Fire4 Technology Primer

Fire4 Systems
Network Products for Public Internet Access

What we offer

Technology Primer

Our customers are businesses who offer Internet access to the public. Most of our customers are in the hospitality industry: resorts, hotels and marinas. We also have customers who need the type of service we offer as part of their business model: events such as trade shows, art exhibitions and flea markets offer wireless Internet to booths and traders who require the Internet connection to process credit card transactions.

We provide a complete technology package for any business that wants to offer Internet access to the public. We provide hardware products, routers and wireless access points, and we provide the software that manages the system.

- High performance hardware products: routers and wireless access points

- Software for billing via scratch cards, credit cards and authenticated free access

- Fully customizable login screens that can include data capture and advertising

- Failure monitoring of any device with email alarm generation

- Remote access to any device to modify the configuration

- User bandwidth management with 2-tier access (free slow service, charged fast service)

- Comprehensive report generation for usage and billing

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How we deliver our products

Technology Primer

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We provide our customers with all the hardware and software products that they need to provide both wired and wireless Internet for the public. Our products are scalable and are used by businesses that range from a South Beach restaurant to a global managed group of resorts.

We do not sell our software, we provide Software as a Service (SaaS). Our clients use our servers to manage their guest Internet networks. Our SaaS solution provides two significant benefits for our customers;

- Our solution is truly plug and play, our clients have no servers to configure and simply connect client side devices and register them with our server.

- Our clients minimize their initial investment; only client side devices (routers and wireless access points) must be purchased

Customers who wish to charge for Internet services are provided with billing options by our software. The majority of our customers however give free Internet as a business differentiator and so our software helps them to make money through new revenue streams and helps them increase business performance through enhanced customer loyalty.

In addition to revenue related features, our software provides a carrier grade solution using low cost products because we develop the firmware installed on client side devices. Features include failure monitoring with trouble ticket initiation, and remote device management with redundant configuration support.
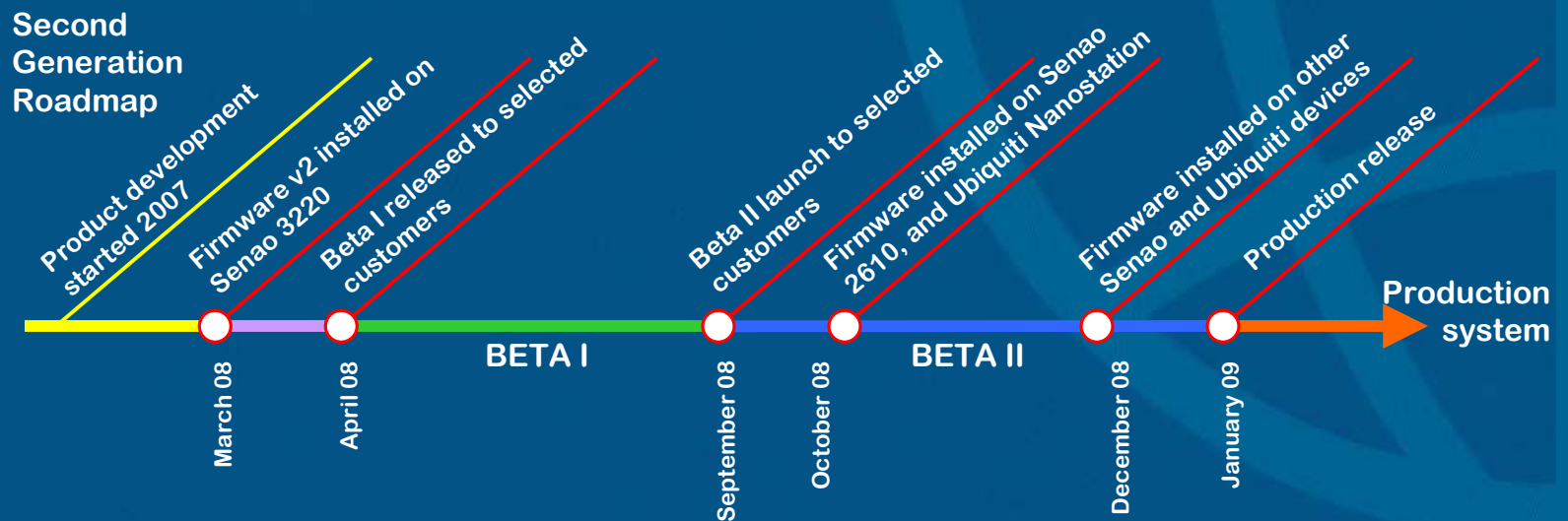
Product development history

Technology Primer

In 2003 we began developing a billing and operations support system software for wireless Internet providers based on cellular industry back office systems technology.

