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Indiana Traffic Signal Hi Resolution Data Logger Enumerations

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Abstract

This document defines the enumerations used to encode events that occur on a traffic signal controllers with high resolution data loggers. The time resolution is to the nearest 100 milliseconds.

Background information on the development of high resolution controller data in Indiana can be found at

> Smaglik E.J., A. Sharma, D.M. Bullock, J.R. Sturdevant, and G. Duncan, "Event-Based Data Collection for Generating Actuated Controller Performance Measures," Transportation Research Record, #2035, TRB, National Research Council, Washington, DC, pp.97-106, 2007. http://dx.doi.org/10.3141/2035-11

Recent applications of high resolution data to develop traffic signal performance measures in Indiana can be found at:

- Outcome-Oriented Performance Measures for Management of Signalized Arterial Capacity
  http://dx.doi.org/10.3141/2192-03
- Track Clearance Performance Measures for Railroad-Preempted Intersections
  http://dx.doi.org/10.3141/2192-06
- Reliability, Flexibility, and Environmental Impact of Alternative Objective Functions for Arterial Offset Optimization
  http://dx.doi.org/10.3141/2259-02
- Visual Education Tools to Illustrate Coordinated System Operation
  http://dx.doi.org/10.3141/2259-06

Event Code	Event Descriptor	Parameter	Description
Active Phase Events:			
0	Phase On	Phase # (1-16)	Set when NEMA Phase On becomes active, either upon start of green or walk interval, whichever occurs first.
1	Phase Begin Green	Phase # (1-16)	Set when either solid or flashing green indication has begun. Do not set repeatedly during flashing operation.
2	Phase Check	Phase # (1-16)	Set when a conflicting call is registered against the active phase. (Marks beginning of MAX timing)
3	Phase Min Complete	Phase # (1-16)	Set when phase min timer expires.
4	Phase Gap Out	Phase # (1-16)	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.
5	Phase Max Out	Phase # (1-16)	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 # (1-16)	Set when phase force off is applied to the active green phase.
7	Phase Green Termination	Phase # (1-16)	Set when phase green indications are terminated into either yellow clearance or permissive (FYA) movement.
8	Phase Begin Yellow Clearance		Set when phase yellow indication becomes active and clearance timer begins.
9	Phase End Yellow Clearance		Set when phase yellow indication become inactive.
10	Phase Begin Red Clearance	Phase # (1-16)	Set only if phase red clearance is served. Set when red clearance timing begins.
11	Phase End Red Clearance	Phase # (1-16)	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 # (1-16)	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.
13-20	Phase events reserved for future use.	Phase # (1-16)	

Active Pedestrian Events:			
21	Pedestrian Begin Walk	Phase # (1-16)	Set when walk indication becomes active.
22	Pedestrian Begin Clearance	Phase # (1-16)	Set when flashing don't walk indication becomes active.
23	Pedestrian Begin Solid Don't Walk	Phase # (1-16)	Set when don't walk indication becomes solid (non flashing) from either termination of ped clearance, or head illumination after a ped dark interval.
24	Pedestrian Dark	Phase # (1-16)	Set when the pedestrian outputs are set off.
25-30	Pedestrian events reserved for future use.		
Barrier / Ring Events:			
31	Barrier Termination	Barrier #(1-8)	Set when all active phases become inactive in the ring and cross barrier phases are next to be served.
32	FYA – Begin Permissive	FYA # (1-4)	Set when flashing yellow arrow becomes active.
33	FYA – End Permissive	FYA # (1-4)	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 # (1-16)	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 # (1-16)	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 # (1-16)	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 # (1-16)	Call to service on a phase is cleared by either service of the phase or removal of call.
45	Pedestrian Call Registered	Phase # (1-16)	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 # (1-16)	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 # (1-16)	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 # (1-16)	Set when ped 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 # (1-16)	Set when ped 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.
50-60	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 clearance 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.
71-80	Overlap events reserved for future use.	Overlap # (as number A=1 B=2, etc)	

Detector Events:			
81	Detector Off	DET Channel # (1-64)	Detector on and off events shall be triggered post any detector delay/extension processing.
82	Detector On	DET Channel # (1-64)	
83	Detector Restored	DET Channel # (1-64)	Detector restored to non-failed state by either manual restoration or re-enabling via continued diagnostics.
84	Detector Fault- Other	DET Channel # (1-64)	Detector failure logged upon local controller diagnostics only (not system diagnostics).
85	Detector Fault- Watchdog Fault	DET Channel # (1-64)	Detector failure logged upon local controller diagnostics only (not system diagnostics).
86	Detector Fault- Open Loop Fault	DET Channel # (1-64)	Detector failure logged upon local controller diagnostics only (not system diagnostics).
87	Detector Fault- Shorted Loop Fault	DET Channel # (1-64)	Detector failure logged upon local controller diagnostics only (not system diagnostics).
88	Detector Fault- Excessive Change Fault	DET Channel # (1-64)	Detector failure logged upon local controller diagnostics only (not system diagnostics).
89	PedDetector Off	DET Channel # (1-16)	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 # (1-16)	
91	Pedestrian Detector Failed	Ped Det # (1-16)	Detector failure logged upon local controller diagnostics only (not system diagnostics).
92	Pedestrian Detector Restored	Ped Det # (1-16)	Detector failure logged upon local controller diagnostics only (not system diagnostics).
93-100	Detector events reserved for future use.		

Preemption Events:			
101	Preempt Advance Warning Input	Preempt # (1-10)	Set when preemption advance warning input is activated.
102	Preempt (Call) Input On	Preempt # (1-10)	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 # (1-10)	Set when gate down input is received by the controller (if available).
104	Preempt (Call) Input Off	Preempt # (1-10)	Set when preemption input is de-activated. May be set multiple times if input is intermittent preemption service.
105	Preempt Entry Started	Preempt # (1-10)	Set when preemption delay expires and controller begins transition timing (force off) to serve preemption.
106	Preemption Begin Track Clearance	Preempt # (1-10)	Set when track clearance phases are green and track clearance timing begins.
107	Preemption Begin Dwell Service	Preempt # (1-10)	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 # (1-10)	Set when linked preemptor input is applied from active preemptor.
109	Preemption Link Active Off	Preempt # (1-10)	Set when linked preemptor input is dropped from active preemptor.
110	Preemption Max Presence Exceeded	Preempt # (1-10)	Set when preemption max presence timer is exceeded and preemption input is released from service.
111	Preemption Begin Exit Interval	Preempt # (1-10)	Set when preemption exit interval phases are green and exit timing begins.
112	TSP Check In	TSP #(1-10)	Set when request for priority is received.
113	TSP Adjustment to Early Green	TSP #(1-10)	Set when controller is adjusting active cycle to accommodate early service to TSP phases.
114	TSP Adjustment to Extend Green	TSP #(1-10)	Set when controller is adjusting active cycle to accommodate extended service to TSP phases.
115	TSP Check Out	TSP #(1-10)	Set when request for priority is retracted.
116-130	Preemption 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, requiring controller database lookup for this actual value.
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 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	
151	Coordinated phase yield point	Phase # (1-16)	
152-170	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)	
173	Unit Flash Status change	NTCIP Flash state # (0-255)	See NTCIP 1202 2.4.5 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 off/on	Manual control enable off/on # (0,1)	
179	Interval Advance off/on	Interval Advance off/on # (0,1)	leading edge on (1), lagging edge (0) optional
180	Stop Time Input off/on	Stop Time Input Advance off/on # (0,1)	Set when stop time input is applied or removed, regardless of source of stop
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 than100 ms
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.		
200-255	Reserved for future use.		