

Practical Applications of Spread Spectrum - Part 3



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Expanding Existing Hardwired Closed- Loop Systems

The defacto standard communications medium for closed-loop interconnect applications for, many years has been twisted copper pairs. A trusty and reliable solution when properly maintained, copper circuits typically provide connectivity between field masters and their associated locals via 1200bps, Bell 202 FSK, a signaling standard adopted by manufacturers in the traffic industry years ago. Fiber is all the rage today for new system deployment, and with its resistance to electrical interference and extreme bandwidth capabilities it is an obvious choice. However, it can be safely said, that a large portion of the copper infrastructure currently in place in traffic applications, in the form of either user owned cable plants, or dedicated leased-lines, will be operational well into the foreseeable future.

Hundreds of thousands of miles of copper pairs are in use nationwide as a communication backbone for closed loop systems. With the continued expansion of cities, and the corresponding growth of rural areas, new intersections are steadily being installed. In many cases, these are beyond the limits of the existing copper infrastructure. At first glance, it would seem the simplest solution for interconnecting these new locals would be to extend the existing copper. In practical terms though, the dollar costs for installation of ductwork and cabling along with the regulatory and environmental issues created, may be difficult to justify by the end-user.

A cost effective alternative today is to interconnect wirelessly. Many license-free Spread Spectrum radio modems are available, and when installed in properly engineered systems will provide communication quality that will equal or exceed that of hardwire. The weak link with using wireless technology for copper extension applications is that the radio modems, having been designed only to interface with a controllers, serial data (RS232) port, cannot be directly connected to an existing copper arterial. If the ultimate goal is to provide a simple, "plug-and-play" method of extending coverage of an existing hardwired, closed-

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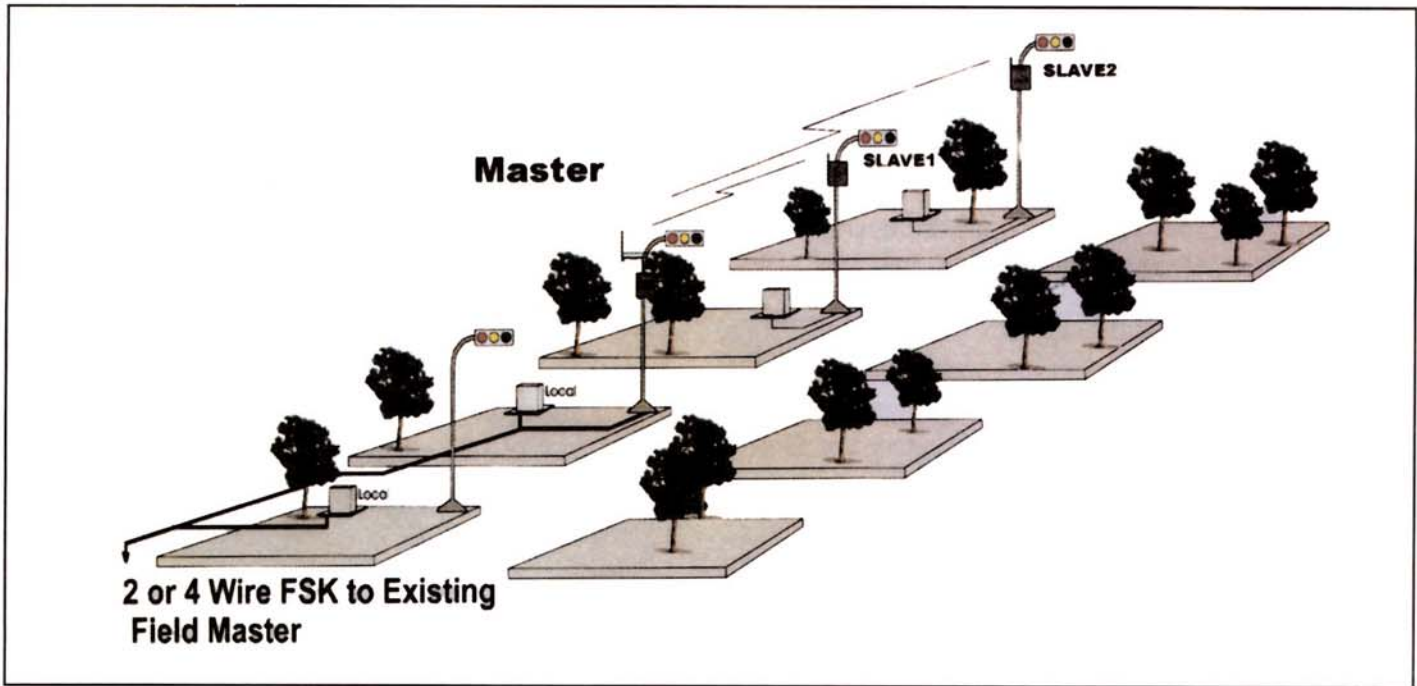


