



Enabling the Next Wave of Connectivity™

Network and Service Deployment Scenarios City of Corpus Christi, Texas

City of Corpus Christi



Executive Summary

Corpus Christi, Texas, is rated as one of the nation's top ten digital savvy cities in a Center for Digital Government poll. The city has deployed one of the nation's first carrier class citywide Wi-Fi mesh networks. The network will link water and gas utilities, police, fire and public works Departments, and public safety agencies to vital online information while they are in the field.



In 2002, Corpus Christi decided to automate meter reading for municipal gas and water services that supply a 147-square-mile area. "Meter readers often have difficulty accessing a property because of fences or dogs," With automated data collection, gas and water customers can check meter data online and view a property's gas and water consumption history

Corpus Christi teamed with Public Technology Inc. (PTI), a national technology research and development membership organization, to work out specifications for the automated meter reading system. The team weighed the pros and cons of two possible implementations:

- Employ the city's already-existing fixed fiber optic network as part of an automatic meter reading (AMR) system.
- Equip meter readers with RFID-based mobile equipment and have them drive by properties and capture meter data from a distance.

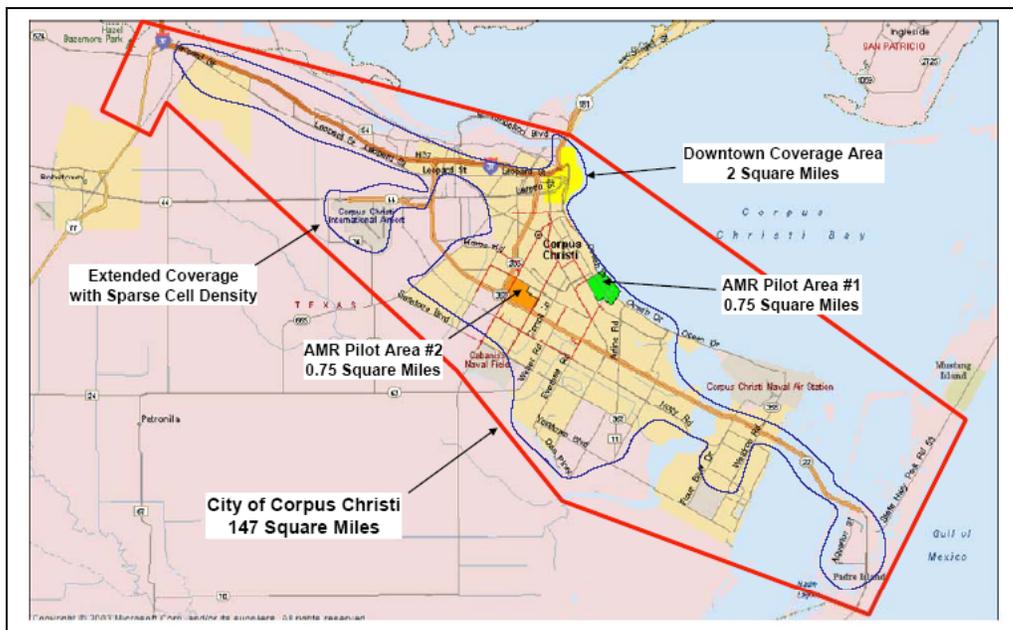
The mobile solution was slightly less expensive. But it was clear that the fixed network plan would provide the customer service benefits that Corpus Christi wanted to implement. Corpus Christi's existing fiber optic network did not extend to the outlying eastern and western flanks – about a third of the area that the AMR system would need to cover. So, a citywide Wi-Fi mesh network rollout was considered that would relay gas and water meter data from AMR concentrators to the city's Utilities Business office system.

Corpus Christi selected Tropos Networks as the sole-source for this. The AMR application uses only a portion of the Wi-Fi mesh network's available bandwidth. City departments immediately saw the potential for a host of other services: vehicle equipped laptops for police, fire and other public safety officers; mobile desktops for field supervisors and managers; and anywhere, anytime access for residents and visitors to city resources such as the library, City Hall and museums. The problem was how to permit broad use of the wireless network and at the same time, restrict the municipal system to authorized users and shield the highly confidential public safety system.