Our products began shipping at the beginning of 2005. Our software and network solutions were adopted by many types of businesses, including hotels, resort management companies and marinas.

Many customers gave us their feedback about the first generation system and we began working on a second generation system in 2007 with new specifications based on customer 'wish lists'. The timeline for the second generation product development process is shown in the diagram.

The second generation of our software went into production in January 2009 after a long beta-testing period.

Second Generation Roadmap

Product development started 2007

Firmware v2 installed on Senao 3220

Beta I released to selected customers

Beta II launch to selected customers

Firmware installed on Senao 2610, and Ubiquiti Nanostation

Firmware installed on other Senao and Ubiquiti devices

Production release

March 08 · April 08 · **BETA I** · September 08 · October 08 · **BETA II** · December 08 · January 09

Production system

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Product overview

Technology Primer

We provide software for Internet providers and other businesses that offer Internet access services to the public. Our Billing and Operational Support Systems (B/OSS) software was developed specifically to meet the needs of public Internet providers. Because we provide software as a service (SaaS) our customers have no upfront software investment costs.
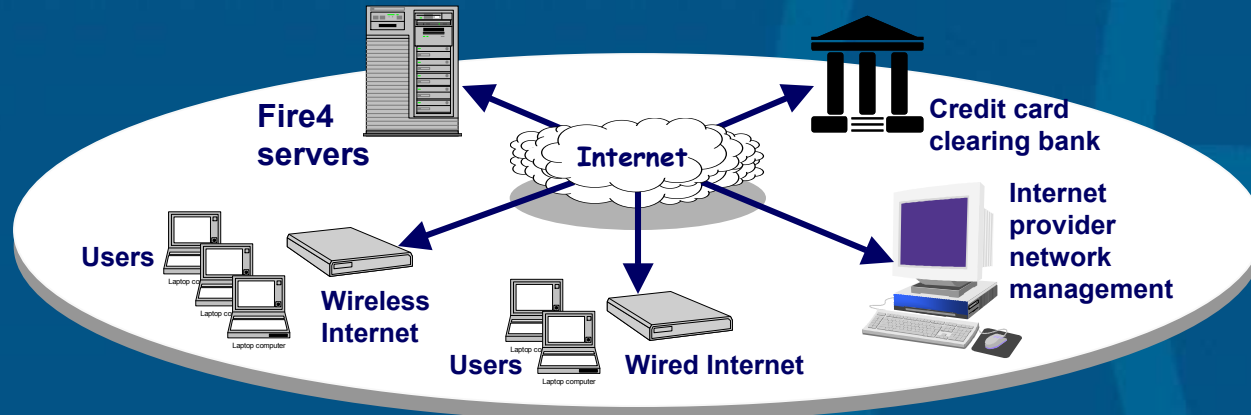
Our clients provide Internet, travel, hospitality, event management and other services:

Wireless Internet Service Providers (WISPs)
Resorts: wireless, kiosks, rooms
Hotels: rooms, conference areas, business centers, wireless
Trade shows: wireless for exhibitors and visitors, wired booths
Marinas: wireless internet
Internet cafes: wired kiosks, wireless
RV parks: wireless internet

