

Indiana Traffic Signal Hi Resolution Data Logger Enumerations

August 2020

Howell Li, Purdue University

Alexander M. Hainen, University of Alabama

James R. Sturdevant, Indiana Department of Transportation

Travis Atkison, University of Alabama

Sufian Talukder, University of Alabama

Jijo K. Mathew, Purdue University

Darcy M. Bullock, Purdue University

Daniel Nelson, Siemens Industry Inc.

Donald M. Maas, Jr., McCain Inc.

Joshua Fink, Econolite Group Inc.

Tom Stiles, Intelight Inc.

Abstract

This document defines the enumerations used to encode events at a 100 millisecond resolution that occur on a traffic signal controller with high resolution data loggers. The enumerations definitions were developed as part of a multi-state pooled fund study, TPF-5(377), conducted in 2018-2019 that conducted a series of stakeholder engagements and panel meetings.

Background

This work enhancing the signal performance measures was organized through the United States Department of Transportation's Pooled Fund Program TPF-5(377) sponsored by the following state Departments of Transportation: California, Connecticut, Georgia, Indiana, Minnesota, North Carolina, Ohio, Pennsylvania, Texas, Utah, Wisconsin, the Federal Highway Administration and the City of College Station. This document is intended to replace the enumeration document developed in 2012.

Sturdevant, J. R., T. Overman, E. Raamot, R. Deer, D. Miller, D. M. Bullock, C. M. Day, T. M. Brennan, H. Li, A. Hainen, and S. M. Remias. Indiana Traffic Signal Hi Resolution Data Logger Enumerations. , Indiana Department of Transportation and Purdue University, West Lafayette, Indiana, 2012. <https://doi.org/10.4231/K4RN35SH>

A summary of past high-resolution traffic signal performance measures can be found at:

Day, C. M., D. M. Bullock, H. Li, S. M. Remias, A. M. Hainen, R. S. Freije, A. L. Stevens, J. R. Sturdevant, and T. M. Brennan. Performance Measures for Traffic Signal Systems: An Outcome-Oriented Approach. Purdue University, West Lafayette, Indiana, 2014. <https://doi.org/10.5703/1288284315333>

Day, C. M., D. M. Bullock, H. Li, S. Lavrenz, W. B. Smith, and J. R. Sturdevant. Integrating Traffic Signal Performance Measures into Agency Business Processes. Purdue University, West Lafayette, Indiana, 2015. <https://doi.org/10.5703/1288284316063>

Enumerations

Event Code	Event Descriptor	Parameter	Description
Active Phase Events:			
0	Phase On	Phase # (1-255)	Set when NEMA Phase On becomes active, either upon start of green or walk interval, whichever occurs first.
1	Phase Begin Green	Phase # (1-255)	Set when either solid or flashing green indication has begun. Do not set repeatedly during flashing operation.
2	Phase Check	Phase # (1-255)	Set when a conflicting call is registered against the active phase. (Marks beginning of MAX timing)
3	Phase Min Complete	Phase # (1-255)	Set when phase min timer expires.
4	Phase Gap Out	Phase # (1-255)	Phase termination due to gap out termination condition. Set once per phase when phase gaps out but may not necessarily occur upon phase termination.
5	Phase Max Out	Phase # (1-255)	Set when phase MAX timer expires but may not necessarily occur upon phase termination due to last car passage or other features.
6	Phase Force Off	Phase # (1-255)	Set when phase force off is applied by the coordinator to the active green phase.
7	Phase Green Termination	Phase # (1-255)	Set when phase green indications are terminated into either yellow change interval or permissive (FYA) movement.
8	Phase Begin Yellow Change	Phase # (1-255)	Set when phase yellow indication becomes active and interval timer begins.
9	Phase End Yellow Change	Phase # (1-255)	Set when phase yellow indication becomes inactive.
10	Phase Begin Red Clearance	Phase # (1-255)	Set only if phase red clearance is served. Set when red clearance timing begins.
11	Phase End Red Clearance	Phase # (1-255)	Set only if phase red clearance is served. Set when red clearance timing concludes. This may not necessarily coincide with completion of the phase, especially during clearance of trailing overlaps, red revert timing, red rest, or delay for other ring terminations.
12	Phase Inactive	Phase # (1-255)	Set when the phase is no longer active within the ring, including completion of any trailing overlaps or end of barrier delays for adjacent ring termination.

13	Extension Timer Gap Out	Phase # (1-255)	Set when phase extension timer gaps out.
14	Phase Skipped	Phase # (1-255)	Set when phase in the programmed ring is skipped for any reason.
15	Extension Timer Reduction Start	Phase # (1-255)	Set when extension timer starts to reduce (the time before reduction).
16	Extension Timer Minimum Achieved	Phase # (1-255)	Set when extension timer minimum is reached (after the time to reduce).
17	Added Initial Complete	Phase # (1-255)	Set when phase added initial timer expires.
18	Next Phase Decision	Phase # (1-255)	Set when the controller determines a phase will be next to begin green after the current active phase(s) end red clearance.
19	TSP Early Force Off	Phase # (1-255)	Set when TSP early force off is applied to an active phase.
20	Preemption Force Off	Phase # (1-255)	Set when controller applies preemption force off to the active cycle.

