

Traffic Signal Unified Command and Control Integration Guidelines

February 5, 2026

Introduction

The Bureau of Operations (BOO) procured Q-Free Kinetic Mobility software as the statewide platform for unified command and control of traffic signals. Kinetic Mobility replaces Intelight Maxview, which was originally deployed in 2018. Kinetic Mobility is a web-based software which allows traffic signal controller databases to be managed and allows for real-time monitoring and operation of connected traffic signals. Kinetic Mobility will be integrated with OpenRoads ATMS software, which will allow TMC operators to implement predefined action sets along signal corridors for special events, work zones, and during incidents. Action sets could also be used to mitigate recurring congestion which impacts signalized corridors differently depending how much traffic diverts from a freeway to the arterial.

This document is intended to provide PennDOT-specific configuration information for consistency in Kinetic Mobility. For general information, refer to the Kinetic Mobility user manual in the Help menu.

Kinetic Mobility Modules

Kinetic Mobility is designed with modules and can control many types of devices. PennDOT has licensed the Signals and Ramp Meter modules. The Integrations and Locations modules are also used in conjunction with the Signals and Ramp Meter modules.

These modules are used as follows:

- Locations – used to organize devices around a physical location, and contains lanes, maneuvers, and crosswalks
- Signals – used for configuring phases and maintaining signal controller databases
- Integrations – used for capturing controller communication settings

There is generally a one-to-one relationship between locations and signals.

Logging into Kinetic Mobility

Kinetic Mobility can be accessed from the following URL with a modern web browser (Chrome, Edge, etc.): <https://penndot-ucc.cloud-q-free.com/ui/kinetic/> This URL is available when connected to the internet and does not require a VPN connection to the PennDOT network. Municipalities and contractors will need to have CWOPA credentials to use Kinetic Mobility.

At the login screen, users need to click on “PennDOT CWOPA Users,” which will redirect to a PennDOT login screen using Microsoft 365. If users have multiple Microsoft 365 accounts, ensure they select their pa.gov account.

Kinetic Mobility runs directly within the web browser and does not require anything to be installed on the user's computer.

PennDOT CWOPA credentials are used to login to Kinetic Mobility. Users will need to login at least once every 30 days or their account will be deleted.

External Access

Whenever the first traffic signals within a municipality are added to Kinetic Mobility, the Department will coordinate with the municipality in order for the municipality to obtain a CWOPA account and access to Kinetic Mobility. A traffic signal supervisor in the district where the municipality is located will send the following documents to the municipality:

- Cover letter explaining Kinetic Mobility, the process for gaining access, and available training opportunities
- PennDOT Kinetic Mobility Access Request form

The municipality (and associated vendors and/or consultants) will follow the procedures outlined in these documents to request access.

Signal Configuration

Integration

The integration (controller device) should be set up before adding a signal.

In the Main Menu, choose Integrations → Integration.

Information to be entered for Integrations:

- Name - This must be the TSAMS ID number for the signal
- Description - should be a short abbreviation for the intersection, in the following format: [Main Street] at [Minor Street] [Permit Number] [(System Permit Number)]
- System Enabled - enable
- Integration Type - pick "Signal"
- Protocol - will vary based on the controller type. Common types include:

Manufacturer	Controller Software	Kinetic Mobility Protocol
Econolite	ASC3 (2.xx) ASC3 LX (32.xx) on Cobalt	ASC3 Signal Controller
Intelligent/Q-Free	Maxtime	Maxtime 2
McCain	Omni eX	NTCIP ASC Signal Controller
Peek	Greenwave	NTCIP ASC Signal Controller
Siemens/Yunex	SEPAC 5.2+	Siemens Sepac Signal Controller
Trafficware/Cubic	Scout	NTCIP ASC Signal Controller

- External ID - leave blank
- Timezone - US/Eastern
- Auto Correct Time Drift - enable
- Connection Settings
 - Maxtime Controllers
 - URL - <http://x.x.x.x:80>
 - SSH port - 22
 - Other Controllers
 - Command Stream Type - Datagram
 - UDP Timeout - 20