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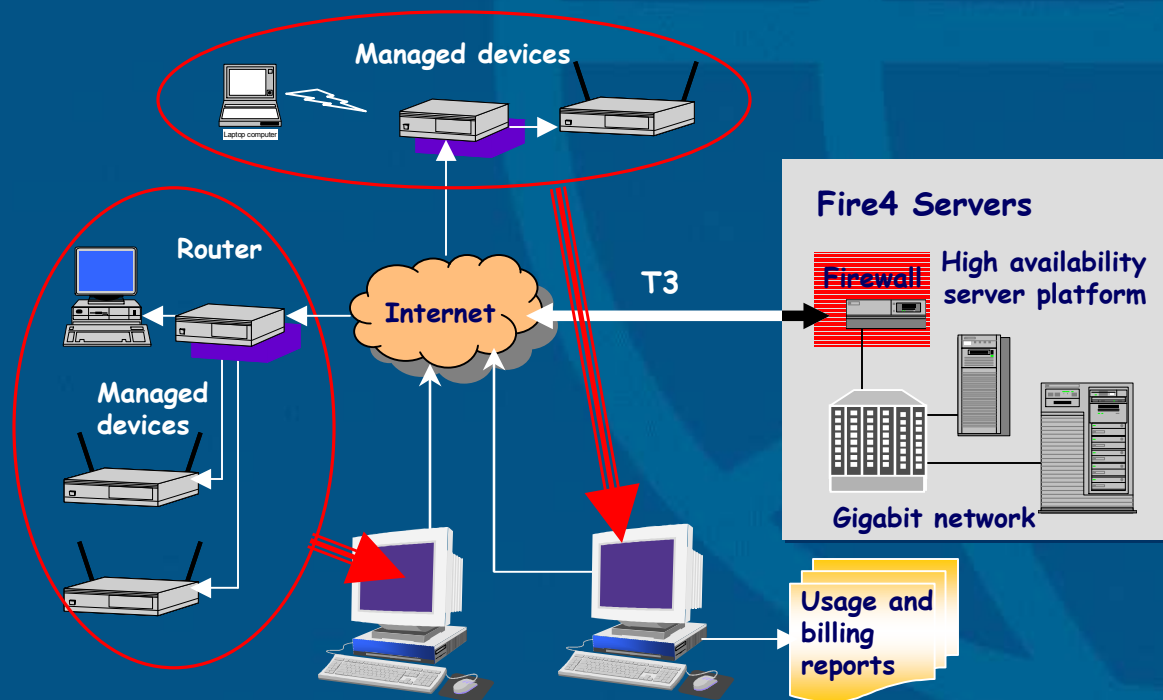# System components

Technology Primer

Our software system has two components.

- The server software is hosted on our servers. All our customers log in to these servers to manage their network devices.

- Our firmware is installed in each client side device. Devices that we offer include routers and wireless access points. We also provide custom products for special applications

Each of our customers has an account on our servers.

When a customer wants to install a new device in the account then the device ID is entered to register the device with the server account.
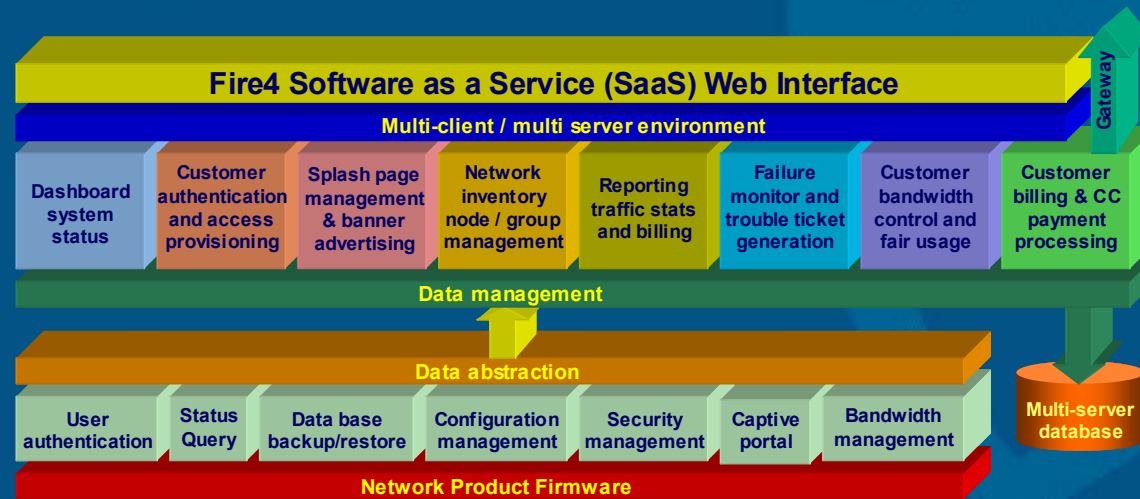
No other configuration is required.

Managed devices

Laptop computer

Router

Internet

Managed devices

T3

Fire4 Servers

Firewall

High availability server platform

Gigabit network

Usage and billing reports

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System architecture

Technology Primer

Fire4 software is a Billing and Operational Support System (B/OSS) that has been developed specifically for businesses providing wireless Internet for guests and visitors (Hot Spots), Broadband Internet Service Providers (ISPs) and Wireless Internet Service Providers (WISPs). The Fire4 software system is provided as a service to subscribers (SaaS) eliminating software purchase investments.