Active Pedestrian Events:			
21	Pedestrian Begin Walk	Phase # (1-255)	Set when walk indication becomes active.
22	Pedestrian Begin Change Interval	Phase # (1-255)	Set when flashing don't walk indication becomes active.
23	Pedestrian Begin Solid Don't Walk	Phase # (1-255)	Set when don't walk indication becomes solid (non-flashing) from either termination of pedestrian change interval, or head illumination after a pedestrian dark interval.
24	Pedestrian Dark	Phase # (1-255)	Set when the pedestrian outputs are set off.
25	Extended Pedestrian Change Interval	Phase # (1-255)	Set when extended pedestrian change interval is requested by pressing the pedestrian push button for two (2) seconds. See 2009 MUTCD Section 4E.13 - Accessible Pedestrian Signals and Detectors - Extended Pushbutton Press Features for more details.
26	Oversized Pedestrian Served	Phase # (1-255)	Set when pedestrian phase is active beyond pedestrian change interval or force off point.
27-30	Pedestrian events reserved for future use.		
Barrier / Ring Events:			
31	Barrier Termination	Barrier # (1-255)	Set when all active phases become inactive in the ring and cross barrier phases are next to be served.
32	FYA – Begin Permissive	FYA # (1-255)	Set when flashing yellow arrow becomes active.
33	FYA – End Permissive	FYA # (1-255)	Set when flashing yellow arrow becomes inactive through either clearance of the permissive movement or transition into a protected movement.
34-40	Barrier events reserve for future use.		

Phase Control Events:			
41	Phase Hold Active	Phase # (1-255)	Set when phase hold is applied by the coordinator, preemptor, or external logic. Phase does not necessarily need to be actively timing for this event to occur.
42	Phase Hold Released	Phase # (1-255)	Set when phase hold is released by the coordinator, preemptor, or external logic. Phase does not necessarily need to be actively timing for this event to occur.
43	Phase Call Registered	Phase # (1-255)	Call to service on a phase is registered by vehicular demand. This event will not be set if a recall exists on the phase.
44	Phase Call Dropped	Phase # (1-255)	Call to service on a phase is cleared by either service of the phase or removal of call.
45	Pedestrian Call Registered	Phase # (1-255)	Call to service on a phase is registered by pedestrian demand. This event will not be set if a recall exists on the phase.
46	Phase Omit On	Phase # (1-255)	Set when phase omit is applied by the coordinator, preemptor, or other dynamic sources. Phase does not necessarily need to be actively timing for this event to occur. This event is not set when phase is removed from the active sequence or other configuration-level change has occurred.
47	Phase Omit Off	Phase # (1-255)	Set when phase omit is released by the coordinator, preemptor, or other dynamic sources. Phase does not necessarily need to be actively timing for this event to occur. This event is not set when phase is added from the active sequence or other configuration-level change has occurred.
48	Pedestrian Omit On	Phase # (1-255)	Set when pedestrian omit is applied by the coordinator, preemptor, or other dynamic sources. Phase does not necessarily need to be actively timing for this event to occur. This event is not set when phase is removed from the active sequence or other configuration-level change has occurred.
49	Pedestrian Omit Off	Phase # (1-255)	Set when pedestrian omit is released by the coordinator, preemptor, or other dynamic sources. Phase does not necessarily need to be actively timing for this event to occur. This event is not set when phase is added from the active sequence or other configuration-level change has occurred.

50	MAX 1 In-Effect	Phase # (1-255)	Set when maximum green (MAX 1) interval is in-effect for the active phase.
51	MAX 2 In-Effect	Phase # (1-255)	Set when maximum green (MAX 2) interval is in-effect for the active phase.
52	Dynamic MAX In-Effect	Phase # (1-255)	Set when dynamic max interval is in-effect for the active phase. This event shall be populated upon termination of MAX green (MAX 1 or MAX 2) interval.
53	Dynamic MAX Step Up	Phase # (1-255)	Set when dynamic max interval steps up for the active phase (initially after two consecutive phase max out events).
54	Dynamic MAX Step Down	Phase # (1-255)	Set when dynamic max interval steps down for the active phase (initially after two consecutive phase gap out events).
55	Advance Warning Sign On	Phase # (1-255)	Set when advance warning sign is on.
56	Advance Warning Sign Off	Phase # (1-255)	Set when advance warning sign is off.
57-60	Phase Control Events reserved for future use		

Overlap Events:			
61	Overlap Begin Green	Overlap # (as number A=1 B=2, etc)	Set when overlap becomes green. Do not set repeatedly when overlap is flashing green. Note that overlap colors are consistent to the GYR intervals resultant from the controller programming and may not be indicative of actual signal head colors.
62	Overlap Begin Trailing Green (Extension)	Overlap # (as number A=1 B=2, etc)	Set when overlap is green and extension timers begin timing.
63	Overlap Begin Yellow	Overlap # (as number A=1 B=2, etc)	Set when overlap is in a yellow change interval state. Note that overlaps which drive yellow field indications during a dwell state may be reported as green or inactive. (common to mid-block signals)
64	Overlap Begin Red Clearance	Overlap # (as number A=1 B=2, etc)	Set when overlap begins timing red clearance intervals.
65	Overlap Off (Inactive with red indication)	Overlap # (as number A=1 B=2, etc)	Set when overlap has completed all timing, allowing any conflicting phase next to begin service.
66	Overlap Dark	Overlap # (as number A=1 B=2, etc)	Set when overlap head is set dark (no active outputs). The end of this interval shall be recorded by either an overlap off state or other active overlap state.
67	Pedestrian Overlap Begin Walk	Overlap # (as number A=1 B=2, etc)	Set when walk indication becomes active.
68	Pedestrian Overlap Begin Clearance	Overlap # (as number A=1 B=2, etc)	Set when flashing don't walk indication becomes active.
69	Pedestrian Overlap Begin Solid Don't Walk	Overlap # (as number A=1 B=2, etc)	Set when don't walk indication becomes solid (non flashing) from either termination of ped clearance, or head illumination after a ped dark interval.
70	Pedestrian Overlap Dark	Overlap # (as number A=1 B=2, etc)	Set when the pedestrian outputs are set off.
71	Advance Warning Sign On	Overlap # (as number A=1 B=2, etc)	Set when advance warning sign becomes active.
72	Advance Warning Sign Off	Overlap # (as number A=1 B=2, etc)	Set when advance warning sign becomes inactive.
73-80	Overlap events reserved for future use.		