The city received several hardware solutions but none offered the combination of flexibility and security that the city required. Pronto Networks' carrier-class OSS solution provided both the required IP-based security and subscriber management elements of authentication, authorization and service and billing plans to meet the city's current and future needs. Pronto's Wi-Fi platform supports VLANs and a captive portal based authentication method that enables the network to be separated for

public and private use. Corpus Christi’s public safety departments can be on one network, its municipal systems on another, and residents and visitors on yet another, all sharing the same infrastructure. The city also can set network privileges and control access. For example, municipal employees can be authenticated by their laptop’s MAC address while residents and visitors must supply a username and password.

For security, the Pronto solution provides an SSL-encrypted registration and authentication process and supports corporate VPN clients that allow city employees secure, encrypted access to the municipal information system. Corpus Christi plans to partner with Internet Service Providers to deliver a host of revenue-generating services over the Wi-Fi network. With the Pronto solution, the city can set up a variety of service plans: for example, free access for public safety and municipal users, a monthly fee for residents and a 24-hour charge for visitors.



Finally, with Pronto, Corpus Christi could customize the main splash page and offer a walled garden – free unauthenticated access to government, utilities, zoning, and public safety sites.

This solution delivered a network that offers secure IP-based authentication, which allows municipalities to carve out the network logically for different users and constituents, from public safety employees to community residents, and from private enterprise users to visitors in public areas.

Network Solution

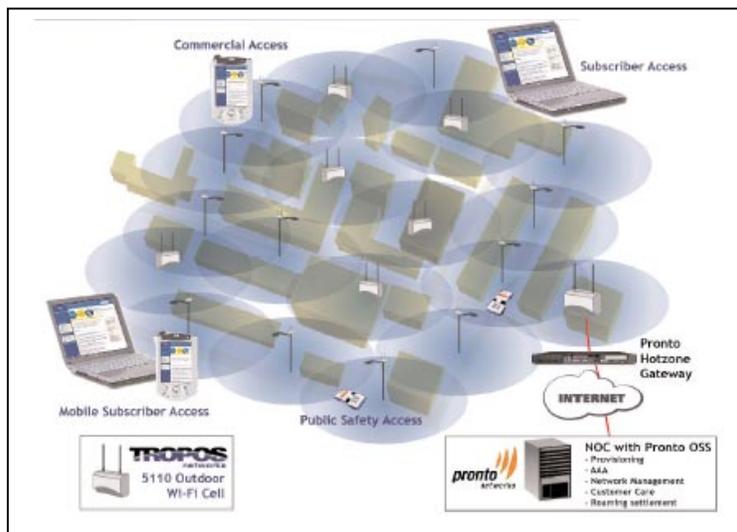
The City Wide Wireless Mesh Deployment leverages the benefit of existing fiber network backbone in the City of Corpus Christi. Pronto’s Hotzone Gateway connects to this network via a VLAN (e.g. VLAN 95 was used for partitioning all the Internet traffic of the city) providing access to the subscriber management systems in

Pronto's OSS thus ensuring the authenticity and accounting of the subscribers using this network.

The Pronto OSS is an open, standards-based wireless broadband service delivery platform. The platform handles provisioning, configuration, authentication, access control, security, pre-paid and post-paid billing, and roaming settlement. The Pronto OSS is a future-proof platform that evolves with industry standards and applications.

The Pronto Hotzone Gateway, a 1U access gateway, supports up to 2,000 concurrent users providing authentication, authorization and accounting, IP routing and customized end user portals.

This gateway authenticates access for public safety and city employees, or whatever groups the municipality designates. The gateway also administers special service plans, splash pages and pricing for residential and business users.



HOW PRONTO NETWORKS COMPONENTS WORK IN THE NETWORK

The Pronto OSS, installed in a Network Operations Center, is the central repository for all subscriber and access-point service branding data. The OSS also provides billing data, reporting, and integration to other back-office systems.

The PHG runs on a Linux Platform. The gateway manages subscriber services for the wireless network. It hosts TCP/IP network services as well as WLAN-specific access, security and other application services. It is self-configuring and remotely managed, with installation requiring only a broadband connection to the Internet.

The gateway also manages traffic for the wide area network (WAN) interface and quality of service for hot zone subscribers by efficiently managing the available bandwidth at the user level.

The PHG sends a message periodically to the OSS communicating its health. This information includes currently authenticated users, network traffic parameters, and other configuration information. If any faults are detected, alerts at the NOC trigger troubleshooting and diagnostic activities to ensure that there is minimum disruption of service.



