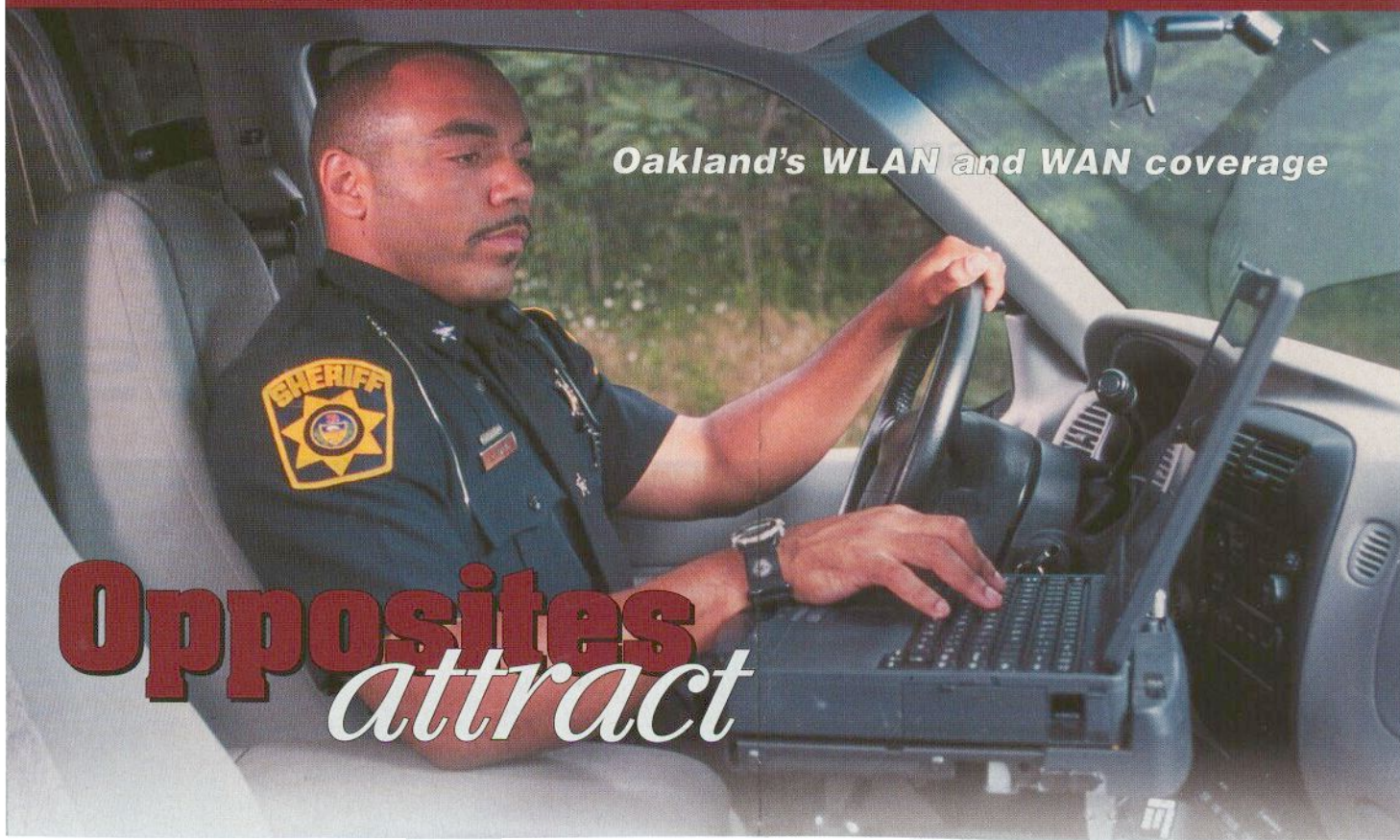




COMMUNICATIONS SPOTLIGHT

Oakland's WLAN and WAN coverage

Opposites
attract



By Donna Rogers

When the Oakland (California) Police Department installed mobile wireless computers in 220 of its squad cars and on its fleet of 35 Harley Davidson motorcycles (the full rollout will be completed this month), the communications upgrade was not without challenges.