Detector Events:			
81	Detector Off	DET Channel #	Detector on and off events shall be triggered post any detector delay/extension processing.
82	Detector On	DET Channel #	Detector on and off events shall be triggered post any detector delay/extension processing.
83	Detector Restored	DET Channel #	Detector restored to non-failed state by either manual restoration or re-enabling via continued diagnostics.
84	Detector Fault- Other	DET Channel #	Detector failure logged upon local controller diagnostics only (not system diagnostics).
85	Detector Fault- Watchdog Fault	DET Channel #	Detector failure logged upon local controller diagnostics only (not system diagnostics).
86	Detector Fault- Open Loop Fault	DET Channel #	Detector failure logged upon local controller diagnostics only (not system diagnostics).
87	Detector Fault- Shorted Loop Fault	DET Channel #	Detector failure logged upon local controller diagnostics only (not system diagnostics).
88	Detector Fault- Excessive Change Fault	DET Channel #	Detector failure logged upon local controller diagnostics only (not system diagnostics).
89	PedDetector Off	DET Channel #	Ped detector events shall be triggered post any detector delay/extension processing and may be set multiple times for a single pedestrian call. (with future intent to eventually support ped presence and volume).
90	PedDetector On	DET Channel #	Ped detector events shall be triggered post any detector delay/extension processing and may be set multiple times for a single pedestrian call. (with future intent to eventually support ped presence and volume).
91	Pedestrian Detector Failed	Ped Det # (1-255)	Detector failure logged upon local controller diagnostics only (not system diagnostics).
92	Pedestrian Detector Restored	Ped Det # (1-255)	Detector failure logged upon local controller diagnostics only (not system diagnostics).
93	TSP Detector Off	TSP #(1-255)	TSP detector events shall be triggered post any detector delay/extension processing.
94	TSP Detector On	TSP #(1-255)	TSP detector events shall be triggered post any detector delay/extension processing.
95-100	Detector events reserved for future use.		

Preemption Events:			
101	Preempt Advance Warning Input	Preempt # (1-255)	Set when preemption advance warning input is activated.
102	Preempt (Call) Input On	Preempt # (1-255)	Set when preemption input is activated. (prior to preemption delay timing) May be set multiple times if input is intermittent during preemption service.
103	Preempt Gate Down Input Received	Preempt # (1-255)	Set when gate down input is received by the controller (if available).
104	Preempt (Call) Input Off	Preempt # (1-255)	Set when preemption input is de-activated. May be set multiple times if input is intermittent preemption service.
105	Preempt Entry Started	Preempt # (1-255)	Set when preemption delay expires, and controller begins transition timing (force off) to serve preemption.
106	Preemption Begin Track Clearance	Preempt # (1-255)	Set when track clearance phases are green and track clearance timing begins.
107	Preemption Begin Dwell Service	Preempt # (1-255)	Set when preemption dwell or limited service begins, or minimum dwell timer is reset due to call drop and reapplication.
108	Preemption Link Active On	Preempt # (1-255)	Set when linked preemptor input is applied from active preemptor.
109	Preemption Link Active Off	Preempt # (1-255)	Set when linked preemptor input is dropped from active preemptor.
110	Preemption Max Presence Exceeded	Preempt # (1-255)	Set when preemption max presence timer is exceeded, and preemption input is released from service.
111	Preemption Begin Exit Interval	Preempt # (1-255)	Set when preemption exit interval phases are green and exit timing begins.
112	TSP Check In	TSP #(1-255)	Set when request for priority is received.
113	TSP Adjustment to Early Green	TSP #(1-255)	Set when controller is adjusting active cycle to accommodate early service to TSP phases.
114	TSP Adjustment to Extend Green	TSP #(1-255)	Set when controller is adjusting active cycle to accommodate extended service to TSP phases.
115	TSP Check Out	TSP #(1-255)	Set when request for priority is retracted.
116	Preemption Force Off	Preempt # (1-255)	Set when preemption force off is applied to the active cycle.
117	TSP Early Force Off	TSP #(1-255)	Set when TSP early force off is applied to the active cycle.
118	TSP Service Start	TSP #(1-255)	Set when requested TSP service begins.
119	TSP Service End	TSP #(1-255)	Set when requested TSP service ends.