- Port – 161 or 501 (match NTCIP port set in controller)
- Host – IP address of the controller (x.x.x.x)
- Idle Time – 20
- Datalink
 - Datalink Type – Simple Network Management Protocol (SNMP)
 - SNMP version – v1
- NTCIP settings
 - Community name – administrator
 - MAX_MIBS – 10
- Remote Agent Configuration – disable
- Polling Settings
 - Polling Enabled – enable
 - Poll Type – sequential
 - Full status poll – 30 seconds
 - Subscription monitor period – 3 (only used for non-Maxtime controllers)
- External Links – see External Links section later in this document
- Traffic Event Settings
 - Enable for Maxtime Controllers
 - Disable for all other controllers

Locations Module

New signals can be added by right-clicking at the intersection location on the main map and choosing “Create Location.” In the Location screen, enter the following information on the Details tab:

- Location Details
 - Name – should be a short abbreviation for the intersection, in the following format: [Main Street] at [Minor Street] [Permit Number] [(System Permit Number)]. Main Street and Side Street names may include SR numbers.
 - Description – can be used for other information, including firmware version, system permit number, permit number, etc. If the intersection has adaptive control, indicate the adaptive product being used (such as Rhythm InSync, Centracs, etc.).
- Location Type: Intersection
- Location Geometry: this will update if you drag the pin around on the map on the left side of the screen

The Configuration tab of the Location screen is used to add lanes, maneuvers, and crosswalks. The following are applicable to the Configuration of Locations:

- Lanes
 - Description – suggested naming convention is “Direction Movement” like “NB L.” When there are multiple lanes for the same movement, enter 1 or 2 after each with 1 being closest to the roadway centerline.
 - Lane Direction – Approach or Departure (approach lanes are those with traffic moving toward the intersection and departure lanes are those with traffic moving away from the intersection)
 - Travel Direction – Compass direction

- Crosswalks
 - Description – suggested naming convention is “Direction Leg” like “East Leg” for the crosswalk which goes across the east leg of the intersection for a north-south crossing movement.

Lanes have a start and end point. Additional points can be added for curved approaches. Right click to delete extra nodes. The lane length should be long enough to include any advance detection zones. The lane arrow should be at the stop bar.

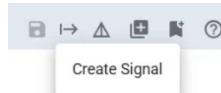
To add a lane, click “Add Lane,” then click on the map at the stop bar and click a second time for the upstream “end” of the lane.

Maneuvers are movements which can be made from one approach lane to one departure lane. For example, a separate left turn lane on an approach would only have a movement which would be a left turn to reach a departure lane. A shared approach lane has multiple maneuvers connecting to multiple departure lanes. To create maneuvers, click on the Maneuvers tab. Then click on an approach lane arrow and click the “Connect” button for the departure lane. Kinetic Mobility will draw an arc connecting the lanes visually in the application, but this doesn’t need to exactly match the vehicle turning path. Best practice is to create as many maneuvers as you would like to see represented in the map display (i.e. Thrus, Lefts, Rights, and U-Turns). Maneuvers will be assigned to signal phases during the Signal configuration step.

Crosswalks are for pedestrian movements. Click on “New Crosswalk” and then click the beginning and end points for the crosswalk.

After completing the Details and Configuration tabs for the Location, click the Save button at the upper right of the screen. The Save Button will be orange whenever there are unsaved changes.

Click the right arrow icon (➡) in the upper right menu and choose “Create Signal.”



Signal Module

When you create a signal from the location, the Signal Location will auto populate with the Location in the Details tab.

