Application Note AN2009-37

Serial Radio Application for Traffic Control

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INTRODUCTION

In the 1970s, traffic control systems started to become intelligent [1]. Today, many United States traffic intersections already have roadside cabinets based on the National Electrical Manufacturers Association (NEMA) TS2 and Intelligent Transportation Systems (ITS) standards. The cabinets contain NEMA controllers or Advanced Transportation Controllers (ATCs). The cabinets and controllers are used for various applications, including traffic signal control, field master unit, ramp metering, traffic count stations, reversible lane control, dynamic message sign control, and more. These traffic subsystems are now being integrated into networks that connect to local and regional Traffic Management Centers (TMCs). Connected traffic management systems are considered a part of ITS.

COMMUNICATIONS COST PROBLEM

Connecting existing traffic controllers to a TMC often occurs in an urban setting. If a major travel route is to be upgraded, several intersections may need to be connected to a TMC that might be several miles away. The appropriate traffic authority has the problem of trying to obtain communications in an area that may be built-up with many businesses, finished sidewalks, street furniture, and busy rights of way. The communications portion of the project may be a major consideration if the traffic authority has to install communications by digging up the rights of way or hanging fiber optics on utility poles.

SEL SOLUTION

One approach to keeping costs under control is to use the SEL-3031 Serial Radio Transceiver to carry serial communications between the TMC and a convenient intersection. To implement this solution, one radio and antenna must be located at the TMC and a second radio and antenna located with one of the intersection controllers (see Figure 1).

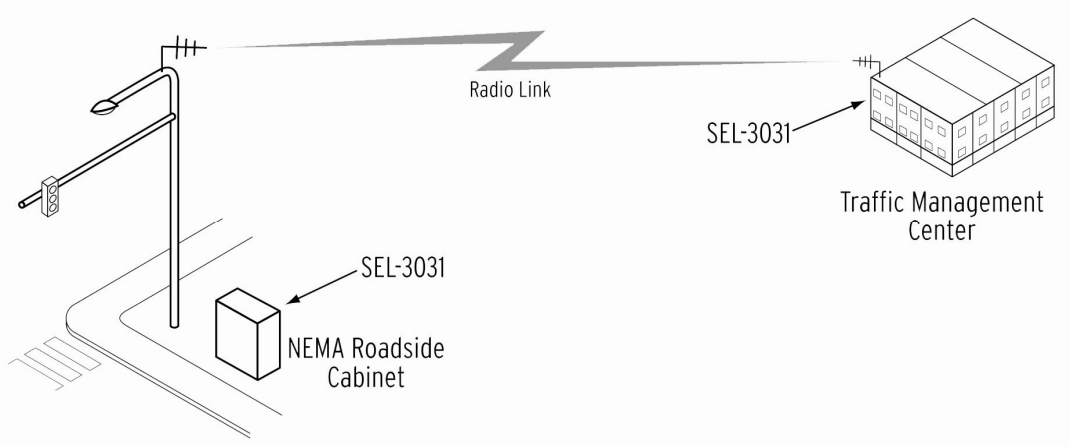

Figure 1 Communications to the TMC Using the SEL-3031

Table 1 Communications Option Comparison

Communications Option	Availability	Capital Cost	Operating Expense
Unlicensed radio (SEL-3031)	Everywhere	Modest	None
Licensed radio	Most locations, some restrictions	Modest plus license	License upkeep
Leased telecom line	Most locations	Minimal to modest	Monthly payments
Leased fiber optic	Not available in many locations	Modest	Monthly payments
Installed own circuits	Dependent on rights of way	Very expensive	None

The environmental requirements are generally defined in the NEMA TS2 standard. This standard requires equipment to operate between –37° and +74°C. The SEL-3031 exceeds this requirement and operates between –40° and +85°C.

DATA COMMUNICATIONS REQUIREMENTS

The Federal Highway Administration (FHWA) publishes an excellent *Telecommunications Handbook for Transportation Professionals* [2]. Chapter 5 provides an example project connecting seven intersections, each operated by an ATC 2070 controller. In the example, the total data requirement is for 6400 bps so the total data traffic can be accommodated in a 9.6 kbps communications circuit. The SEL-3031 has three serial circuits, each capable of full data encryption at 9.6 kbps. The encryption technology is 256-bit Advanced Encryption Standard (AES), a level that meets FIPS 140-2. The system is engineered to resist man-in-the-middle and replay attacks on the radio transmission.

CUT COSTS AND IMPROVE SYSTEM FLEXIBILITY WITH THE SEL-3031

The flexibility, frequency hopping, security, data capabilities, and tough environmental capabilities of the SEL-3031 make it an excellent choice for traffic applications.

REFERENCES

[1] National Electrical Manufacturers Association, *Traffic Control Systems*, vol. I. New York: The Association, 1976.

[2] U.S. Department of Transportation, Federal Highway Administration, *Telecommunications Handbook for Transportation Professionals: The Basics of Telecommunications*. Available: http://ops.fhwa.dot.gov/ publications/telecomm_handbook/

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