120-130	Preemption/TSP Events reserved for future use		
---------	---	--	--

Coordination Events:			
131	Coord Pattern Change	Pattern # (0-255)	Coordination pattern that is actively running in the controller. (Highest priority of TOD, System or manual command). This event will not be reapplied if coordination is temporarily suspended for preemption or other external control.
132	Cycle Length Change	Seconds (0-255)	This event shall be populated upon selection of a new coordination pattern change that selects a new cycle length. Cycle lengths in excess of 255 shall record this event with a 255 parameter, along with event code 156.
133	Offset Length Change	Seconds (0-255)	This event shall be populated upon selection of a new coordination pattern change that selects a new cycle length. Offsets in excess of 255 shall record this event with a 255 parameter, requiring controller database lookup for this actual value.
134	Split 1 Change	New Split Time in Seconds (0-255)	Split change events shall be populated upon selection of a new coordination pattern as well as during a split change to an active pattern via Signal Control and Prioritization (SCP), Adaptive Control System (ACS) Lite or other adaptive control system.
135	Split 2 Change	New Split Time in Seconds (0-255)	
136	Split 3 Change	New Split Time in Seconds (0-255)	
137	Split 4 Change	New Split Time in Seconds (0-255)	
138	Split 5 Change	New Split Time in Seconds (0-255)	
139	Split 6 Change	New Split Time in Seconds (0-255)	
140	Split 7 Change	New Split Time in Seconds (0-255)	
141	Split 8 Change	New Split Time in Seconds (0-255)	
142	Split 9 Change	New Split Time in Seconds (0-255)	
143	Split 10 Change	New Split Time in Seconds (0-255)	
144	Split 11 Change	New Split Time in Seconds (0-255)	

145	Split 12 Change	New Split Time in Seconds (0-255)	
146	Split 13 Change	New Split Time in Seconds (0-255)	
147	Split 14 Change	New Split Time in Seconds (0-255)	
148	Split 15 Change	New Split Time in Seconds (0-255)	
149	Split 16 Change	New Split Time in Seconds (0-255)	
150	Coord cycle state change	Parameter (0-6) defined as: 0 = Free 1 = In Step 2 = Transition - Add 3 = Transition - Subtract 4 = Transition - Dwell 5 = Local Zero 6 = Begin Pickup 7 = Master Cycle Zero	
151	Coordinated phase yield point	Phase # (1-255)	Set once per cycle for each coordinated phase when controller suspends the coordinated phase.
152	Coordinated phase begin	Phase # (1-255)	Set when coordinated phase begins.
153	Logic Statement True	Logic Statement # (1-255)	Set when the logic statement evaluation changes from "False" to "True".
154	Logic Statement False	Logic Statement # (1-255)	Set when the logic statement evaluation changes from "True" to "False".
155	Unit Control Status Change	Parameter (1-10) defined as: 1 = Other 2 = System Control 3 = System Standby 4 = Backup Mode 5 = Manual 6 = Timebase 7 = Interconnect 8 = Interconnect Backup 9 = Remote Manual Control 10 = Local Manual Control	See NTCIP 1202v0326 5.4.5 for definition.

156	Additional Cycle Length Change	Seconds (0-255)	Set simultaneously with Event Code 132 when existing cycle length exceeds 255 seconds. When this Event Code 156 is used, Event Code 132 shall be 255, where the value of this Event Code 156 will be the additional cycle length above 255 (in seconds). Cycle lengths longer than 510 seconds will require a controller look up.
157-170	Coordination events reserved for future use.		

Cabinet / System Events:			
171	Test Input On	Test Input # (as number A=1 B=2, etc)	Cabinet test or special function input as defined by the local controller.
172	Test Input Off	Test Input # (as number A=1 B=2, etc)	Cabinet test or special function input as defined by the local controller.
173	Unit Flash Status Change	NTCIP Flash state # (0-255)	See NTCIP 1202 2.4.6 for definition.
174	Unit Alarm Status 1 Change	NTCIP Alarm Status 1# (0-255)	See NTCIP 1202 2.4.8 for definition.
175	Alarm Group State Change	NTCIP Alarm Group State (0-255)	See NTCIP 1202 2.4.12.2 for definition.
176	Special Function Output On	Special Function # (0-255)	Special function output as defined by the local controller.
177	Special Function Output Off	Special Function # (0-255)	Special function output as defined by the local controller.
178	Manual control enable On/Off	Manual control enable On/Off # (1,0)	Special function output as defined by the local controller.
179	Interval Advance On/Off	Interval Advance On/Off # (1,0)	Leading edge on (1), lagging edge (0) optional.
180	Stop Time Input On/Off	Stop Time Input Advance On/Off # (1,0)	Set when stop time input is applied or removed, regardless of source of stop or state.
181	Controller Clock Updated	Optional parameter: Time correction in Seconds (0-255)	Set when the controller OS clock is adjusted via communications, OS command, or external input.
182	Power Failure Detected	True (1)	Line voltage drops between 0-89 volts AC for more than 100ms.
184	Power Restored	True (1)	Line voltage applied/reapplied greater than 98 volts AC.
185	Vendor Specific Alarm	Vendor defined parameter	Placeholder for generic failure/alarm types as defined by vendor.
186-199	Cabinet/System events reserved for future use.		
200	Alarm On	Alarm # (as number A=1 B=2, etc)	Set when cabinet/system alarm is activated.
201	Alarm Off	Alarm # (as number A=1 B=2, etc)	Set when cabinet/system alarm is released.
202	Aux Switch On/Off	Aux switch On/Off # (1,0)	Set when local controller aux switch is active (1) or inactive (0)

