Migrating Local Networks to Citywide Wi-Fi with PePLink Surf

Overview

When Citywide Wi-Fi Internet service becomes available, many residents with small-scale local networks choose to "migrate" by switching their networks' high-speed Internet services from the existing ISP(s) to Citywide Wi-Fi Internet.

These application notes present typical local network layouts before and after the migration, a practical application of the PePLink Surf Subscriber Station, as well as some benefits and considerations for migrating.

Benefits and Considerations

Cost-saving benefits of migrating are realized most readily by residents who mainly use the Internet just to "browse":

- Citywide Wi-Fi Internet is often a low-cost, or sometimes free, high-speed Internet access service implemented by the municipal government.
- Savings through reduced on-going running costs result from switching to the Citywide Wi-Fi service and unsubscribing from the paid service of the existing ISP(s).

Residents who do more than just "browse" should consider the necessity of the other subscribed services (e.g. ISP e-mail, web hosting, etc.) that are provided by the existing ISP, and then appropriately facilitate the continued availability of the necessary services.

Migration Scenario with Typical Local Network Layouts

Before Citywide Wi-Fi Implementation

To begin, before Citywide Wi-Fi is implemented, an ISP provides high-speed Internet service via Cable and/or DSL. A typical layout consists of the following components on the customer premises (e.g. home, office, etc.):

- Cable / DSL Modem
- Wireless Router
- Local Servers / Desktops / Notebooks

The following diagram illustrates the layout; further elaboration subsequently follows.

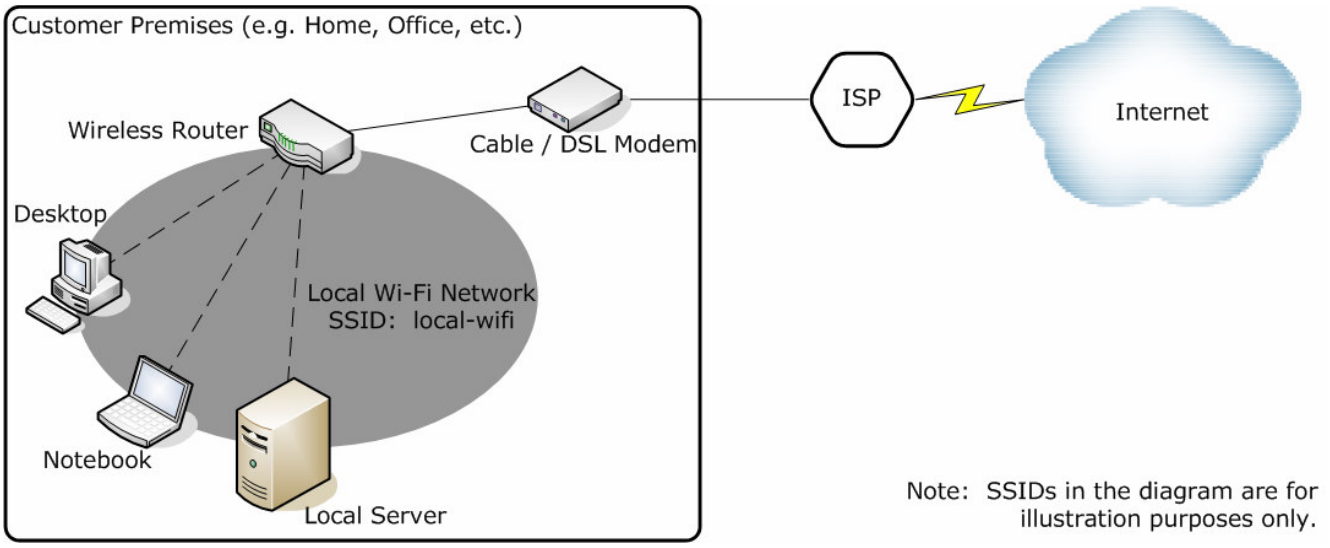

Figure 1 – Network Layout before Citywide Wi-Fi Implementation

The following are the key connections on the customer premises that enable the on-premise computers to access the Internet:

1. Wireless connections, via the SSID **local-wifi**, between the computers and wireless router (Note: the SSID, **local-wifi**, is for illustration only.)
2. Wired connection between the wireless router and Cable / DSL modem:
   - An Ethernet cable typically connects the wireless router to the Cable / DSL modem.
   - With a Cable modem, the wireless router is typically set up to use **DHCP** for WAN.
   - With a DSL modem, the wireless router is typically set up to use **PPPoE** for WAN.
3. Wired connection between the Cable / DSL modem and ISP:
   - The modem is typically connected to an outlet on the wall.
   - A Cable modem is typically connected to the wall outlet by a co-axial cable.
   - A DSL modem is typically connected to the wall outlet by a cable that is similar in appearance to a telephone cord.