The system architecture is 2-tier, the top tier resides on our servers, and the bottom tier resides on each network device as resident firmware.
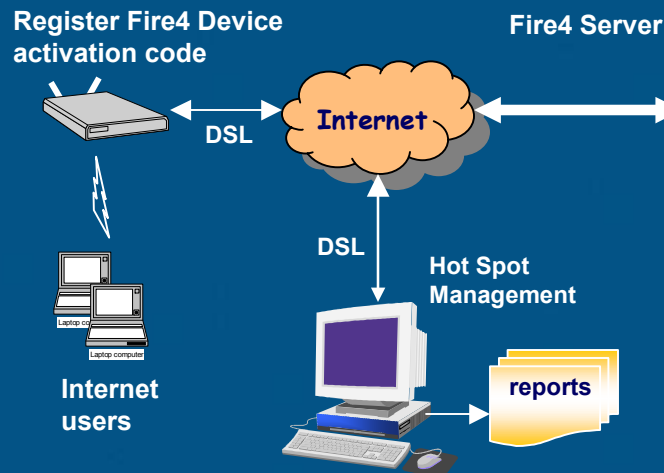
Fire4 Software as a Service (SaaS) Web Interface

Gateway

Multi-client / multi server environment

| Dashboard system status | Customer authentication and access provisioning | Splash page management & banner advertising | Network inventory node / group management | Reporting traffic stats and billing | Failure monitor and trouble ticket generation | Customer bandwidth control and fair usage | Customer billing & CC payment processing |

Data management

Fire4 Billing and Operational Support System Architecture

Data abstraction

| User authentication | Status Query | Data base backup/restore | Configuration management | Security management | Captive portal | Bandwidth management |

Multi-server database

Network Product Firmware

Each Fire4 subscriber can attach any device that has Fire4 firmware installed. Our software provides 'carrier grade' performance at an extremely low cost.

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Registering a new product with the subscribers account

Technology Primer

Our customers create a new subscription account when they connect their first product. Subsequent products that customers purchase are registered to the same account. All Fire4 products are shipped with an activation code printed on the product. The customer should open the account NETWORK DEVICE menu entry and then click on ADD DEVICE. The device activation code is then entered into the box provided.

All Fire4 products are available through resellers and include the cost of the first year subscription service with the price of the product. The device subscription is renewed yearly by the purchase of a subscription token from any of our resellers. Please consult our resellers for product and subscription prices

Register Fire4 Device activation code

Fire4 Server

DSL

Internet

DSL

Hot Spot Management

Laptop co
Laptop computer

Internet users

reports

Fire4 server system subscription service features

Basic Billing:
Authentication via Fire4 servers
Download access codes to print
Resell pre-pay scratch cards

Advanced Billing:
Authentication via Fire4 servers
Credit card billing
Periodic accounting
Wholesale billing

Advertising:
Banners on splash pages
Click-through to advertisers site

Customization:
Splash pages
Web site links
Custom pre-pay scratch cards

Internet provider console:
Virtual Network Operations Center (vNOC)

Monitoring:
Real time failure monitoring
Configure for each node
Trouble ticket for network manager
Work order text message to field technician

Management:
Central management of nodes and groups
Traffic stats reporting
Billing system reporting

Bandwidth:
Control of user bandwidth via access codes
Set the download/upload speed of each code and change dynamically

Internet provider console:
Access billing, monitoring and device management functions via a browser graphic interface:

FIRST YEAR SUBSCRIPTION FEE IS INCLUDED WITH EQUIPMENT PURCHASE

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Server account functionality

Technology Primer

Our server software provides the functionality that any type of business will need to provide Internet access to the public. The majority of customers are hospitality businesses however other businesses such as flea markets and trade shows also use our software to provide wireless Internet. Key functional features are listed below.