203	Split 17 Change	New Split Time in Seconds (0-255)	Split change events shall be populated upon selection of a new coordination pattern as well as during a split change to an active pattern via Signal Control and Prioritization (SCP), Adaptive Control System (ACS) Lite or other adaptive control system.
204	Split 18 Change	New Split Time in Seconds (0-255)	
205	Split 19 Change	New Split Time in Seconds (0-255)	
206	Split 20 Change	New Split Time in Seconds (0-255)	
207	Split 21 Change	New Split Time in Seconds (0-255)	
208	Split 22 Change	New Split Time in Seconds (0-255)	
209	Split 23 Change	New Split Time in Seconds (0-255)	
210	Split 24 Change	New Split Time in Seconds (0-255)	
211	Split 25 Change	New Split Time in Seconds (0-255)	
212	Split 26 Change	New Split Time in Seconds (0-255)	
213	Split 27 Change	New Split Time in Seconds (0-255)	
214	Split 28 Change	New Split Time in Seconds (0-255)	
215	Split 29 Change	New Split Time in Seconds (0-255)	
216	Split 30 Change	New Split Time in Seconds (0-255)	
217	Split 31 Change	New Split Time in Seconds (0-255)	
218	Split 32 Change	New Split Time in Seconds (0-255)	
219-255	Reserved for future use		

Appendix

Executive Summary

The first version of the Indiana Traffic Signal Hi Resolution Data Logger Enumerations was published in 2012 and has been widely adopted by the traffic industry. Since the initial specification was released, traffic signal controller manufacturers, including Econolite, Siemens, Peek, McCain, Intelight, and Trafficware, have incorporated the standardized data logging enumerations into their controllers on a software level. As the enumerations have been adopted and implemented, small discrepancies in measure calculations and ambiguities in enumeration definitions have emerged which has resulted in varying implementation between manufacturers.

To address the current discrepancies, Pooled Fund Project TPF-5(377) was created to enhance the definitions and develop new enumerations where appropriate. The aim of the project is to enhance and expand the Traffic Signal Performance Measures that were developed under the original Pooled Fund Project TPF-5(258). The work to enhance the enumerations involved identifying as many issues as possible with the current 2012 specification, modify existing definitions as needed, and incorporate new enumerations to address all concerns and issues.

In March of 2019, a roundtable meeting was held at Purdue University, West Lafayette, IN where representatives from FHWA, state Departments of Transportation, private sectors, and other stakeholders participated. The University of Alabama team presented potential inconsistencies and ambiguities in the current data logger specifications and proposed relevant solutions regarding the issues. Issues from each state were discussed, and each controller manufacturer presented their notes and thoughts. After the panel meeting, The University of Alabama team reached out to all manufacturers to collect additional thoughts and suggestions for modifications to the specification. More than thirty issues and suggestions were collected, considered, and assembled in this updated document.

This second version of the specification has addresses all known discrepancies and issues with the 2012 data logger enumerations and presents solutions relevant to the issues in the form of modified definitions. In addition, this report introduces several new enumerations and descriptions which were gathered from participating agencies and vendors. The Appendix section of this report discusses all the changes made on the updated hi resolution traffic data logger enumerations. One final comment from manufacturers that was noted is the need for testing of the enumerations. A standard protocol of software testing should be used to verify that the enumerations are consistent from one manufacturer to another.

New Event Code 13

Event Code	Event Descriptor	Parameter	Description
13	Extension Timer Gap Out	Phase # (1-255)	Set when extension timer gaps out.

Note: Event Code (EC) 13 is proposed to eliminate the ambiguity in EC 4 (Phase Gap Out) definition. Different controller manufacturers report EC 4 differently (i.e., some controllers report EC 4 multiple times during single green and some report once at the end of the green). The new EC 13 is set when extension timer gaps out.

New Event Code 14

Event Code	Event Descriptor	Parameter	Description
14	Phase Skipped	Phase # (1-255)	Set when phase in the programmed ring is skipped for any reason.

Note: Event Code (EC) 14 is proposed to help verify if any phase in the programmed ring is skipped for any reason. This event needs to be logged before the start of green of the next phase served. This event code was proposed by Dan Nelson (Siemens Industry, Inc.).

New Event Code 15

Event Code	Event Descriptor	Parameter	Description
15	Extension Timer Reduction Start	Phase # (1-255)	Set when extension timer starts to reduce (the time before reduction).

Note: Event Code (EC) 15 is proposed to log the event when extension timer begins to reduce after the arrival of a conflicting call and before the time to reduce. This event code was proposed by Dan Nelson (Siemens Industry, Inc.).

New Event Code 16

Event Code	Event Descriptor	Parameter	Description
16	Extension Timer Minimum Achieved	Phase # (1-255)	Set when extension timer minimum is reached (after the time to reduce).

Note: Event Code (EC) 16 is proposed to capture the event when extension timer minimum is achieved upon the expiration of time to reduce. This event code was proposed by Dan Nelson (Siemens Industry, Inc.).

New Event Code 17

Event Code	Event Descriptor	Parameter	Description
17	Added Initial Complete	Phase # (1-255)	Set when phase added initial timer expires.

Note: Event Code (EC) 17 is proposed to log the controller event when phase added initial timer expires. This event code was proposed by Dan Nelson (Siemens Industry, Inc.).

