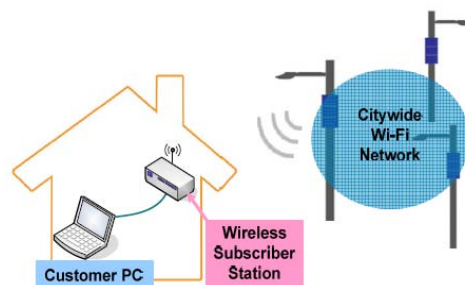


The Importance of Wireless Subscriber Stations to Successful

Citywide Wi-Fi Deployments

Introduction

As citywide wireless networks proliferate, service providers and network operators are quickly realizing that wireless subscriber stations – small devices that enhance communication between customers' computers and Citywide Wi-Fi networks – will play a central role to successful service deployment.



With fewer than 20% of all Internet users having access to “wireless ready” laptop PCs ¹, providing a wireless subscriber station as part of a wireless service offering is crucial to successfully achieving a sufficient addressable market size, healthy take rates, and universal adoption.

Further, a well-designed wireless subscriber station facilitates a positive customer experience through immediate benefits such as enhanced signal quality and coverage, a clear service demarcation point, and instant service activation.

This white paper discusses the role that a wireless subscriber station can play in offering service, two major categories of subscriber stations, and how the differences between them can make or break a successful service offering.

Capturing Wireless Market Share

With all of the recent press and hype around Wi-Fi, WiMax, and other wireless technologies, many people assume that simply “offering Wi-Fi service” will lead to large numbers of subscribers. Yet, there is a relatively small installed base of consumers with computers that have simple Wireless capabilities, let alone newer technologies. Thus, in order to attract subscribers and capture market share, service providers/operators must address the needs of the large proportion of potential customers who are without Wireless capabilities.

¹ Pew Internet Project Data Memo, “28% of American Adults are Wireless Ready”, May 2004.

Wireless-enabling Devices

The following are the main types of devices currently available to provide wireless capability to existing customer PCs (i.e. Wireless-enabling devices):

- Wireless PC card / USB Dongle Devices
- Wireless Bridge Devices
- Wireless Subscriber Stations

The following sections provide an overview of each type of Wireless-enabling devices and highlight the respective advantages and drawbacks.

Wireless PC Card / USB Dongle Devices

Wireless devices of this type are small, simple devices that plug directly into either the PC Card or USB slot on a laptop or desktop computer, and enable the computer to send and receive data on a Wi-Fi network.

While wireless PC card / USB dongle devices are generally simple and low-cost, there are drawbacks to this approach, as summarized below:

Wireless PC Card / USB Dongle Devices	
Advantages	Drawbacks
<ul style="list-style-type: none"> • Low cost • Readily available through retail channels 	<ul style="list-style-type: none"> • Under-powered, and poor ability to receive/send signals • May not work with all computers, especially older PCs and operating systems • Requires installation of software drivers • Difficult to troubleshoot: when an issue arises, is it because of the computer or the wireless service? • Enables only one computer • Difficult to monitor and/or manage from a central location the service quality • Little or no security

Wireless Bridge Devices

Wireless devices of this type are standalone devices that connect at one end to one computer via an Ethernet cable, and at the other end to a Wi-Fi network via wireless signals.

Wireless bridge devices generally possess much higher transmission power than PC card / USB dongle devices, and can be positioned independently from the computer for optimal signal reception. However, wireless bridge devices do not address other issues that arise when connecting to wireless citywide networks, summarized below:

Wireless Bridge Devices	
Advantages	Drawbacks
<ul style="list-style-type: none"> • High-powered • Connects one computer by standard Ethernet • No software or drivers required on the computer 	<ul style="list-style-type: none"> • No easily accessible administration interface • Difficult to troubleshoot – Layer 2 vs. Layer 3 troubleshooting is not simple • Enables only one computer, additional computers require an external router • Difficult to monitor and/or manage from a central location the service quality • Little or no security