Citywide Wi-Fi Implemented

The following diagram illustrates the network layout after the initial implementation of Citywide Wi-Fi; further elaboration subsequently follows.

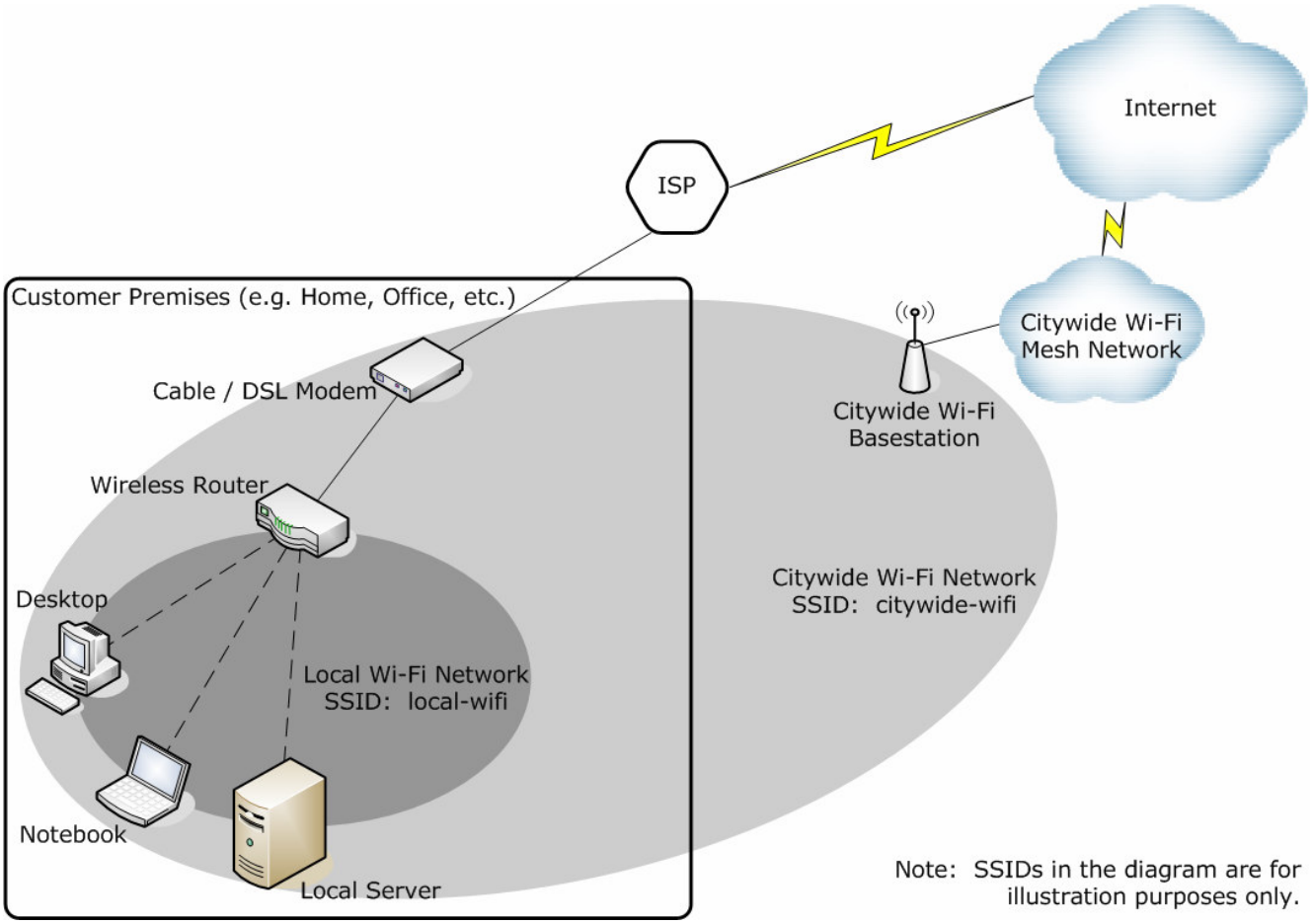

Figure 2 – Layout of Existing and New Citywide Wi-Fi Network

After the implementation of Citywide Wi-Fi, the following key components will have been added to the city's communication infrastructure:

