development specifications under addendum A.

13 System Architecture

13.1 Security

CerebusServer™ offers multiple levels of security ensuring that all the data is safe and cannot be accessed by unauthorised parties.

- The CerebusServer™ includes a built-in firewall that is by default configured to block all requests to invalid port numbers. Also the incoming packet rate is limited to protect from denial of service DoS.
- All http traffic with CerebusServer™ is SSL encrypted, including the management user interface, end-user portal and the communication between the CerebusServer™ and gateways.
- Each administrator has a personal username and password that is needed to login to the administration user interface.
- All the data is stored in a relational database that is included in CerebusServer™.

13.2 System Requirements

The CerebusServer™ requires a dedicated PC computer, on which the software is installed. The minimum system requirements for the CerebusServer™ are as follows:

Processor - Pentium-compatible 1 GHz or higher processor

Operating system – SuSE Linux 9.3

Memory - 512 MB of RAM

Hard Disc - 40 GB

CDROM - CD-ROM drive (bootable)

Network Interface - 10/100Base-T Ethernet (802.3)

Internet connectivity - High-speed Internet connection with a static and public IP address

13.3 System Backups

CerebusServer™ has a backup function in order to make automatically safe copies of the system configuration and database contents, including the usage data, into backup files. By default, CerebusServer™ creates daily backups for the important directories and files. These directories include system configuration files and the database files.

Backup files are stored for the last 30 days, after which older files are deleted automatically from the CerebusServer™ host.

14 ISE and Nomadix

14.1 ISE

ISE is a premier supplier of backend billing and service management products for the global broadband and wireless services industries. ISE's innovative and flexible software products enable service providers, operators and venue owners to deliver and manage new value-added broadband services to multiple networks.

ISE's flagship product CerebusServer™ has been selected by customers and partners IT integrators and wireless Internet service providers. Customer satisfaction is ISE's highest priority. We work hard to ensure that we provide the best possible service to our customers and that our products match customer requirements and exceed expectations—today and in the future.

14.2 Nomadix

Nomadix is a leading provider of Public-access Gateways and embedded software solutions for creating intelligent networks that deliver transparent, secure, high-speed Internet access to the mobile user – virtually anywhere throughout the world.

The company is headquartered in Westlake Village, Calif., with sales offices in Europe, China, Japan, Singapore and South Korea. Nomadix sells and supports its products globally through OEM partnerships, Value Added Resellers and Systems Integrators.

Addendum A

CerebusServer™ Portal Development Specifications

This document describes the rules you need to follow when designing your portal templates.

Basic .tmp Files

CerebusServer™ uses .tmp files for custom portals. These files are HTML pages that conform to CerebusServer™ standards.

Do not include any <html> or <body> or <head> tags. CerebusServer™ adds this automatically. Your template files should only contain the HTML that would normally be between the <body> and </body> tags.

Your start or “home” page must be called index.tmp.

All template files must end with the .tmp extension. When you link from one template page to the other, be sure to link to the page with the .tmp extension.

No dynamic scripting is allowed. This includes all JavaScript, VBScript, ASP, PHP, etc.

All images must be referenced with the tag and the src property must be the first inline. For example, , would be correct.

All tags must make use of double quotes (") and not single quotes (').

Only 1 style sheet is allowed and it must be called style.css. It must be in the root of your portal templates. It is up to you to ensure browser compatibility of the style sheet.

Portal Components

Add components to your pages using the following tags:

1. {account_login}
 - a. Creates a username/password account login form.
2. {voucher_login}
 - a. Creates a voucher login form.
3. {credit_card}
 - a. Creates a credit card purchase form
 - b. It allows users to create accounts.
 - c. When returning users' username and password match, time will be topped up. If only the username matches, a username already exists message will appear.
4. {pms_1_way}
 - a. Creates a PMS purchase form.
 - b. It is meant for one way PMS interfaces only.
 - c. It allows users to create accounts.
 - d. When returning users' username and password match, time will be topped up. If only the username matches, a username already exists message will appear.
5. {monthly_debit_order}

- a. Creates a form that gathers information from your users that enables you to debit order the user.
- b. Users will create their accounts online.
- c. You may pass form parameters to this component specifying the information that you will need. Please see section 'Parameter Passing' and 'Form Parameters'.

All components are structured in tables and they are complete with error checking. No extra coding is needed.

Components will only appear if their respective settings are set within CerebusServer™. This includes setting up account types, billing options, billing plans and merchant settings where needed.

Parameter Passing

CerebusServer™ enables you to pass parameters to certain components. Only certain components support parameters.

Parameters are passed inside the '{ }' brackets and just before the closing '}' bracket of the component. They are in turn enclosed with square '[']' brackets.

Parameters are formed in name value pairs similar to a query string and parameter sets are separated by commas ','.

For example:

```
{component[
  Param1=value&type=value&name=value,
  Param2= value&type=value&name=value,
  Param3=value&type=value&name=value
]}
```

Form Parameters

Form parameters are used by CerebusServer™ to construct user defined forms. These are handy with certain components such as surveys or monthly debit orders.

The following parameters are available:

1. disp_name
 - a. required
 - b. the display name next to the form element
2. type
 - a. required
 - b. describes the input type
 - c. either text, textarea, select, checkbox or radio
3. name
 - a. required
 - b. this is the name of the form input field
 - c. important to use a sensible naming convention
4. value
 - a. optional
 - b. the default value of the form input field
5. size
 - a. optional
 - b. only available to text and select types
 - c. will cause the select type to become a multiple select input type

6. rows
 - a. optional
 - b. available only to the textarea type
7. cols
 - a. optional
 - b. available only to the textarea type
8. options
 - a. optional
 - b. available only to the select type
 - c. this parameter has sub parameters : value, option
9. checked
 - a. optional
 - b. only available to checkbox and radio types
 - c. valid values are " (null or empty) or 'checked' (without quotes)

For example:

```
{monthly_debit_order
[
disp_name=Name&type=text&name=barry&size=10,
disp_name=Location&type=select&name=location&options=0&value=CT&option=CapeTown&options=2&
value=JHB&option=Johannesburg,
disp_name=SendEmail&type=checkbox&name=email&value=yes&checked=checked
]
}
```