The agency's main purpose in deploying a wireless data system was to be able to check license plate tags, along with wants and warrants. However, with such a system, field officers were sometimes not able to access critical data resources because of a slow data transfer rate. Sending a large graphic file, a mugshot, for example, could clog the network for as long as an hour.

Like many agencies around the country, the Oakland PD found a need to supplement its existing radio frequency (RF) spectrum. The main challenge that the department encountered while examining options for the communications upgrade was finding a solution that would run over its

existing Motorola RD-LAP private RF radio network, and could achieve a higher rate of data transfer.

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Intelligent mobile routing

The answer to this challenge was a new concept for the wireless data industry called intelligent mobile routing. Intelligent mobile routing permits use of any type of wireless network with any application and device, creating the ability to seamlessly and automatically roam between networks without intervention.

One type of wireless network — private or public — is not a complete

panacea for any agency's needs. Each has strengths as well as trade-offs. As a result of this new intelligent mobile routing software, the Oakland PD was able to choose a combination of networks to carry its communications, maximizing the features of each.

The department determined that a public wireless local area network (WLAN) such as 802.11b was the best way to handle bandwidth issues. The 802.11b network transfers files at a rate of up to 11 megabits per second (mbps). Throughput is 700 times faster than conventional RF communications of 14 kbps and over 500 times faster than CDPD's 19.2 kbps. By installing WLAN access points city-wide, officers would now be able to send and receive information at high speeds when within range of the network. Larger files such as mugshots, video and PDF files could now be transferred quickly and efficiently, without clogging up bandwidth.

Oakland employs the 802.11b spread spectrum WLAN at access points in conjunction with CDPD wide area coverage for its motorcycle officers and in conjunction with pri-

vate RF for its mobile patrol cars.

Universally available across jurisdictional lines, CDPD networks provide them with wide area coverage outside traditional departmental boundaries. CDPD networks also supplement the RF used by patrol cars and provides a backup in case of a system failure. In addition, CDPD can

be easier to fund than building a new RF network because usage is charged on a monthly basis.

Cellular and radio signals, as mentioned, are slow transmitters. To supplement each, Oakland combined them with an 802.11b local area network. This high speed network is selectively used at access points

throughout the city. When patrol officers bring the car in for relief and fill up with gasoline between shifts, they come into range of spread spectrum access points and their computers are automatically updated. Large files are downloaded and uploaded in as little as 30 seconds. "A whole lot of information is transferred quickly," says Officer Inez Ramirez III, a computer programmer with the department's IT unit. Although it's not in real-time, it still works well, he reports. Future plans are to expand access points to 35 fire stations across the city.

However, 802.11b is no panacea. Strict regulations limit wattage that can be transmitted by 802.11b antennas. In fact, each 802.11b tower only puts out enough power to cover about 2 1/2 blocks, yet the city of Oakland is about 8 miles long. It is not feasible to cover the entire city with WLAN coverage.

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— Inez Ramirez, Oakland (California)
Police Department

The problems wireless coverage cause for public safety fall into two camps: bandwidth and coverage, comments Mark Ferguson, director of marketing with Padcom Inc., Bethlehem, Pennsylvania. "Either street officers are unable to transmit the large loads of information they require over a wide area network (like CDPD or private RF) or they are able to push a lot of data with a wireless local area network like 802.11b, but are seriously limited in coverage area. In fact, the latter only covers about 300 feet from the access point."

Many police departments today are adding a public network "to augment holes and gaps" in their private networks, says Sheryl Waddell,

TotalControl, one of the components of Padcom's Connectivity Suite software, provides administrative control over the networks used for specific applications. This functionality enables administrators to exercise the same level of control over both wireline and wireless users.

Padcom director of sales. It is important for departments to have a wireless networking platform with the capability of switching between the LAN and WAN.