- **AAA**: Authentication, Authorization (access control), and Accounting
- **Access control**: Access code limit Internet to authorized users
- **Captive portal**: Redirect user access to a custom login page
- **Custom Branding**: Design custom login pages and include advertising
- **Billing**: Payment methods include scratch cards and credit cards
- **Free access**: advertising and collection of user information
- **Reporting**: Download billing and network usage reports
- **Remote management**: Centrally manage all network devices
- **Failure alarm**: Instant alerts about problems with network devices
- **Bandwidth throttling**: Traffic shaping & limiting controlled by billing
- **Easy deployment**: Plug 'n play network roll out, no server configuration
- **Inexpensive**: Operating costs start low scale with the growing network
- **Easily outsourced**: Great tool for IT providers who support hospitality clients

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Authentication, Authorization, and Accounting (AAA)

Technology Primer

A large part of the Fire4 server software is dedicated to Authentication, Authorization, and Accounting (AAA). In addition functions of device monitoring with trouble ticket initiation, remote device management, reporting and captive portal customization are added to the system.

- Authentication: the process where the network device verifies the users right to access the network using an access code that is passed to the server for verification.

- Authorization (Access Control): applies the system access policy implemented by the network device to determine whether an access requests from the user shall be granted or rejected. Access control codes are based on restrictions, such as duration of permitted access, physical location restrictions, restrictions against multiple logins by the same entity or user, IP address filtering, bandwidth control/traffic management, and optionally compulsory tunneling to a specific endpoint.

- Accounting: is the tracking of the consumption of network resources by users. This information is used for management, planning and billing. The information is available to the account holder in the form of reports. The accounting is real-time which means that accounting information that is delivered concurrently with the consumption of the resources. Information that is gathered includes the user MAC address, the nature of the service delivered, when the service began, and when it ended. Accounting information is maintained on our servers for a minimum of two years in accordance with laws of the member countries of the European Union.

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Captive portal

Technology Primer

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The captive portal is a mechanism to redirect the hot spot user to a login page (the splash page) the first time that a user attempts to access any Web site.

The login page can be one of our library pages or a custom designed series of pages. The login page requests the user to enter a code. If credit card billing has been configured the user can purchase access time.

The disclaimer mode permits free access when the user has agreed to the terms and conditions. The disclaimer mode can also be used to collect information from the user in return for the free access. The disclaimer mode also has a timer that determines how long users are permitted access to the Internet: this is a feature for coffee bars that want to avoid becoming free office space.

All modes can include advertising that is commercialized by the wireless Internet provider.

The captive portal provides a log-in box to enter the access code or a box to enter credit card information if that option is chosen. The captive portal also provides a disclaimer box if that mode is chosen.

Captive Portal

Re-direction to log-in page

Internet provider access point

Log-in page

Internet provider customer

Laptop computer

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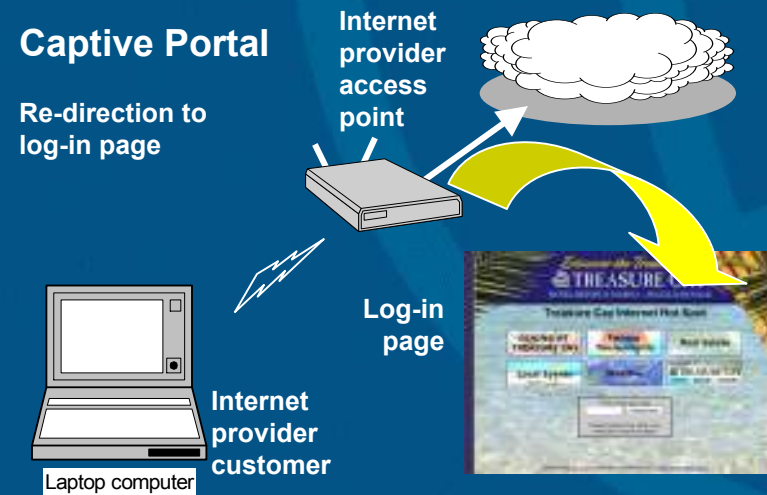
Custom splash (login) page design

Technology Primer

Internet providers and hot spot operators can customize several aspects of the Fire4 system to display a business identity for the Internet providers clients. In addition to the login page design the Internet provider can use the login page for advertising and also to capture customer information which is very useful for free internet systems.

- Splash page (login display): Library splash page designs are available for download and customization. Splash pages can be created by HTML programmers: instructions and a HTML template for creating a login page are available. Multi-page login sequences can be prepared to capture user information.

- Banner advertising: Banners can be added to the splash page and managed centrally.

- Scratch cards: We stock popular scratch cards. Customers can also design branded scratch cards. Please contact us for further information.