New Event Code 18

Event Code	Event Descriptor	Parameter	Description
18	Next Phase Decision	Phase # (1-255)	Set when the controller determines a phase will be next to begin green after the current active phase(s) end red clearance.

Note: Event Code (EC) 18 is proposed to log the event when controller determines a phase will be next to begin green after the current active phase ends red clearance. This event code was proposed by Howell Li (Purdue University.).

New Event Code 19

Event Code	Event Descriptor	Parameter	Description
19	TSP Early Force Off	Phase # (1-255)	Set when TSP early force off is applied to an active phase.

Note: Event Code (EC) 19 is proposed to log the event when controller applies early force off to an active phase during Transit Signal Priority (TSP) operation. This event code was proposed by Mark Taylor (UDOT).

New Event Code 20

Event Code	Event Descriptor	Parameter	Description
20	Preemption Force Off	Phase # (1-255)	Set when controller applies preemption force off to the active cycle.

Note: Event Code (EC) 20 is proposed to log the event when controller applies preemption force off to the active cycle. This event code was proposed by Howell Li (Purdue University).

New Event Code 25

Event Code	Event Descriptor	Parameter	Description
25	Extended Pedestrian Change Interval	Phase # (1-255)	Set when extended pedestrian change interval is requested by pressing the pedestrian push button for two (2) seconds. See 2009 MUTCD Section 4E.13 - Accessible Pedestrian Signals and Detectors - Extended Pushbutton Press Features for more details.

Note: Event Code (EC) 25 is proposed to log the event when extended pedestrian change interval is requested by pressing the pedestrian push button for two (2) seconds. This event code was proposed by Dan Nelson (Siemens Industry, Inc.).

New Event Code 26

Event Code	Event Descriptor	Parameter	Description
26	Oversized Pedestrian Served	Phase # (1-255)	Set when pedestrian phase is active beyond pedestrian change interval or force off point.

Note: Event Code (EC) 26 is proposed to log the event when pedestrian phase is still active beyond pedestrian change interval or force off point due to heavy pedestrian demand. This event code was proposed by Tom Stiles (Intelight Inc.).

New Event Code 50 and 51

Event Code	Event Descriptor	Parameter	Description
50	MAX 1 In-Effect	Phase # (1-255)	Set when maximum green (MAX 1) interval is in-effect for the active phase.
51	MAX 2 In-Effect	Phase # (1-255)	Set when maximum green (MAX 2) interval is in-effect for the active phase.

Note: Event Codes (EC) 50 and 51 are proposed to log the events when controller maximum green (MAX 1 or MAX 2) interval is in-effect for the active phase. These event codes were proposed by Steve Gault (PennDOT) and Matthew Carlisle (NCDOT).

New Event Code 52

Event Code	Event Descriptor	Parameter	Description
52	Dynamic MAX In-Effect	Phase # (1-255)	Set when dynamic max interval is in-effect for the active phase. This event shall be populated upon termination of MAX green (MAX 1 or MAX 2) interval.

Note: Event Code (EC) 52 is proposed to log the event dynamic max interval is in-effect for the active phase. This event shall be populated upon termination of MAX green (MAX 1 or MAX 2) interval. This event code was proposed by Steve Gault (PennDOT).

New Event Code 53 and 54

Event Code	Event Descriptor	Parameter	Description
53	Dynamic MAX Step Up	Phase # (1-255)	Set when dynamic max interval steps up for the active phase (initially after two consecutive phase max out events).
54	Dynamic MAX Step Down	Phase # (1-255)	Set when dynamic max interval steps down for the active phase (initially after two consecutive phase gap out events).

Note: Event Code (EC) 53 is proposed to log the event dynamic max interval steps up for the active phase (initially after two consecutive phase max out events). Dynamic max step value will be added to the running max or adaptive maximum until the running max or adaptive maximum is greater than the larger of the normal maximum or dynamic maximum. Event Code (EC) 54 is proposed to log the event when dynamic max interval steps down for the active phase (initially after two consecutive phase gap out events). Dynamic max step value will be subtracted from the running max or adaptive maximum until the running max or adaptive maximum is less than the smaller of the normal maximum or dynamic maximum. These event codes were proposed by Steve Gault (PennDOT) and Matthew Carlisle (NCDOT).

New Event Code 55 and 56

Event Code	Event Descriptor	Parameter	Description
55	Advance Warning Sign On	Phase # (1-255)	Set when advance warning sign is On.
56	Advance Warning Sign Off	Phase # (1-255)	Set when advance warning sign is Off.

Note: Event Code (EC) 55 is proposed to log the event when advance warning sign is on. Event Code (EC) 56 is proposed to log the event when advance warning sign is off. These event codes were proposed by Dan Nelson (Siemens Industry, Inc.).

New Event Code 71 and 72

Event Code	Event Descriptor	Parameter	Description
71	Advance Warning Sign On	Overlap # (as number A=1 B=2, etc)	Set when advance warning sign becomes active.
72	Advance Warning Sign Off	Overlap # (as number A=1 B=2, etc)	Set when advance warning sign becomes inactive.

Note: Event Codes (EC) 71 and 72 are proposed to log the event when advance warning sign becomes active or inactive. These event codes were proposed by Steve Gault (PennDOT).

New Event Code 93 and 94

Event Code	Event Descriptor	Parameter	Description
93	TSP Detector Off	TSP #(1-255)	TSP detector events shall be triggered post any detector delay/extension processing.
94	TSP Detector On	TSP #(1-255)	

Note: Event Codes (EC) 93 and 94 are proposed to log Transit Signal Priority (TSP) detector events. This event code was proposed by Tom Stiles (Intelight Inc.).