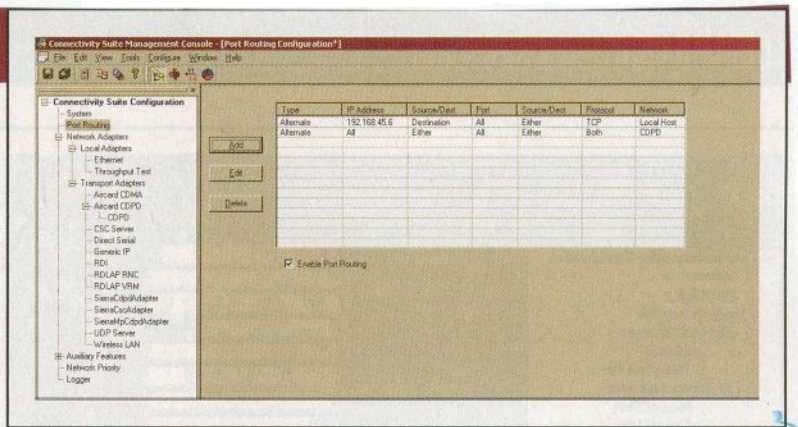
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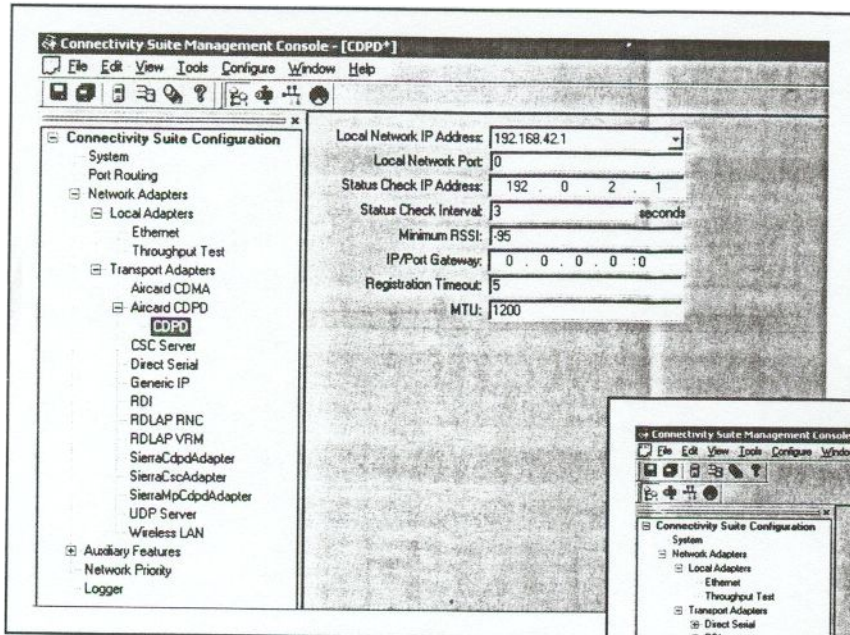
— Sheryl Waddell, Padcom

Padcom's wireless solution

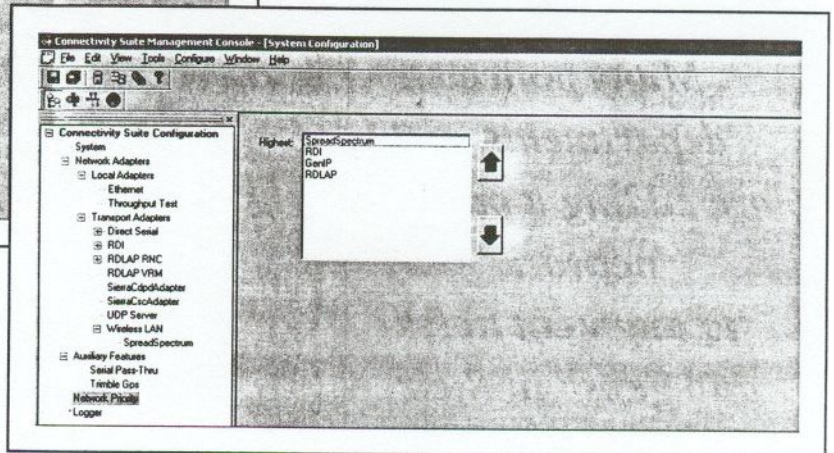
Padcom provides the intelligent routing software or middleware that seamlessly routes communications. The company's product is hardware, software and network independent. The Padcom Wireless Data Connectivity Suite is composed of these software components: TotalConnect, TotalSecure, TotalControl and TotalRoam. The network switching software, TotalRoam Ellipse, overcomes the shortcomings of wireless data communications by bridging the gap between different types of networks. It creates a virtual single data network automatically and transparently to the user.

