Simple Network Contact Closure

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Caltrans District 3
The Problem- To control Extinguishable Messages signs in remote locations.

The Alternatives-
1) A cellular based radio was used in the past, which used the overhead control channels on the analog cellular network. A web page was used to control the radios. The downside to this solution was it required using the vendors Gateway to access the radios. This meant the vendor was also responsible for providing the webpage. The analog network was being phased out, which meant a new digital radio was required. This was a good time to look for a change.
2) Use a telular phone to connect a digital cellular phone to an analog X-10 device.

The Solution- A GPRS radio with an Ethernet output coupled to a Webrelay.

The Advantage- Direct access to the GPRS radio network. Easily monitored and controlled via built-in web page or by XML message.
Appendix B: Specifications

Power Requirements:
Model X-WR-1R12-1I5-5
Voltage: 5VDC ± 5%
Current (operating at 10Mbps): 318mA max
Current (operating at 100Mbps): 460mA max

Model X-WR-1R12-1I5-I and X-WR-1R12-1I24-I
Voltage: 9~28VDC
Current at 9V (operating at 10Mbps): 224mA max
Current at 9V (operating at 100Mbps): 319mA max
Current at 24V (operating at 10Mbps): 88mA max
Current at 24V (operating at 100Mbps): 121mA max

Model X-WR-1R12-1I5-E
POE Class 1 (0.44Watt to 3.84Watt range). Optionally can be powered with external 5VDC power supply.

I/O: 1 Optically Isolated Input, 1 Relay Output

Relay Contacts:
Contact Form: SPDT (form c)
Contact Material: AgSnO₂
Max Voltage: 125VAC, 100VDC
Max Current: 12A

Relay Control Options: ON/OFF or Pulsed
Pulse Timer Duration: 100ms to 86400 Seconds (1 day)
Accuracy of pulse timer: 99.99%
**Optically Isolated Input:**
Input Voltage: 3-12VDC  (5V Input models)
Input Current: 4.7mA – 25mA  (5V Input models)

Input Voltage: 11-28VDC  (24V Input models)
Input Current: 4.9mA – 13.4mA  (24V Input models)

Input Isolation:  1500V

**Network:** 10/100 Base-T Ethernet
**Network Setup:** static IP address assignment, TCP port selectable

**Connectors:**
Power/Input: 5-position, removable terminal strip, 3.81mm terminal spacing
(Replacement part number, Phoenix Contact 1803604 )
Relay: 3-position, removable terminal strip, 7.62mm terminal spacing
(Replacement part number, Phoenix Contact 1767012)
Network: 8-pin RJ-45 socket

**LED Indicators:** 4
- Input voltage applied
- Relay coil engaged
- Network linked
- Network activity

**Physical:**
Operating Temperature: -20° to 70°C  (-4°-158°F)
Size: 1.41in (35.7mm) wide X 3.88in (98.5mm) tall X 3.1 in(78.0mm) deep
Weight: 5oz (142 grams)
Enclosure Material: Lexan 940  (UL94 V0 flame rated)

**Password Settings:**
Password protection on setup page: Yes
Password protection on control page: Optional
Password Encoding: Base 64
Max password length: 10 characters
Power Supply (Powers WebRelay) (5VDC or 9-28VDC)

WebRelay

Switch (or sensor)

IP Network

WebRelay

Device to be Controlled

Fuse or Circuit Breaker

Power Supply (Powers WebRelay) (5VDC or 9-28VDC)

Power Source (For device to be controlled)
EMS Digital Cellular Control Wiring Diagram

Wireless Cellular Radio Modem

Cat-5e Cable

WebRelay

Vin+ Vin- N.O. C Input+ Input-

Duplex Receptacle (120V/AC)

20VAC-12VDC 500mA Wall Mount Adapter

RELAY

NO COM 120VAC Relay

A B

4 6

7 8

AC FROM SERVICE AWG#8

BLK WHT

Master Switch

BLK WHT

AC OUT EMS

Dean Campbell
Modified 10/15/2007
WebRelay Screen Shots:

Initial setup display. Contains basic information about WebRelay.
Network setup.

Network parameters require reboot before they take effect.

- **IP Address**: 192.168.1.2
- **Netmask**: 255.255.255.0
- **Broadcast**: 192.168.1.255
- **Gateway**: 192.168.1.1
- **TCP Port**: 80
- **Modbus Port**: 602
- **Speed**: 10 Mbps
- **Mode**: Half Duplex

[Submit] [Reset]
Password setup.
Relay/Setup. Input and relay function settings.
Control page setup. These settings customize the control page.
Control page setup in reboot controller mode.
Built-In Web Server

![Web Relay Interface](image-url)
District 3 Web Relay Access Page

### District 3 - EMS/CMS Control

**Please click on the location that you want to control**

<table>
<thead>
<tr>
<th>Relay Number</th>
<th>Rte #</th>
<th>Description</th>
<th>EMS Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>89</td>
<td>NB Tahoe City HAR</td>
<td>HAR</td>
</tr>
<tr>
<td>2</td>
<td>89</td>
<td>WB Tahoe City HAR</td>
<td>HAR</td>
</tr>
<tr>
<td>3</td>
<td>267</td>
<td>EB Kings Beach HAR</td>
<td>HAR</td>
</tr>
<tr>
<td>4</td>
<td>267</td>
<td>WE Kings Beach HAR</td>
<td>HAR</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>NB S/O Pocket Rd - 47th Ave HAR</td>
<td>HAR</td>
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<td>6</td>
<td>50</td>
<td>EB at Camino - Camino HAR</td>
<td>HAR</td>
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<tr>
<td>7</td>
<td>50</td>
<td>EB WO Watt - Bradshaw HAR</td>
<td>HAR</td>
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<td>8</td>
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<td>WE EO Zinfandel - Bradshaw HAR</td>
<td>HAR</td>
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<tr>
<td>9</td>
<td>99</td>
<td>NB Calvine - 47th Ave HAR</td>
<td>HAR</td>
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<tr>
<td>10</td>
<td>99</td>
<td>SB JNO 12th Ave - 17th Ave HAR</td>
<td>HAR</td>
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<tr>
<td>11</td>
<td>80</td>
<td>EB at Gold Run</td>
<td>HAR</td>
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<tr>
<td>12</td>
<td>80</td>
<td>WE at Gold Run</td>
<td>HAR</td>
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<tr>
<td>13</td>
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<tr>
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<td>80</td>
<td>WE at Baxter</td>
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<td>15</td>
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<td>WE JWO Blue Canyon #32 CMS - Reset</td>
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<td>WE at Capital Ave - HIGH WINDS</td>
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<tr>
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<td>89</td>
<td>EB at Gold Run #18</td>
<td>CMS - Reset</td>
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Implementation Issues

1) The greatest trouble is getting a signal to the GPRS modem

2) The second problem was trying to create a simple single web page that would could control and maintain current status. The problem was the delay when attempting to poll for status using the XML messages due to latency and/or unreachable elements.

The Temporary Fix

A simple web page with direct links to each of web relay’s web server

The Final Solution

To create a server side application that would poll for status and service a user’s control requests with minimal delay.