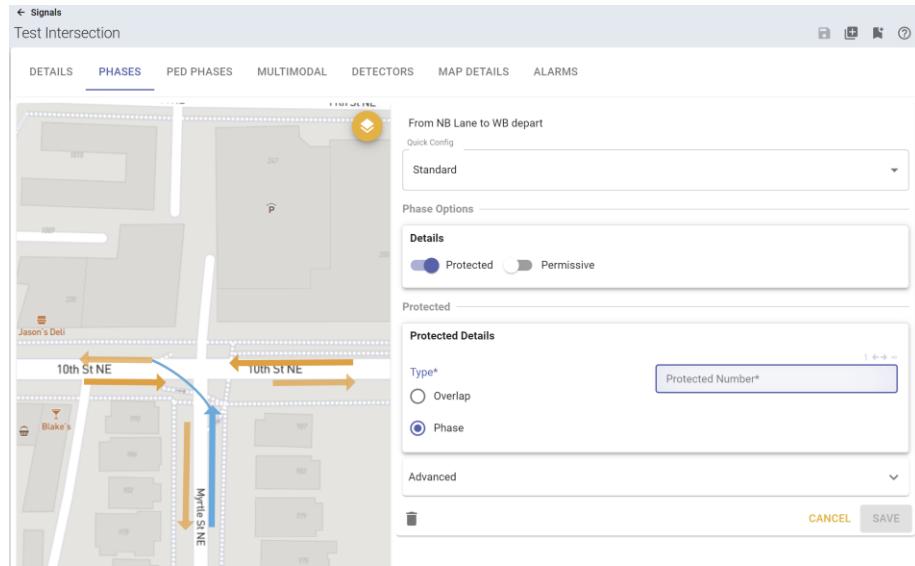
On the Details tab, the Main Phases should be added to indicate which phases will drive the main map color for main street green. Typically this will be Phase 2 and Phase 6.

Click Add Device to add a device from the Integrations Module to the signal. Pick the integration created previously. The devices list will only show Integrations that are System Enabled and not attached to an existing Signal. The browser page may need to be refreshed to see newly created/enabled Integrations.

Signal Phases

On the Phases tab, add the phases to each lane and associated maneuvers. This is required for the graphics to show up on the main map. Each maneuver may have a protected phase, a permissive phase, or both. Custom icons can be selected in the Advanced section under protected or permissive. Kinetic Mobility will choose default icons based on the angle of the maneuver. Note, the configuration options are for the display of the map icons and do not affect the signal running in the field.

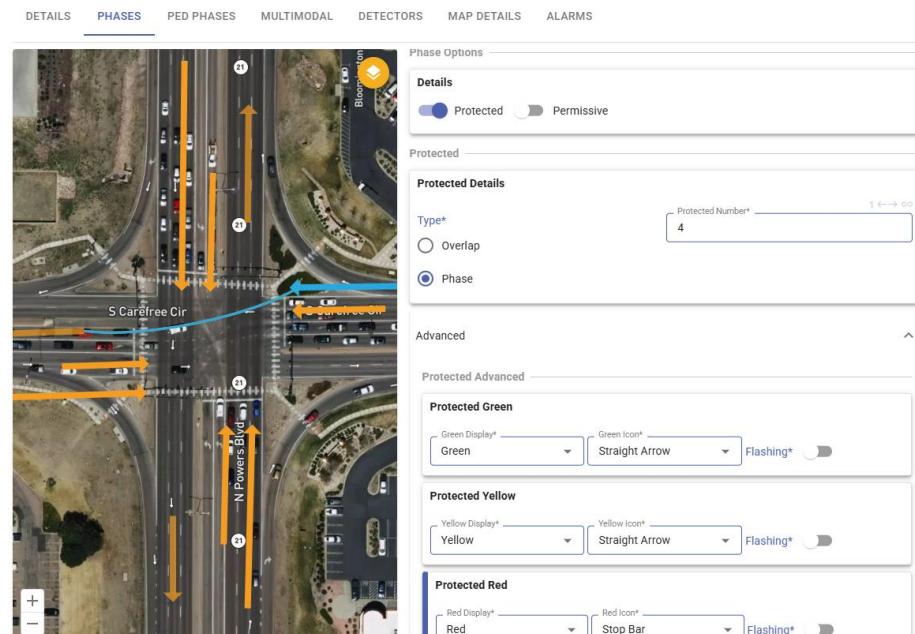
The “Quick Config” provides quick options for icon display. Within the dropdown, ‘Standard’ is for through or protected left turn phases, while ‘Flashing Yellow Arrow’ and ‘Five Section Protected Permissive’ provides options for PPLT/RT phases. ‘Manual’ will automatically be selected if Advanced display features are edited.