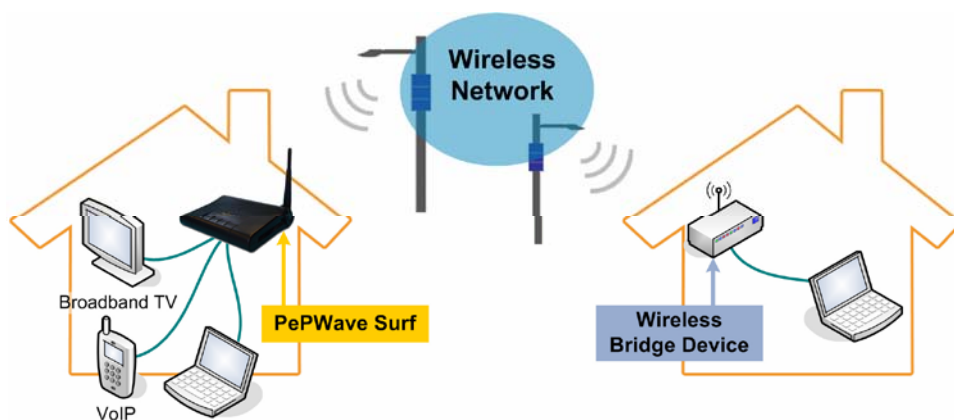
Wireless Subscriber Stations

This is a new generation of wireless devices that solves many of the issues that are unaddressed by the aforementioned types of devices. In addition to connecting the customer with the wireless network, wireless subscriber stations provide the benefits of enhanced security and manageability, ease of use, and multi-user capabilities, outlined as follows:

Wireless Subscriber Station	
Advantages	Drawbacks
<ul style="list-style-type: none"> • High-powered • Connects multiple computers by standard Ethernet • No additional software and/or drivers are required on the PC • Simple web-based administration interface • Simple troubleshooting: Layer 3 demarcation from wireless network • Built-in intelligence for monitoring & managing service quality • Built-in advanced WPA/802.1x/802.11i encryption & security • Built-in NAT & firewall • Supports multiple computers 	<ul style="list-style-type: none"> • Not available – until now

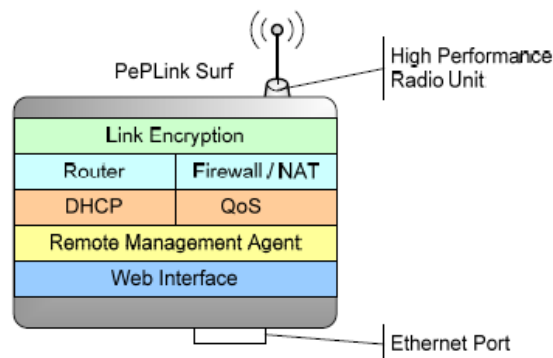
The Pepwave Surf Wireless Subscriber Station

Pepwave Surf is a sophisticated wireless subscriber station built specifically for citywide wireless networks. The following diagram illustrates the scenarios with Pepwave Surf vs. a wireless bridge device.



The Pepwave Surf wireless subscriber station connects multiple devices; whereas a wireless bridge connects one device.

The Pepwave Surf is an intelligent Layer 3 device that incorporates a high-performance wireless radio unit, an integrated home gateway router, as well as built-in security and remote-management capabilities.



Pepwave Surf supports a wide range of functionality.

The advantages of this Pepwave Surf are summarized below:

Easier Troubleshooting via Clear Demarcation

The subscriber station clearly identifies a Layer 3 service demarcation point (or service boundary). It is much easier to identify and address the cause in a connectivity problem since there are no dependencies on customers' computer hardware, software, or drivers to complicate troubleshooting.

Better Coverage and More Reliable Service

Most desktop and laptop computers, PC cards, and USB dongles are designed for indoor use and low-power wireless signals. As a result, they often cannot receive signals from an outdoor Wi-Fi network; or if they can, they lack sufficient transmission power to send signals back. Pepwave Surf is built with a high performance radio unit that has high reception sensitivity, and the transmission power to perforate where other devices cannot.

Simpler Setup via True Plug-and-play

Pepwave Surf eliminates all user-side computer configurations to provide a true plug-and-play experience through a standard Ethernet connection and a web-based configuration interface. No additional software or drivers on the customers' computers are required.

Network and Data Security

Pepwave Surf supports advanced 802.1x/WPA/802.11i authentication and encryption mechanisms to authenticate users and networks, as well as to securely encrypt user data. User authentication protects the network from rogue users. Network authentication protects users from malicious attempts to pose as the service provider's network. These attempts, when successful, can hi-jack the users' connection and enable the theft of personal, financial and other valuable data.

Computer Protection

According to research studies², an un-patched Windows PC directly connected to the Internet lasts on average for 20 minutes before it is compromised by attacks, worms, or viruses. Therefore, protection from direct exposure to the Internet is desired. Pepwave Surf has a built-in firewall and performs NAT (Network Address Translation) to shield customer computers against attacks and other risks that originate from the Internet. Customers enjoy a secure service, which results in fewer support calls.