Figure 1

loop system wirelessly, with absolutely no system reconfiguration or controller modification, a new wireless device designed specifically for the traffic industry is needed.

Enter the Wireless Interconnect Unit

A Wireless Interconnect Unit has more to offer the traffic industry than a standard RS-232 Radio modem. This device is a completely integrated package combining the latest in Spread Spectrum Radio technology with built-in 2/4 Wire FSK connectivity. This device offers flexibility and functionality all in one box. The "License-Free," nature of the radio technology combined with the "plug and play," Copper Wire (2/4 Wire FSK) connection means that a Wireless Interconnect System can be up and running today with no hassle.

Implementation of a Wireless solution for a Closed Loop System is quick and simple with a Wireless Interconnect unit since it can be connected directly to the existing copper wire (2/4 Wire FSK) infrastructure (see figure 1). This device is pre-configured for the specific application and offers "plug and play," operation. The key benefit to using a Wireless Interconnect Unit (compared to a standard RS-232

Radio Modem) is that no external hardware or additional system integration or modification is needed when interfacing with existing copper communication lines. A Wireless Interconnect system is a cost effective and reliable way to expand a Closed Loop system.

Whether the system uses Centralized Control or an On-Street Master, the connection and operation is the same. To extend the coverage of an existing Closed Loop system, connect a Wireless Interconnect Master directly to the existing Copper Lines. At all Local controller locations (within range), a Slave Wireless Interconnect unit is connected to the controller.

In figure 1, a Master Wireless Interconnect unit has been installed at the end of the existing copper lines and will bring 2 "stand-alone" intersections on-line. At the two "orphan," intersections, a Slave Wireless Inter-

connect unit is installed. All data passed over the copper line from the master controller is transmitted through the air to the local controllers. The operation of this wireless system will match the performance of the copper line system; providing high data integrity on timing or data uploads and downloads. A Wireless Interconnect System can also operate successfully in systems with demanding polling protocols (once/sec). Since the Wireless Interconnect Master interfaces directly with the existing copper wire, it can be located at any point along the communication lines. It