Signal Phase Example 1: Through Phase

The configuration below will generate an icon at the location of the WB through arrow to represent Phase 4 at the intersection. Based on the configuration shown, this icon would display: a green arrow during Phase 4 green, a yellow arrow during Phase 4 yellow, and a red stop-bar during Phase 4 red.

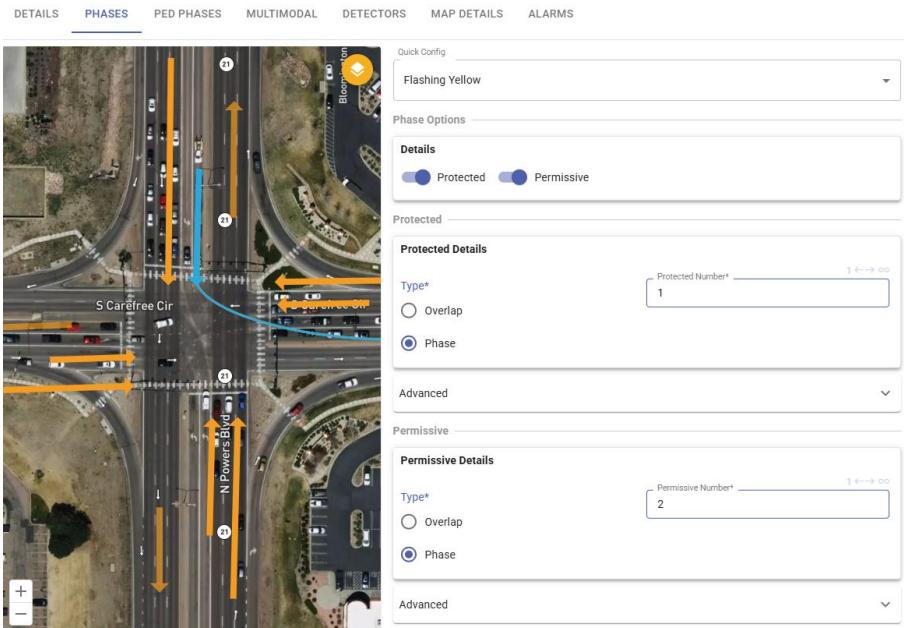
Both the display color and shape of the icon for each phase indication (R, Y, G) can be edited by viewing the ‘Advanced’ options. Kinetic Mobility reads the controller real-time status information and converts it into an icon display based on the configuration below.



Signal Phase Example 2: FYA Left Turn Phase

The configuration below would display: a green left-arrow during Phase 1 green, a flashing yellow left- arrow during Phase 2 green, and yellow and red solid arrows for Phase 2 yellow and red, respectively.

These configuration settings will generally match the display of the FYA in the field. However, the configuration should be modified for users that omit FYA by time-of-day. In those cases, the Permissive Details should map to the Overlap number of the FYA so that the left-arrow holds solid red as dictated by the controller's overlap programming.



Signal Ped Phases

On the Ped Phases tab, add the phases for each crosswalk. This is required for ped signals to show up on the main map. The yellow and red displays should be changed to ORANGE.

East leg

Control Type* Ped	Ped/Overlap Number* 8	
Green Display White	Green Icon Walk	Flashing <input checked="" type="checkbox"/>
Yellow Display ORANGE	Yellow Icon Hand	Flashing <input checked="" type="checkbox"/>
Red Display ORANGE	Red Icon Hand	Flashing <input checked="" type="checkbox"/>

Signal Multimodal

Multimodal tab can be used to add multimodal icons, which aren't attached to lanes. This can be used to add bike signals.

Signal Detectors

On the Detectors tab, each detection zone can be added within a lane to display the detector call status on the map. Click on the lane and then click "Add Detector." The detector configuration generates icons for display on the map as well as configuration for ATSPM reports that rely on detector type and placement information (e.g., Purdue Coordination Diagram, Approach Volume, etc).