Support for Multiple Computers

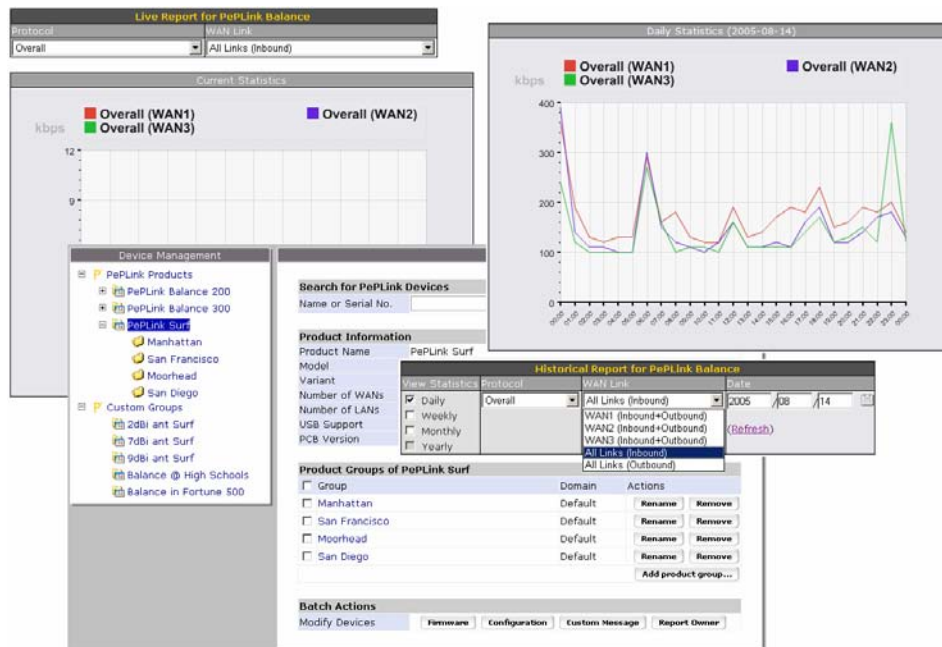
Pepwave Surf can provide a subscriber with access to the wireless network service through all of their home computers. The integrated gateway router and automatic client IP address assignment capabilities of Pepwave Surf allow multiple computers to simultaneously access the Internet.

Quality of Service

With the increasing use of the Internet to carry delay-sensitive traffic such as VoIP and high-quality audio and video, the ability to prioritize user traffic becomes important. Pepwave Surf stands out from the rest by supporting the proposed Internet standard 802.11e to achieve higher throughput and maintain low jitter and latency for applications (such as VoIP) that require high-quality data streams.

Remote Manageability

Pepwave Surf can be remotely managed by Pepwave InControl – a Central Management System.



Screenshots of Pepwave InControl

InControl is a carrier-grade provisioning, management, and reporting solution for large-scale deployment of home and business services that utilize subscriber stations such as the Pepwave Surf.

A highlight of InControl features follows:

1. Provisioning
 - Auto-discovery and setup
 - Content pushing
2. Management
 - Firmware updates
 - Device configuration parameters
 - Firewall/security policy
3. Reporting
 - Device status, usage, uptime, customer behaviors
 - Security alerts on attacks

Summary

Recently, firsthand experiences with citywide Wi-Fi have revealed both the need for and the benefits of the Wireless Subscriber Station, which until now has been the missing link for a successful citywide Wi-Fi service.

Summarized below are the many benefits that the Wireless Subscriber Station class of devices brings to both the network operator and subscribers:

Wireless-enabling Devices Comparison Summary				
Functionality & Benefits	Pepwave Surf	Wireless Bridge	PC Card / USB Dongle	Built-in Wi-Fi
Easy Troubleshooting / Clear Demarcation	✓	✓ / ✗	✗	✗
Better Coverage / More Reliable Service	✓	✓	✗	✗
Easier Setup / True Plug-and-play	✓	✗	✗	✗
Network & Data Security	✓	✗	✗	✗
Computer Protection	✓	✗	✗	✗
Multiple Computer Support	✓	✗	✗	✗
Quality of Service	✓	✗	✗	✗
Remote Management	✓	✗	✗	✗

Being the first device to comply with the Tropos TMCX specification, Pepwave Surf is a proven solution for citywide networks, where uninterrupted carrier-grade service is a no-compromise requirement.

About Pepwave

Pepwave is the proven market leader in delivering specialized wireless solutions for industrial networking, wireless mobility, service providers, and professional hotspots. As an innovator of wireless technology solutions, Pepwave operates globally in cooperation with distributors, system integrators, ODM partners, and strategic alliances.

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