New Event Code 116

Event Code	Event Descriptor	Parameter	Description
116	Preemption Force Off	Preempt # (1-255)	Set when preemption force off is applied to the active cycle.

Note: Event Code (EC) 116 is proposed to log the event when controller applies preemption force off to the active cycle. This event code is proposed upon the request from Josh Fink (Econolite Group Inc.). Since Event Code 6 (Phase Force Off) is shared by both coordinators and preemption, a new event code eliminates the confusion over the definition of existing EC-6.

New Event Code 117

Event Code	Event Descriptor	Parameter	Description
117	TSP Early Force Off	TSP #(1-255)	Set when TSP early force off is applied to the active cycle.

Note: Event Code (EC) 117 is proposed to log the event when controller applies early force off to the active cycle during Transit Signal Priority (TSP) operation. This event code was proposed by Tom Stiles (Intelight Inc.).

New Event Code 120 and 121

Event Code	Event Descriptor	Parameter	Description
120	TSP Service Start	TSP #(1-255)	Set when requested TSP service begins.
121	TSP Service End	TSP #(1-255)	Set when requested TSP service ends.

Note: Event Codes (EC) 120 and 121 are proposed to log the event when Transit Signal Priority (TSP) service starts and ends. This event code was proposed by Tom Stiles (Intelight Inc.).

New Event Code 152

Event Code	Event Descriptor	Parameter	Description
152	Coordinated phase begin	Phase # (1-255)	Set when coordinated phase begins.

Note: Event Code (EC) 152 is proposed to log event when controller begins serving the coordinated phase. This event code was proposed by Dan Nelson (Siemens Industry, Inc.).

New Event Code 153

Event Code	Event Descriptor	Parameter	Description
153	Logic Statement True	Logic Statement # (1-255)	Set when the logic statement evaluation changes from "False" to "True".

Note: Event Code (EC) 153 is proposed to log the event when the logic statement evaluation changes from "False" to "True". This event code was proposed by Steve Gault (PennDOT) and Matthew Carlisle (NCDOT).

New Event Code 154

Event Code	Event Descriptor	Parameter	Description
154	Logic Statement False	Logic Statement # (1-255)	Set when the logic statement evaluation changes from "True" to "False".

Note: Event Code (EC) 154 is proposed to log the event when the logic statement evaluation changes from "True" to "False". This event code was proposed by Steve Gault (PennDOT) and Matthew Carlisle (NCDOT).

New Event Code 155

Event Code	Event Descriptor	Parameter	Description
155	Unit Control Status Change	Parameter (1-10) defined as: 1 = Other 2 = System Control 3 = System Standby 4 = Backup Mode 5 = Manual 6 = Timebase 7 = Interconnect 8 = Interconnect Backup 9 = Remote Manual Control 10 = Local Manual Control	See NTCIP 1202v0326 5.4.5 for definition.

Note: Event Code (EC) 155 is proposed to log the event when control mode for Pattern, Flash, or Free at the controller changes to the parameter (1-10) defined above. This event code was proposed by Steve Gault (PennDOT).

New Event Code 156

Event Code	Event Descriptor	Parameter	Description
156	Additional Cycle Length Change	Seconds (0-255)	Set simultaneously with Event Code 132 when existing cycle length exceeds 255 seconds. When this Event Code 156 is used, Event Code 132 shall be 255, where the value of this Event Code 156 will be the additional cycle length above 255 (in seconds). Cycle lengths longer than 510 seconds will require a controller look up.

Note: Event Code (EC) 156 is proposed to log the event when existing cycle length exceeds 255 seconds. When this Event Code 156 is used, Event Code 132 shall be 255, where the value of this Event Code 156 will be the additional cycle length above 255 (in seconds). Cycle lengths longer than 510 seconds will require a controller look up. This event code was proposed by Josh Fink (Econolite Group Inc.).

New Event Code 200 and 201

Event Code	Event Descriptor	Parameter	Description
200	Alarm On	Alarm # (as number A=1 B=2, etc)	Set when cabinet/system alarm is activated.
201	Alarm Off	Alarm # (as number A=1 B=2, etc)	Set when cabinet/system alarm is released.

Note: Event Codes (EC) 200 and 201 are proposed to log the event when cabinet or system alarm is activated or released. These event codes were proposed by Donald Maas Jr. (McCain Inc.).

New Event Code 202

Event Code	Event Descriptor	Parameter	Description
202	Aux Switch On/Off	Aux switch On/Off # (1,0)	Set when local controller aux switch is active (1) or inactive (0)

Note: Event Codes (EC) 202 is proposed to log the controller auxiliary switch on/off event. This event code was proposed by Dan Nelson (Siemens Industry, Inc.)

New Event Code 203 to 218

Event Code	Event Descriptor	Parameter	Description
203	Split 17 Change	New Split Time in Seconds (0-255)	Split change events shall be populated upon selection of a new coordination pattern as well as during a split change to an active pattern via Signal Control and Prioritization (SCP), Adaptive Control System (ACS) Lite or other adaptive control system.
204	Split 18 Change	New Split Time in Seconds (0-255)	
..
218	Split 32 Change	New Split Time in Seconds (0-255)	

Note: Event Codes (EC) 203 to 218 are proposed to log the split change event for extended phase 17-32. Phase limit has been extended from previous 0-16 to proposed 0-32, to provide accommodation for ITS cabinet. These event codes were proposed by Mark Taylor (UDOT).