- Detector Number – the controller input channel used by the detector
- Detector Type
 - Advance – use for advance zones, such as radar or volume density
 - Stop Bar – use for stop bar presence zones
 - Demand – use for stop bar count zones
- Distance, Length, Width, and Description – see table below

Detector Type	Distance	Length	Width	Description
Advance	250	10	10	NB Advance
Stop Bar	40	40	10	NB Left Stop Bar
Demand	0	5	10	NB Left Count

Notes for detectors:

- Distance is the leading edge of the detector (the end the vehicle triggers first). For stop bar detectors, this should be the same as the length of the zone.
- Kinetic does not support detectors which span multiple lanes. The detector should just be assigned to the primary lane.
- In the map view, detector actuations are indicated with a bold border on the detection zone. The inside gray box does not change color.

Additional Map Icons

On the Map Details tab, review if map icons have been generated correctly. Phase arrows, Ped icons, and Detector icons can only be generated from the proceeding configuration steps. The generated icons can then be moved, rotated, or hidden from the map if desired.

Configure additional icons for the map display by clicking New Map Icon, then selecting a type. For example, a Status type icon can be added to display a text on the map.

Cloning Intersections

To simplify creating signals, when the same phasing is used at multiple intersections, the intersection can be cloned.

Find the signal you want on the map, right click and choose "Clone Signal." In the pop-up window, choose the new intersection location on the map.

Cloning does not copy the integration (controller).

Locations Tree

Kinetic Mobility operates with locations in a nested tree structure. An example of the Kinetic Mobility device tree is shown at right.

The hierarchy of the device tree is as follows:

- PennDOT District
- County
- Municipality
- Systems/Corridor
- Intersection
- Signal

The hierarchy is managed through the Locations module, which is accessed from Main Menu → Locations → Locations Tree.

Groups	Type	Protocol
Local TOC		
District 1		
Erie County		
Erie City		
12th Street		
12th St @ Ash St	Intersection	
2997	Signal	Econolite EOS
12th St @ Cascade St	Intersection	
3014	Signal	Econolite EOS
12th St @ Cherry St	Intersection	
3005	Signal	Econolite EOS

Newly added locations can be assigned to an existing group by clicking the “three-dot” icon for the location and then selecting “Move Group/Location.” This will prompt a dialog box that will allow the user to select a new Group. A moved Group will become a “child” of the group selected here and a location will become a member of the new Group.

The “Add Group” button on the Locations Tree screen can be used to add counties, municipalities, or systems when needed. Smaller groups such as systems/corridor should correspond to signals that are usually coordinated together. This allows the time of day patterns to be set for the group and applied to all the signals in that group.

User Groups and Roles

User permissions are determined by a combination of the user group of which a user is assigned and roles. A user may belong to multiple groups.

Pennsylvania’s deployment of Kinetic Mobility has two basic roles:

- Regular User
- Super User

Different role groups are created by geographic area (PennDOT District, Municipality, Vendors, etc.) with each of these two basic roles.

In a future upgrade, the user roles will be applied to branches of the Location Tree.

External Links

External links provide access to third-party vendor systems, such as detection systems. Following are examples for systems currently in use:

System Name	External Link Name	Type	URL
InSync Adaptive Processor	InSync – Intersection Name	Browser Link	http://xx.xx.xx.xx/cameraViewMulti.php
Gridsmart	Gridsmart – Intersection Name	Browser Link	Copy and paste Camera API (Quadview)*
Rhythm Hawkeye	Hawkeye – Intersection	Application	http://xx.xx.xx.xx:5001/login

*To obtain Gridsmart Camera API Quadview URL:

1. Select Info	2. Select Show GRIDSMART API	3. Copy QUADVIEW link
		

Note, the Gridsmart Quadview only works in Internet Explorer mode. The external link will only work if Kinetic Mobility is used in the Microsoft Edge browser, and then reload the page in IE mode.

Due to web browser restrictions, Kinetic Mobility does not support opening programs on a user's computer. Therefore, only links that open in a web browser are supported. The following are not supported:

- RTSP video detection streams using VLC
- Wavetronix

ATMS Integration

PennDOT's Traffic Management Centers (TMCs) use OpenTMS as the Advanced Transportation Management System (ATMS). OpenTMS is used to manage various types of ITS devices. PennDOT has built a module in OpenTMS to allow TMC operators to implement Kinetic Mobility action sets, such as in response to a freeway incident, planned event, or work zone that will divert traffic to a signalized corridor.