Splash page with customized graphics

Banner advertising

Login box

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User billing and authentication options controlling Internet access

Fire4 Systems
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The Fire4 billing system provides several billing and authenticated access options for the Internet service provider.

- Sell pre-pay scratch card to customers wanting Internet access
- Generate access codes for pre-pay sale to customers
- Generate access codes for post-pay monthly billing
- Charge customers for Internet using credit card payment
- Generate access codes for free authenticated access
- Dual mode: free metered speed plus charged premium access

Credit card billing and scratch card sales through retail stores are appropriate to provide Internet access in locations such as airports or marinas. Customers can resell our stock scratch cards or design custom scratch cards. Hotels can print 1-day duration access codes to give to guests.

Our billing system offers flexibility for many other types of businesses.

For further information and a 'scratch' card sample please email our sales department using the form on our Web site contact page.

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User billing with credit cards

Technology Primer

The Fire4 credit card billing system has gateways with AUTHORIZE.NET and with PAYPAL®. The customer can add credit card billing to the management system by providing a valid account number for AUTHORIZE.NET or PAYPAL® and paying the credit card billing setup fee. Fire4 does not have access to payments received by Internet providers.

When credit card billing is activated the Internet provider sells Internet access in modules of time: five different time modules are offered to the user.

The Internet provider determines the charge for each time module at each device.

When the user makes a successful purchase using a credit card an access code is issued for the time duration purchased.

The Internet provider can log on to the management console to see credit card processing reports for each network device.

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Billing for bandwidth usage

Technology Primer

Bandwidth usage is one of the parameters verified by the billing system. Access codes can be generated with or without bandwidth control. If bandwidth control is selected then the download and upload speeds in Kbytes/sec are specified.

This useful feature permits differential billing plans based on Internet usage. The billing system also permits a free slow service with a faster charged service.

With this feature any business that offers free Internet access can reduce costs by reducing the download and/or upload speeds for each user. Costs are reduced by downgrading the Internet service: for example use a business DSL line instead of a T1 line to provide Internet for guests.

As an alternative the business can maintain the T1 data circuit with a bandwidth limited free service, but charge users for a premium, full-bandwidth service.

All Fire4 products include the bandwidth control feature which is activated by bandwidth controlled access codes.

When access codes are generated on the server, upload/download speed is one of the options that can be selected.

DSL/T1

Internet

NX1 Router

Bandwidth limited free service

Unlimited bandwidth premium paid service

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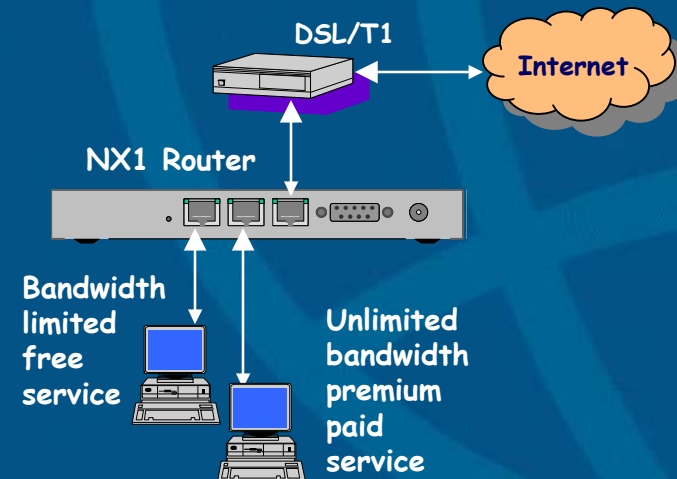
Network device failure monitoring