The Connectivity Suite uses an Internet protocol (IP) standard for communication. By making the existing proprietary RF network IP-based, TotalConnect software allows Oakland police officers to transmit IP data over its Motorola RD-LAP network in the WAN. Utilizing Litton





TotalConnect (left), one of the components of Padcom's Connectivity Suite software, allows users to configure specific parameters for each Network Adapter. Once these parameters are configured, TotalConnect software provides end-to-end IP functionality, regardless of the communication protocol.



TotalRoam (right), one of the components of Padcom's Connectivity Suite software, enables the use of multiple networks to create a "virtual single network" for users. The prioritization scheme allows users to define their own default network, based on speed, cost or other business rules.

laptop computers with Cisco Aironet 350 cards installed, the patrol vehicles can communicate over the wireless LAN upon entering any of the 2 1/2-block, 802.11b coverage areas. The wireless LAN capabilities of the solution are automatically initiated by TotalControl, enabling officers to begin large file downloads, like the color warrants and wanted posters generated by their VisionTek application, through the wireless LAN.

The traffic officers will be able to transmit files over Sierra Wireless AirCard 300 NIC modems that are conveniently stored inside the new Panasonic CF34 Toughbook computers on their motorcycles.

The routing software's various other features assist not only in current needs, but allow future migration. First TotalConnect makes all networks appear like IP networks. Off-the-shelf, IP-based software can run on mixed IP and non IP-based networks, an important feature not available in the past, says Ferguson.

In addition, TotalControl Port Routing places control in the hands of

the IT administrator. "Historically, IT has had no control over what the officer does," says Ferguson. "This gives some control back." TotalControl Port Routing allows IT administrators to specify which networks the officers can use for which applications.

"Even if someone was able to capture the data, they wouldn't be able to decipher it."

— Inez Ramirez, Oakland (California) Police Department

In the past, administering upgrades in software in mobile police computers "has been an efficiency problem," states Waddell. TotalControl AutoLaunch provides "an effective way instead of sneakernets" to provide software synchronization and updates. In conjunction with XcelleNet's mobile

management product, Afaria, Oakland can centrally distribute software applications and updates, and track hardware and software assets. Using TotalRoam Ellipse as a wireless conduit, police IT administrators can wirelessly automate functions such as distributing, supporting and updating software; rolling back or uninstalling software packages; supplying missing or corrupted files; and other maintenance services.

Securing the data

Public networks, such as 802.11b, are typically used by businesses and are easily intercepted. "A big concern was 'how do we secure it?'" says Ramirez.

The department designed three layers of security to safeguard not only the connectivity point but the data as well. The first line of defense is the WEP (wireless encryption protocol) key encryption inherent in the Cisco Aironet 350 wireless product, as well as Cisco ACS software. Second is a MAC Address filter. Each network card has a specific MAC address and as each user signs on, it cross-refer-

ences a database with the authorized MAC addresses of the network cards, keeping out unauthorized users. If a card is stolen, the number can immediately be taken off the list.

Padcom's TotalSecure module provides 256-bit encryption for Oakland's data.