The OpenTMS module will be updated for Kinetic Mobility and is not currently functional.

Action Sets

To create Action Sets in Kinetic Mobility, choose Main Menu→Signals→Configuration / Action Sets.

When creating an Action Set, the following parameters should be set:

- Name – name should reflect the problem that is being addressed, such as the name of the freeway, direction, and the location of the detour (Exit to Exit). The naming should be consistent with the names of established detours in RCRS.
- Number – pick a unique number. It is recommended to use the route number as the beginning of the number.
- Operational Impact – choose from High, Medium, Low.
 - High – events which result in the highest amount of traffic on the signalized corridor. This could be the result of a high volume diversion or could be a lower volume diversion during peak hours. These plans would be expected to cause more delays on side streets intersecting the corridor.
 - Medium – events which will increase the volume on the signalized corridor, but the volume is not high enough to justify severe delays for intersecting side street traffic. These types of events could be a freeway with a lane closure where not all traffic is diverted.
 - Low – events where the traffic volume increase on the arterial should be prioritized with offsets in the direction of the diversion, but the cycle length is kept lower to continue serving intersecting side street traffic with minimal delay.

- Notes – notes should indicate more specific details about what the plan will do, including the name of the signalized corridor where the traffic detoured. Include information about what the operational impact means specific to the corridor. Examples of types of incidents for which the action set should be utilized may also be included (e.g. full closure during peak times, road work X during off peak times).
- Choose Signals – select the signals from the location tree where the action will be applied
- Command Type – select “Pattern”
- Pattern Type – select “Pattern #”
- Pattern Number – enter the coordination pattern to be used for the diversion
- Priority – enter the same High/Medium/Low as the Operational Impact

Alarms should be set in the controller to turn on Alarm 10 whenever a diversion plan is activated. This can normally be done through the logic processor in the controller. The alarm can be used to trigger email notifications in Kinetic Mobility, such as notifying a municipality whenever a diversion plan is implemented.

It is recommended to use consistent plan numbering for incident management coordination plans in signal controllers for ease of establishing action sets, although this is not required. The following are suggested:

- Eastbound diversion – Plans 50-59
- Westbound diversion – Plan 60-69
- Northbound diversion – Plan 70-79
- Southbound diversion – Plan 80-89

Plans should start with the first available number for the applicable direction. All of the diversion plans can be set to the same alarm number for the purpose of notifications.

Signal Connections to Maxview

Districts should seek to connect any signals which are on the Commonwealth network to Kinetic Mobility to minimize the need to maintain multiple software platforms and ensure ATMS functionality at the maximum number of locations. Existing central systems with IP communications on the Commonwealth network can be migrated relatively easy to Kinetic Mobility. Older legacy systems with serial communications and/or dial-up connections should be reviewed to determine if the communication and/or controllers can be upgraded as part of a project to integrate with Kinetic Mobility.

For projects where signals controllers will be replaced, the specifications should indicate the new controller must be compatible with Kinetic Mobility. The controller manufacturer may provide their MIBs to PennDOT for integration of new controller types, or they may provide controller software which provides support for Q-Free MAXTIME controller objects.

Generally, multiple central systems cannot simultaneous poll a signal controller. Although the intent is to provide full functionality for controllers through MIB integration, there may be cases where a vendor-specific central system is needed for operation, such as adaptive control. In those cases, the signals should be set up and configured in Kinetic Mobility, but polling should be disabled. The primary control will be from the other vendor’s software. This scenario would allow the signal to be deactivated in the other software to run an action set through ATMS if the need arises.

Maxview Migration Clean-up

Kinetic Mobility has more configuration information than what was previously supported in Maxview. Intersections which were migrated from Maxview should be modified as follows:

- All lanes are named either “an approach” or “a departure.” These names should be modified in accordance with the naming convention described in the Locations module section of this document.

Document History

Date	Made By	Description
2/5/2026	Steve Gault	Initial Version