Technology Primer
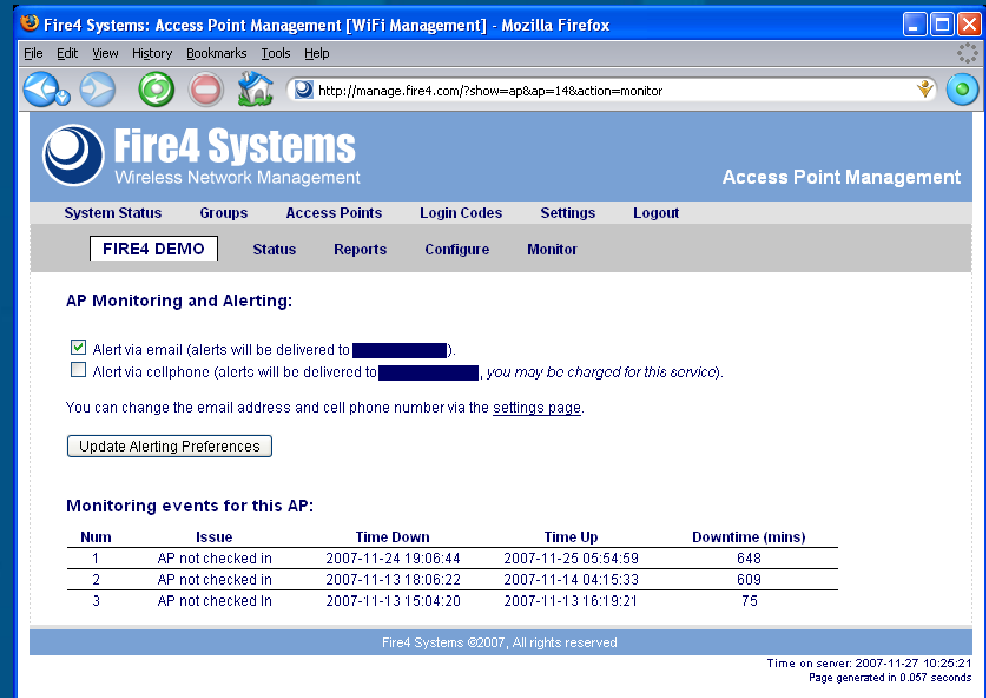
Internet providers and businesses selling Internet access must provide a reliable service. If the service fails then users will complain and income will stop. Equipment may fail or the data circuit to the equipment may drop and it is important that the problem is rectified quickly. The Internet provider or hot spot operator must know about the failure quickly before users call in to complain.

The Fire4 software provides a real-time warning to the network operator when the device or circuit fails through a continuous monitoring process. Failure initiates a trouble ticket process via email.

The Internet provider can configure a failure warning for each monitored device.

Device monitoring reduces the downtime of the network and improves the performance towards a 'carrier grade' level.

The field tech needs only to swap the failed device and power it up. The configuration file of each node can be backed up and restored to the replacement device which simplifies the field service procedure.

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Technology Primer

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Each network device that has Fire4 firmware installed can be managed remotely. The Internet provider log into the management account to remotely manage devices.

Each device has an identical configuration file like that shown in the figure. The configuration file can be uploaded from a device and downloaded to a device, both locally and remotely.

The configuration file of any access point or router can be displayed and edited by the remote network manager. After modification, the file is sent to the device to implement the new configuration.

Replacing a failed device is very easy: power up the replacement device then download the configuration file to the replacement device.

The remote management procedure permits the design of redundant network configurations where access points can be placed in a 'hot standby' mode. When the network manager identifies the failure of a device that has a redundant configuration then the hot standby can be activated to ensure continuity of service.