Multiple VLANs are configured at the OSS to separate different types of traffic (Voice, Police, Fire/EMS, etc.). Each Hotspot location can present a uniquely branded user interface when the Wi-Fi client device connects to the PHG, which is called as a Splash Page. Using a Splash page, the user can provide his login credentials, get authenticated to start surfing the Internet. Users may also access location-specific information and other services without requiring authentication to the Hotspot network. The custom interfaces are managed and updated centrally via the Pronto OSS.

The splash page for Corpus Christi is shown nearby.

Some of the free-access walled garden links offered on the network are:

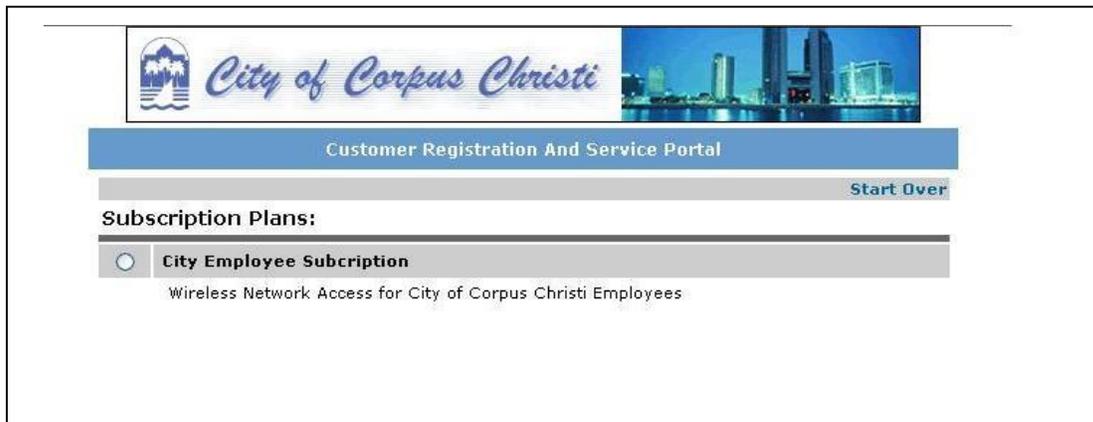
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www.corpuschristiairport.com
www.prontonetworks.com
www.troposnetworks.com
www.intel.com

Services Solution

City of Corpus Christi, Texas' City Wide Wireless Network offers its residents and employees the wireless broadband services in the following types of locations:

1. City Halls
2. Cafés
3. Hotels
4. Shops
5. Other public areas

Any user who tries to access the wireless network initially needs to sign-up for the access. At the first login attempt by the user, he/she is presented with a registration page where he needs to provide his credentials in order to gain access. The registration page presented to the Corpus Christi Wireless Network users is shown nearby.



Once the user signs-up for the access, he is provided with a username and password. Using, this username and password, once the user is authenticated, he/she can access the citywide network in the above-mentioned locations using the following options available for purchase:

- Daily Prepaid Plan – Using this plan, user gets one full day prepaid high-speed wireless Internet access. This remains Valid for continuous 24 hours from the time of first login.
- Test family Plan - Users can enjoy unlimited Wi-Fi access for a fixed fee per month. Max User counts – 5.

- City Employee Subscription – This plan defines Wireless Network Access for City of Corpus Christi Employees.

Pronto's OSS which is being used by City of Corpus Christi also supports authentication, authorization and accounting (AAA) methods to manage access and billing of WLAN users. Multi-tiered rating and service plans enable both retail and wholesale offerings with support for a variety of authentication and payment mechanisms. Credit cards, pre-paid cards, monthly subscription plans and bandwidth usage plans are also supported, as well as roaming settlements with aggregators such as Boingo, iPass, and GRIC.

Those implemented by City of Corpus Christi for authentication include the following:

- Boingo
- GRIC
- IPASS
- Prepaid Card Authentication
- Pronto Authentication
- Syniverse Authentication

Roaming

City of Corpus Christi also has Inbound Roaming Settlement with Sprint by which it provides Roaming Services to its users in the following locations:

- a. Bush Intercontinental Airport
- b. Bush International Airport Terminal E
- c. Juan Valdez Café

At this time, other Roaming Locations include the following:

- i. KCI Kansas City International Airport
- ii. Addison Conference and Theatre Center / Addison
- iii. Central Dupage Hospital
- iv. Louisville International Airport
- v. Salt Lake City International Airport
- vi. Tysons Galleria
- vii. William P. Hobby Airport