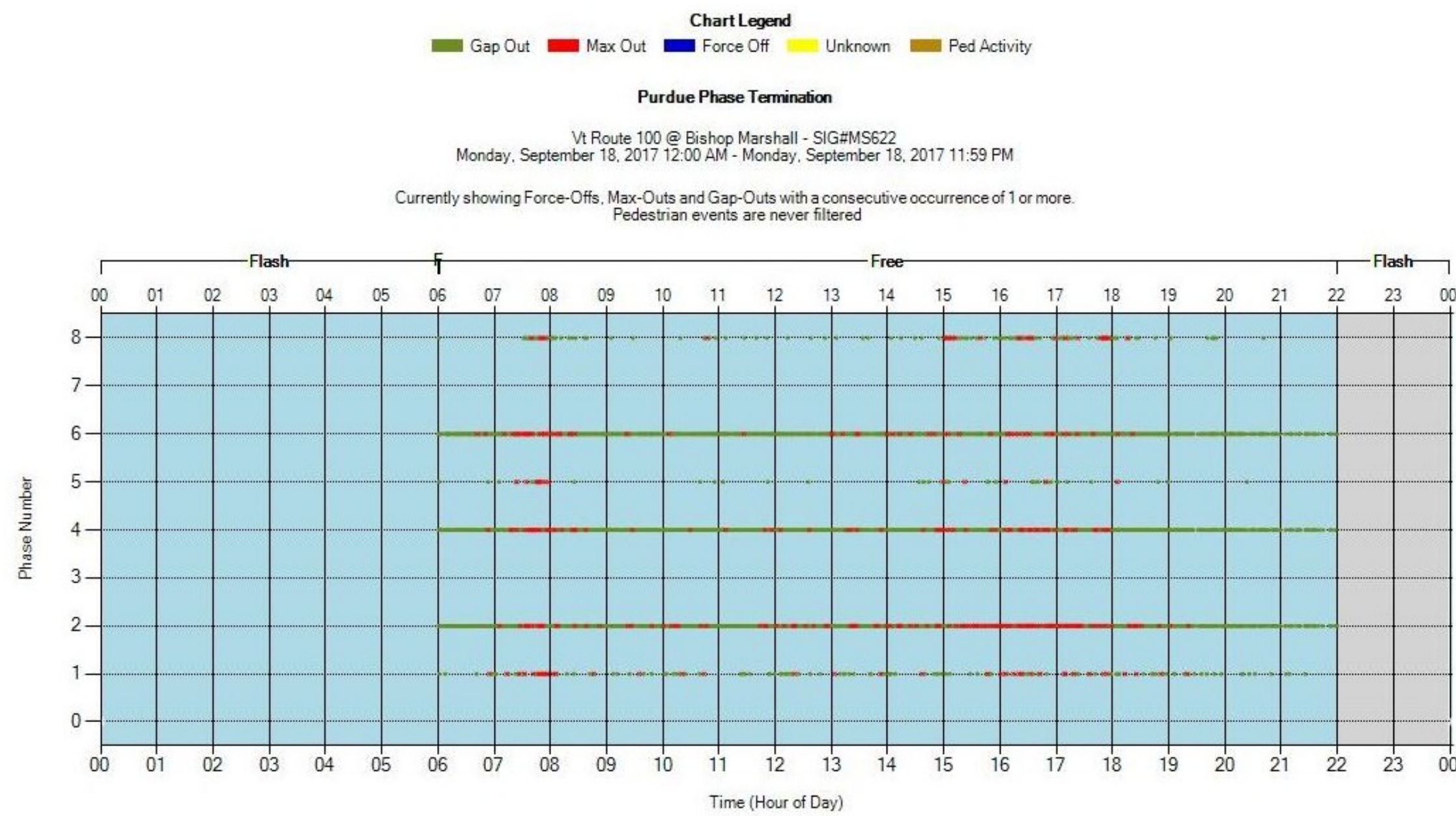


Derek L. Lyman, P.E.