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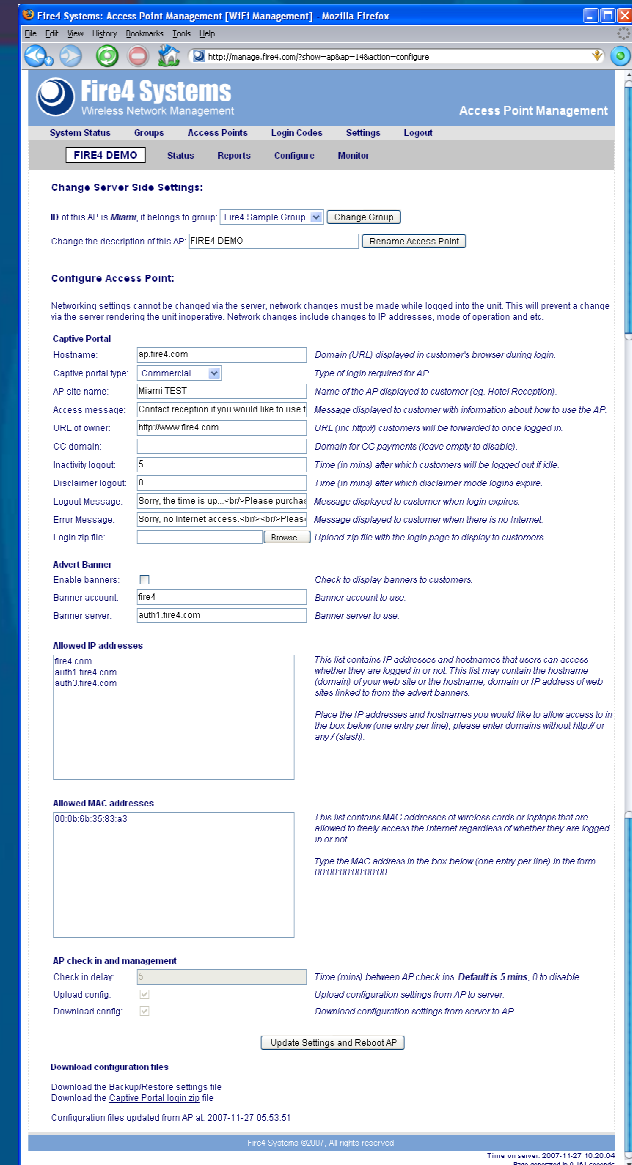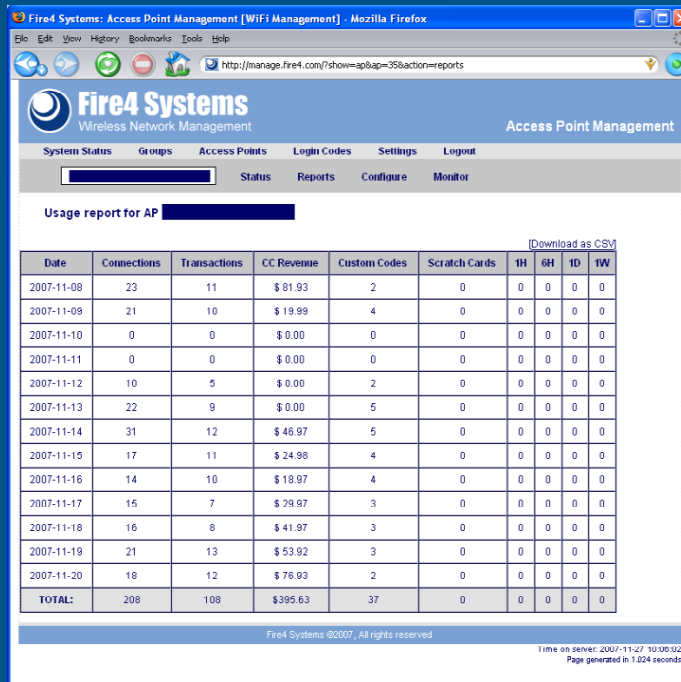
Generation of reports

Technology Primer

Reports have two functions. The first is to to analyze the node and group productivity, and check if the return on investment goals are being met. Secondly, the Internet provider can easily manage the business financials by inputting billing data into an accounting system.

Reports can be downloaded from the subscription server in comma separated value (CSV) format suitable for reading as a data file by spreadsheet programs such as Microsoft Excel. CSV billing reports can also be read by accounting software such as Quickbooks.

Network device usage report

Credit card billing report

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Applications

Technology Primer

The Fire4 billing software system is in use by many types of businesses that offer Internet to the public.

○ Resorts: Customers manage Internet services for resorts throughout the Caribbean from on central location

○ Trade shows: Wireless Internet for boots and also Internet access via kiosks for visitors during a 1 day to 1 week event

○ Hotels: Internet in guest rooms, wireless Internet for conference areas and restaurants and a business center. The service can be free for guests with a charge for visitors.

○ Marinas: Long range wireless equipment must cover a large area. Billing is via credit cards and scratch cards, with access coded printed for mariners renting dockage.

○ Flea markets: Weekly or seasonal events where vendors rely on an authenticated wireless Internet connection for their customer credit card billing

○ Bars and restaurants: Venues require only one wireless point however most want multi-page login to collect customer information before free Internet access is provided

○ RV parks: Long range wireless coverage with both scratch card and credit card billing, plus banner advertising for local vendors who offer services and products to RV'ers

○ Temporary events: Outdoor concerts, fashion shows and publicity events require wireless internet services even though the duration of the event may be a few hours.

For more information …..

Fire4 Systems
Network Products for Public Internet Access

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Products for public Internet networks:

Fire4 Systems Inc. – www.fire4.com
Tel: 305-558-8773

Hospitality industry public Internet solutions

Hospitality Internet Solutions – www.hospitality-internet.com
Tel: 305-394-6333

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