"Even if someone was able to cap-

ture the data, they wouldn't be able to decipher it," says Ramirez. The module contains three encryption algorithms: AES, 3DES and ARC4 that provide an end-to-end security solution. The advantage of the Connectivity Suite is the ability to switch networks while maintaining a connection, explains Ferguson.

Requiring an officer to end the session and then log in and reauthenticate in the new network can waste valuable seconds, an important safety consideration.

Among Padcom's clients are numerous public safety agencies, as well as public utilities. The company also works with a variety of hardware, software and wireless network providers.

Looking ahead to the future

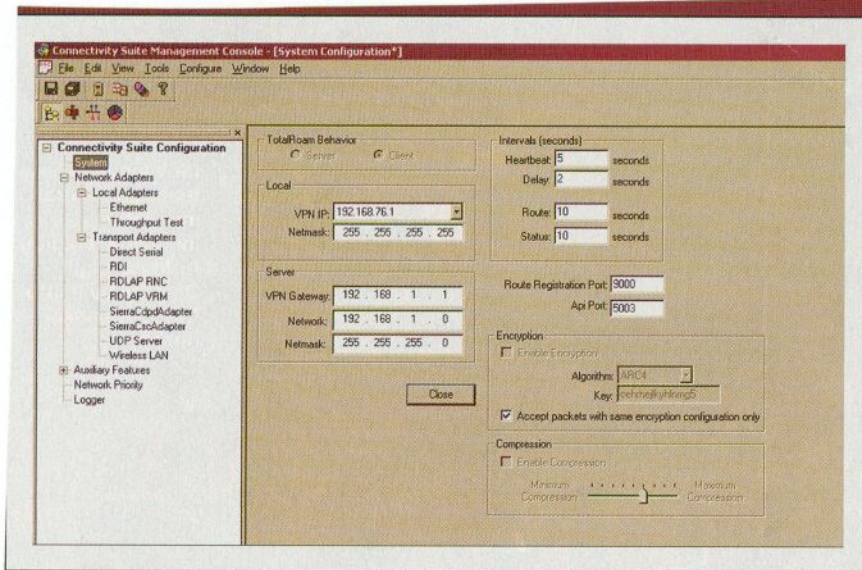
The virtual single network concept that Padcom uses offers a migration path for future technology and application uses. The networking platform allows the ability to upgrade to GPS whenever a department wishes; expansion capabilities for growth and migration to technologies such as GPRS or CDMA without involving application development applications; and an open-systems (IP) network environment, allowing ready addition of new applications over the wireless data network.

The choice for law enforcement will continue to be WAN to WLAN.

— Sheryl Waddell, Padcom

Waddell believes the network choice for law enforcement will continue to be WAN to WLAN. She estimates the migration path in the wide area spectrum may shift from cellular CDPD to CDMA or GPRS technology in the future.

The Oakland PD will be ready to move ahead into either technology as needed. The department continues to extend its coverage, not only in regard to bandwidth, but with new types of applications. Ramirez, who spent time on the beat as a street officer yet is trained as a computer programmer, brings a unique dual aspect to the job. "I talk to the people creating the technology, but I



TotalSecure, one of the components of Padcom's Connectivity Suite software, allows administrators to ensure higher levels of secure wireless communication through the use of encryption. TotalSecure provides user-defined levels of encryption and keys.

integrated CAD, records management system and field reporting system. While the vendor was not finalized at press time, one thing was certain: the intelligent routing software permits an officer to take advantage of the best of both worlds in network coverage without taking his mind off the job. ■

know what the job is and what you need to do the job," says Ramirez. "I know what is feasible and what is useful to the officer, without being overburdening. It cuts through a lot of wasted development."

Since the initial purchase of the routing software in November 2000,

the department has made great strides in overcoming its challenges. When the new CDPD coverage was approved last fall, its fleet of bikes were ready to be fully connected to check wants and warrants. Last November, the department was also close to signing a contract for a fully

Donna Rogers is the communications editor of this publication. She can be reached at drogerskranich@rcn.com.

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