Modified Definition - Event Code 4

Event Code	Event Descriptor	Parameter	Existing Description	Proposed Description
4	Phase Gap Out	Phase # (1-255)	Set when phase gaps out but may not necessarily occur upon phase termination. Event may be set multiple times within a single green under simultaneous gap out.	Phase termination due to gap out termination condition. Set once per phase when phase gaps out but may not necessarily occur upon phase termination.

Note: The definition of Event Code 4 is modified to eliminate ambiguity in the definition. A new event code (EC 13 – Extension Timer Gap Out) is proposed.

Modified Definition - Event Code 6

Event Code	Event Descriptor	Parameter	Existing Description	Proposed Description
6	Phase Force Off	Phase # (1-255)	Set when phase force off is applied to the active green phase.	Set when phase force off is applied by the coordinator to the active green phase.

Note: The definition of Event Code 6 is modified to eliminate ambiguity in the definition. Since Event Code 6 (Phase Force Off) is shared by both coordinators and preemption, therefore, a new event code is proposed for Preemption Force Off (New Event Code 116) and the existing definition of event code 6 is modified.

Modified Definition - Event Code 7

Event Code	Event Descriptor	Parameter	Existing Description	Proposed Description
7	Phase Green Termination	Phase # (1-255)	Set when phase green indications are terminated into either yellow clearance or permissive (FYA) movement.	Set when phase green indications are terminated into either yellow change interval or permissive (FYA) movement.

Note: Event code 7 is modified to keep consistency with the 2009 MUTCD Section 4D.26-Yellow Change and Red Clearance Intervals. This was proposed by Ted Lombardi (Caltrans).

Modified Definition - Event Code 8

Event Code	Existing Event Descriptor	Proposed Event Descriptor	Parameter	Existing Description	Proposed Description
8	Phase Begin Yellow Clearance	Phase Begin Yellow Change	Phase # (1-255)	Set when phase yellow indication becomes active and clearance timer begins.	Set when phase yellow indication becomes active and interval timer begins.

Note: Event code 8 is modified to keep consistency with the 2009 MUTCD Section 4D.26-Yellow Change and Red Clearance Intervals. This was proposed by Ted Lombardi (Caltrans).

Modified Definition - Event Code 132

Event Code	Event Descriptor	Parameter	Existing Description	Proposed Description
132	Cycle Length Change	Seconds (0-255)	This event shall be populated upon selection of a new coordination pattern change that selects a new cycle length. Cycle lengths in excess of 255 shall record this event with a 255 parameter, requiring controller database lookup for this actual value.	This event shall be populated upon selection of a new coordination pattern change that selects a new cycle length. Cycle lengths in excess of 255 shall record this event with a 255 parameter, along with event code 156.

Note: The description of Event Code 132 is modified since a new event code 156 is proposed to log additional cycle length change event. Josh Fink (Econolite Group Inc.) suggested the change.

Modified Definition - Event Code 134

Event Code	Event Descriptor	Parameter	Existing Description	Proposed Description
134	Split 1 Change	New Split Time in Seconds (0-255)	Split change events shall be populated upon selection of a new coordination pattern as well as during a split change to an active pattern via ACS Lite or other adaptive control system.	Split change events shall be populated upon selection of a new coordination pattern as well as during a split change to an active pattern via Signal Control and Prioritization (SCP), Adaptive Control System (ACS) Lite or other adaptive control system.

Note: The definition of Event Code 134 is modified since the existing definition only refers to Adaptive Control System (ACS). However, some vendors modify splits with Signal Control and Prioritization (SCP) system. Josh Fink (Econolite Group Inc.) reported this issue.

Modified Definition - Event Code 150

Event Code	Event Descriptor	Existing Parameter	Proposed Parameter	Description
150	Coord cycle state change	Parameter (0-6) defined as: 0 = Free 1 = In Step 2 = Transition - Add 3 = Transition - Subtract 4 = Transition - Dwell 5 = Local Zero 6 = Begin Pickup	Parameter (0-7) defined as: 0 = Free 1 = In Step 2 = Transition - Add 3 = Transition - Subtract 4 = Transition - Dwell 5 = Local Zero 6 = Begin Pickup 7 = Master Cycle Zero	

Note: The parameter of event code 150 is modified with an inclusion of new parameter 7 (Master Cycle Zero). Parameter 7 will be logged when master controller clock turns zero. Modification is proposed by Mark Taylor (UDOT).

Modified Definition - Event Code 151

Event Code	Event Descriptor	Parameter	Existing Description	Proposed Description
151	Coordinated phase yield point	Phase # (1-255)		Set once per cycle for each coordinated phase when controller suspends the coordinated phase.

Note: The definition of Event Code 151 is added since there was no definition for this event code.

Modified Definition - Event Code 180

Event Code	Event Descriptor	Parameter	Existing Description	Proposed Description
180	Stop Time Input On/Off	Stop Time Input Advance On/Off # (1,0)	Set when stop time input is applied or removed, regardless of source of stop.	Set when stop time input is applied or removed, regardless of source of stop or state.

Note: *The definition of Event Code 180 is modified as per suggestion from Ted Lombardi (Caltrans).*