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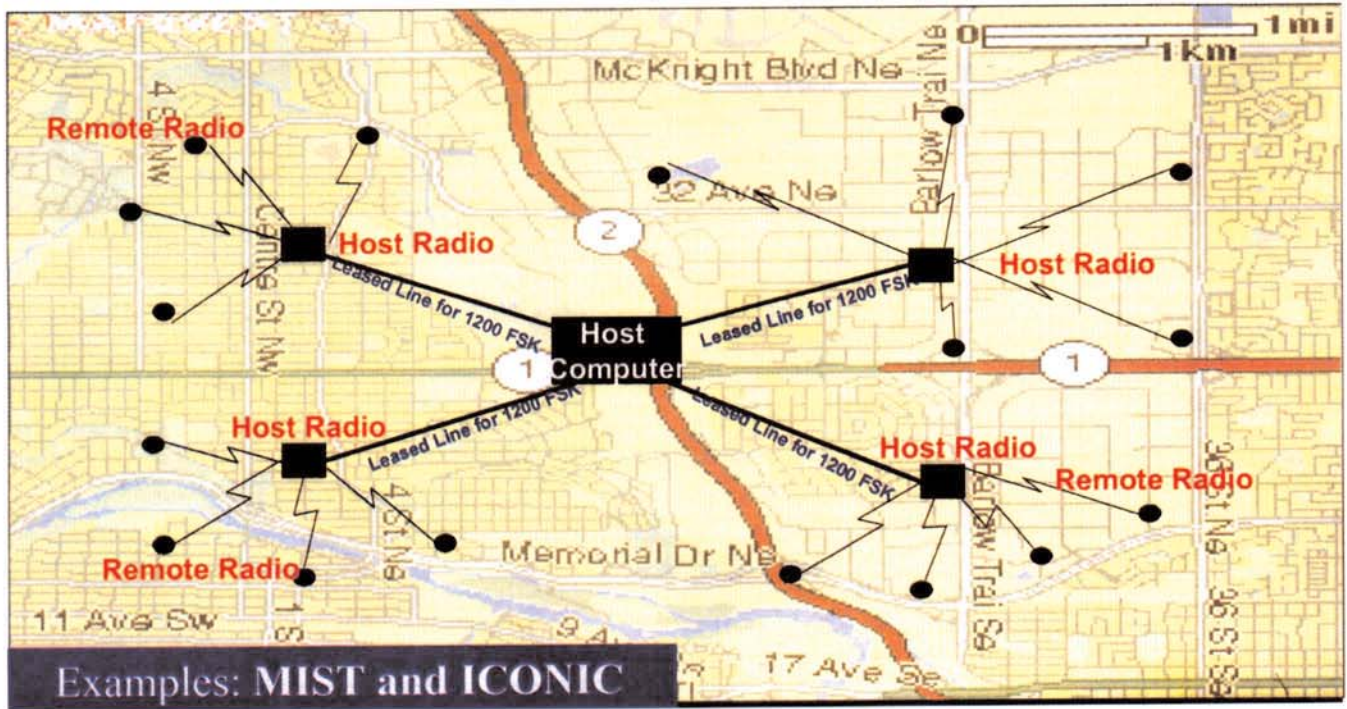


Figure 2

is possible to choose the best location for the radio, which will provide the greatest range for the wireless system. In contrast, when using a standard RS-232 Radio Modem the Master radio must be located at the ON-Street Master controller, thereby limiting the flexibility and functionality of the system. This is especially important to consider for Centralized Control applications such as MIST, ICONS, VMS, Series 2000 where the TOC may be located in the city center and the stand alone intersections are near the city limits. The ability to connect a Wireless Interconnect Unit directly to the existing copper lines allows us to go the end on the copper wire and use a Wireless Link to bring more intersections on line.

Figure 2 depicts a typical centralized control system. Using a system of Wireless Interconnect Units, the coverage of this system can be expanded and "orphan," intersections can be brought on line. This example shows 4 different Wireless Interconnect systems operating within the central system, each on a separate comm. line from the TOC. There is no limitation on how many Wireless Interconnect Units can be used within a typical Closed Loop system. In this example, there is one HOST Radio installed on each of the 4 main copper lines. All local intersection controllers within wireless range from the HOST Radios can be brought on-line.

The introduction of wireless products designed specifically for ITS applications allows for quick and simple installation and commissioning. For example, a Wireless Interconnect Unit is designed specifically to interface directly with existing Copper Wire communications lines. No external hardware or engineering equates to no headaches for field technicians. With all of the things that can go wrong in a closed loop system, it is important to have a wireless product that is simple to work with and reliable. A Wireless Interconnect Unit offers "plug and play," operation in all Closed Loop systems, is a cost effective and reliable solution for expanding system coverage. The combination of a Spread Spectrum Radio and a FSK interface opens up a world of possibilities for all ITS systems. It's a Wireless World Out There! ■

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