VTrans - Highway Division – Maintenance & Operations Bureau - TSMO

## Purdue Phase Termination Chart



The Purdue Phase Termination Chart among the suite of ATSPMs can efficiently display the capacity utilization of our traffic signals

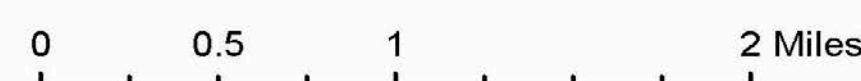
Chittenden County Regional Planning Commission, Vermont  
Implementation of Dedicated Short-Range Communication (DSRC)  
and Automated Traffic Signal Performance Measures (ATSPMs)  
along an Urban Traffic Signal Corridor:  
Real Time Traffic Information through DSRC Deployment



Date: 7/14/2017



CHITTENDEN COUNTY RPC  
Communities Planning Together



## Implementation of Dedicated Short Range Communication (DSRC) and Automated Traffic Signal Performance Measures (ATSPMs) along an Urban Traffic Signal Corridor: Real Time Traffic Information through DSRC Deployment (Pending Award)

VTrans in partnership with the CCRPC would like to present an innovative proposal to improve the traffic flow on our most congested corridor in the State, Shelburne Road (US Route 7). Our proposal includes the installation of remote communications along the corridor to support dedicated short-range communication, DSRC, implementation to prepare us for connected vehicle and AASHTO's SpaT (Signal Phasing and Timing) challenge. This project will integrate three Every Day Counts (EDC) program focus areas:

- EDC 4 – Automated Traffic Signal Performance Measures
- EDC 3 – Regional Models of Cooperation
- EDC 3/4 – Data Driven Safety Analysis

## Study Intersection Upgrades

Intersection	Town	New Cabinet	New Controller	Advanced Detection	Ethernet Radios	DSRC Radio
MS-511	US 7 & WEBSTER RD		X	X	X	X
MS-507	US 7 & LONGMEADOW RD		X	X	X	X
MS-508	US 7 & BAY RD		X	X	X	X
MS-512	US 7 & PINE HAVEN SHORES		X	X	X	X
MS-513	US 7 & HULLCREST RD		X	X	X	X
MS-509	US 7 & MARTINDALE RD		X	X	X	X
MS-515	US 7 & HARBORVIEW RD		X	X	X	X
MS-514	US 7 & ALLEN RD		X	X	X	X
MS-516	US 7 & BARTLETT BAY RD		X	X	X	X
MS-517	US 7 & IDX DR		X	X	X	X
MS-518	US 7 & MCINTOSH AVE	X	X	X	X	X
MS-519	US 7 & BALDWIN AVE	X	X	X	X	X
MS-524	US 7 & LAUREL HILL RD		X	X	X	X
MS-520	US 7 & BREWER PKWY	X		X	X	X
MS-521	US 7 & QUEEN CITY PKWY	X		X	X	X
MS-522	US 7 & SWIFT ST	X		X	X	X
BVT-1	US 7 & I-189 WB OFF RAMP		X		X	X

## Sample Connected Vehicle Equipment

### Savari SW-1000 Road-Side-Unit (RSU) Datasheet

Savari is the leading vendor of DSRC-based RSEs in its test beds and commercial applications. The Savari StreetWAVE™ has proven its reliability from the freezing cold of a Michigan winter to the extreme heat of an Arizona summer. It offers multiple configuration options for DSRC radios, Wi-Fi and GPS, and is compliant with the United States Department of Transportation (USDOT) RSE v4.1 specification. The StreetWAVE comes with the most thoroughly tested and highly regarded RSE software. The Ann-Arbor Safety Pilot Model Deployment uses Savari RSUs exclusively, and it is also used by CAMP-V21.

#### Key Features

- Mobility
  - Ease of implementation and deployment
  - Ease of configuration
  - Sturdy mechanical design
- Features
  - On-board GPS for location services and synchronization
  - PoE with full surge protection
  - FCC certified
  - USDOT GPL vendor
  - Available SDK for application development
  - Available remote management support
  - PCAP logging and error reporting including support for message
- Optional slot for mPCI cards

#### DSRC Message support

- WSA broadcasts
- Traveler information messages
- Roadside alert
- SPAT, SPM messages
- GIDMAP messages
- RTCM messages

#### Standard support

- IEEE 802.11p
- IEEE 1609.2
- IEEE 1609.3
- IEEE 1609.4
- SAE J2735
- NTCIP
- USDOT v4.1 RSU specification

#### Networking

- IPv6 and IPv4 support
- SIP tunnel support
- SSL
- SSH
- TLS

#### Applications

- Selected V2I Safety (sample)
  - I2V - Traffic signal violation warning
  - I2V - Curve speed warning
  - I2V - Left turn assistant
  - I2V - Stop sign movement assistance
  - I2V - Red light violation warning
  - I2V - Reduced speed zone warning