1. Citywide Wi-Fi Mesh Network:
    - The Mesh Network is a core high-speed network that both carries data within the city and inter-connects the city and the Internet.
2. Citywide Wi-Fi Basestations:
    - The Basestations are the wireless interfaces for households to access the Internet through the Citywide Wi-Fi Mesh Network.
    - The Basestations are required because the Mesh Network carries data at speeds, and in formats, that are incompatible with typical home and office wireless networking equipment.
    - To provide full Citywide Wi-Fi coverage, numerous Basestations are installed throughout the city. (The previous diagram illustrated only a single Basestation.)

Citywide Wi-Fi now provides to households another Internet service, in addition to the existing ISP(s). As illustrated in the previous diagram, the nearest Basestation provides wireless Internet service via the SSID **citywide-wifi**. Computers on the customer premises with wireless capabilities can continue to access the existing ISP via the SSID **local-wifi**, or potentially access the Citywide Wi-Fi Internet service via the SSID **citywide-wifi**.

One Basestation typically provides wireless Internet coverage for a number of households in its vicinity. (For example, a Basestation may be installed on a telephone pole by the curb to provide wireless coverage to nearby houses.) Therefore, the strength of the signals transmitted from a Basestation, by design, is quite powerful. The SSID **citywide-wifi** should be easily detectable by wireless-capable computers on the customer premises.

However, in order for a computer to connect with the nearby Basestation, the wireless device(s) on the customer-premise computer(s) must have the ability to transmit signals with sufficient strength. Common home and office wireless computing equipment are designed to operate within the customer premises; therefore, they typically do not possess enough transmission power required to successfully send wireless signals back to the Basestation. In such cases, the customers' computers can detect the SSID **citywide-wifi**, but connection with the Basestation is not possible due to the insufficient transmission power of the customers' computers.

The solution: PePLink Surf Subscriber Station.

PePLink Surf Subscriber Station

The PePLink Surf subscriber station is a device specifically designed to wirelessly connect and communicate with Citywide Wi-Fi Basestations.

To enable external communication with Citywide Wi-Fi Basestations, the key distinguishing feature of PePLink Surf is the capability to transmit significantly more powerful wireless signals than common home and office wireless equipment.

Within the customer premises, communication takes place among PePLink Surf, computers, and other devices via a standard Ethernet connection.

The ability to connect computers and devices to PePLink Surf through a standard Ethernet connection allows households to "migrate" their Internet service, by switching from the existing ISP(s) to Citywide Wi-Fi Internet. The following scenario illustrates.

Migration to Citywide Wi-Fi

With a typical small-scale local network, migrating from the Internet service from the existing ISP(s) to Citywide Wi-Fi Internet involves the following high-level steps:

1. Disconnect the Ethernet connection between the wireless router and Cable / DSL modem
2. Connect the wireless router and PePLink Surf by Ethernet
3. Perform minor re-configuration on the wireless router, as necessary

The following diagram illustrates the migration scenario; further elaboration subsequently follows.