#### Components

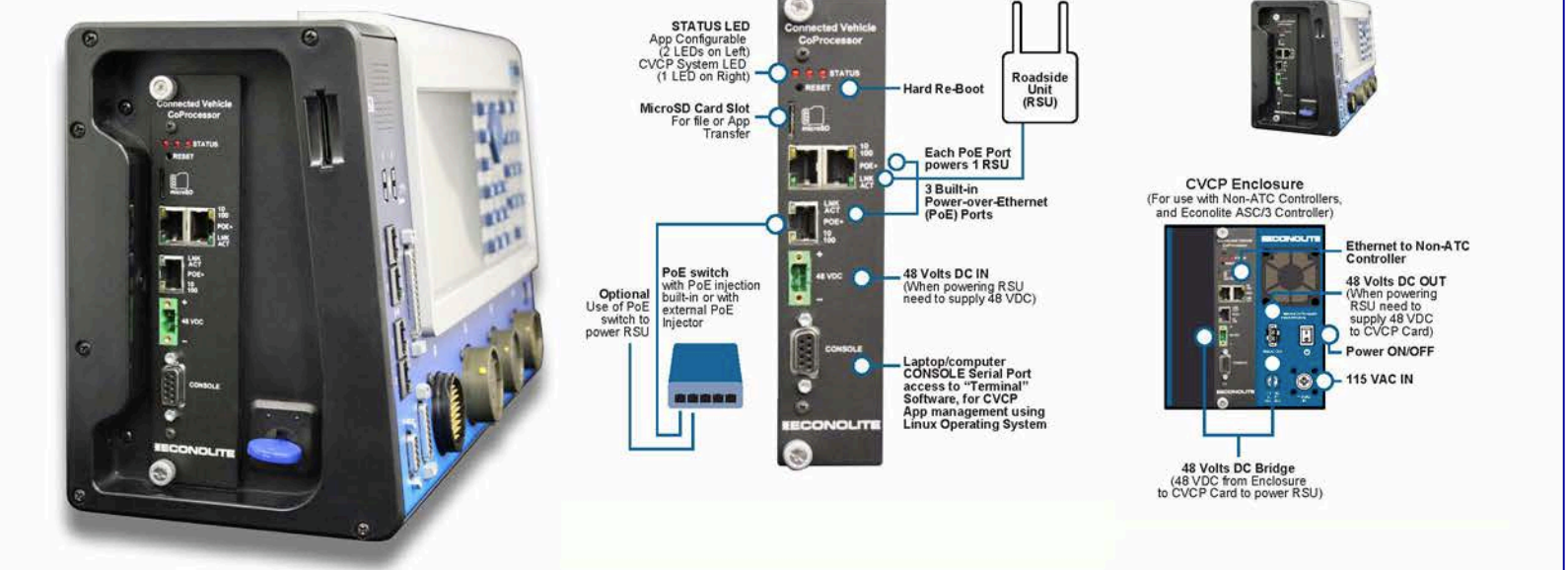
- Processor: 800 Mhz, iMX6 dual core
- Memory: 1 GB DDR DRAM
- Storage: 8 GB Flash
- DSRC interfaces: Dual radio support
- GPS: U-Blox tracking sensitivity -160dBm
- HSM: Infineon SLI 97
- Power Rating: IEEE 802.3 at PoE
- Power Consumption: -10W
- Temperature: -35C to +75C
- Dimensions: 8" (L) x 8 1/2" (H) x 2 1/2" (D)
- Antenna Connectors: N-Type Male (DSRC) & SMA (GPS)
- LEDs: Power, Status & Diag
- Standards Compliance: USDOT RSU v4.1 specification
- FCC Compliance: FCC, CFR 47 Part 90
- Traffic Controller Compatibility: Compatible with NTCIP compliant traffic controllers

#### Accessories (optional)

- Pole mounting kit (power over ethernet) controller kit
- Available for rapid deployment and testing of connected vehicle applications. Sample applications are available through a comprehensive programmers guide.

#### SDK (sold separately)

### CV CoProcessor Module Datasheet



#### Ethernet Communications

- Integrated 5-port 10/100 managed Ethernet switch
- Three front panel mounted 10/100, 802.3 at Type-I Ports
- Capable of Power-over-Ethernet on front panel
- One 10/100 port to backplane DIN connector for communications with ATC switch
- One 10/100 port to SOM

#### Power

- Internal 5VDC @ 0.5A
- External 48VDC @ 105A
- Recommended 48VDC power supplies
- Internal/development use: SL Power CENR0604803F01
- Field use: TDK-Lambda DPP20491

#### Mechanical Specifications

- Product Dimensions (L x W x D) - 8.66in x 6.97in x 1.58in
- Standard Model 2070 communications slot mechanical form factor

#### Software Specifications

- Linux 3.x SDK

#### Optional

- Stand alone enclosure and power supply



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