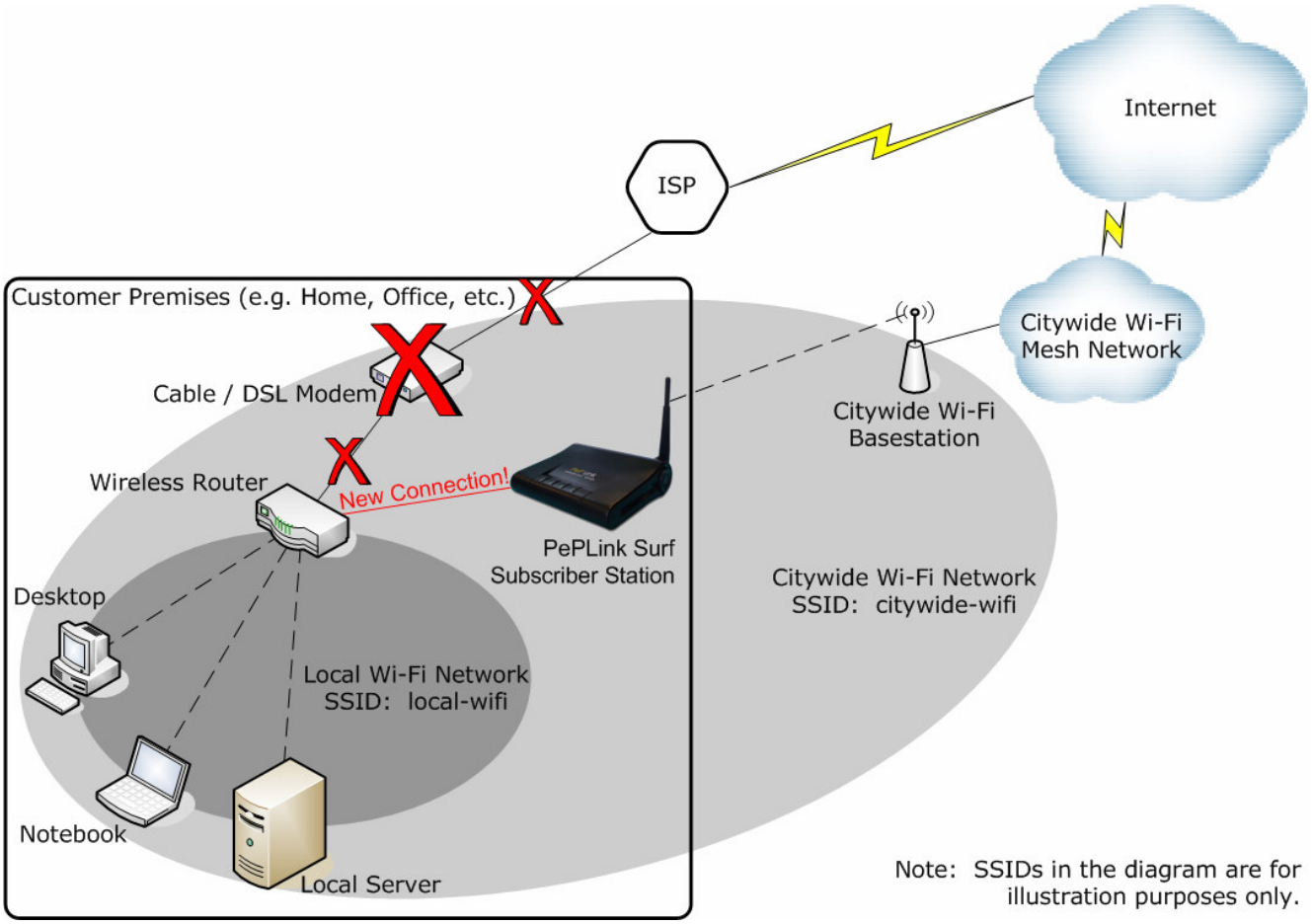

Figure 3 – Migration Scenario

After migrating to Citywide Wi-Fi, the following are the key connections on the customer premises that enable the on-premise computers to access the Internet:

1. Local wireless connections, via the **local-wifi** SSID, between the computers and wireless router (Note: the SSID, **local-wifi**, is for illustration only.)
2. Wired connection between the wireless router and the PePLink Surf Subscriber Station:

   - An Ethernet cable connects the wireless router to PePLink Surf.
   - The wireless router should be set up to use **DHCP** for WAN.

   This connection replaces the previous wired connection between the wireless router and Cable / DSL modem.

   - With a cable modem, the wireless router is typically set up to use **DHCP** for WAN.
   - With a DSL modem, the wireless router is typically set up to use **PPPoE** for WAN.

   Therefore, after connecting the wireless router to PepLink Surf, the wireless router may require some re-configuration to ensure that it is set up to use **DHCP** for WAN.

   A restart may be required in order to connect to PePLink Surf.
3. Citywide Wireless connection, via the **citywide-wifi** SSID, between the PePLink Surf Subscriber Station and the Citywide Wi-Fi Basestation (Note: the SSID, **citywide-wifi**, is for illustration only.)