

# TRAFFIC SIGNAL COORDINATION



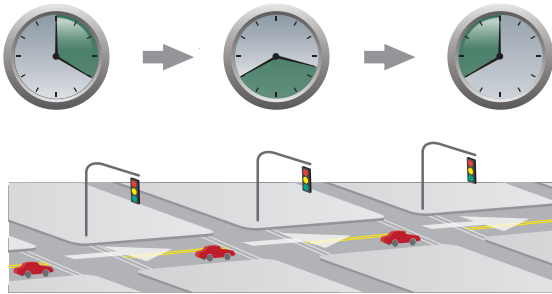
# TRAFFIC SIGNAL COORDINATION

is the synchronization of traffic signals along a street in order to minimize stops and delays.

## HOW TRAFFIC SIGNAL COORDINATION WORKS

For traffic signals along a street to remain synchronized, they must have the same cycle length, which is the time it takes a signal to go from green to yellow to red and then back to green. Cycle lengths typically range from one to two minutes.

In order to minimize stops, signals are coordinated to provide progression for vehicles, which means the light turns green prior to their approach. Progression is determined by the "offset" of the green light, or the time it takes to travel between intersections.



Imagine that each traffic signal has a clock with a second hand. Each signal's second hand is staggered from the others to allow travel time for each direction.

Perfect progression is possible on one-way streets. The quality of progression along two-way streets in both directions is dependent on many factors, including: consistent signal spacing (ideally 1/2 mile apart), side street traffic volume and accommodating pedestrians, left turns and transit.

In order to establish traffic signal coordination along a street, traffic engineers consider many factors, including which traffic signals should work together, the signal's cycle length and offset time, how the green time is divided among directions at each intersection and what day(s) and time of day each coordination strategy is in effect.

# BENEFITS AND TRADEOFFS IN TRAFFIC SIGNAL COORDINATION

While traffic signal coordination cannot entirely eliminate red lights, it is effective in reducing stops and delays and improving the flow of traffic on major streets.

Studies conducted by the Utah Department of Transportation (UDOT) and other national entities indicate that traffic signal coordination can reduce stops, delays, gasoline consumption and air pollution emissions by up to 25%.



Many factors make it mathematically impossible to provide green lights on all streets and in all directions of travel. Traffic engineers evaluate and carefully balance the tradeoffs to help traffic effectively progress down a street. Although each intersection is different, coordination must serve all these needs within the same cycle length. Some of these tradeoffs include the following:



## STRATEGIES

Given these limitations and tradeoffs, UDOT's traffic engineers employ a number of specific strategies to minimize the total delay to the traveling public:

**Favor the busier direction.** During the morning and afternoon rush hours, up to 75% of traffic may be in the heavier direction, with 25% in the lighter direction. In these cases, the traffic signals are timed to favor the majority in the heavier direction. While this strategy reduces overall delay and air pollution, progression in the lighter direction may suffer.

**Favor the busier street.** At some intersections, up to 90% of total traffic is on the main street and only 10% from the side street. Here the signals are timed to give a long green light to the main street and a short green light for the side street.

**Favor through traffic.** On many busy streets, traffic signals are coordinated to favor the busy through traffic over left turns onto smaller volume streets.

**Special traffic signal timing for events.** Sports and civic events generate large crowds that create a need for favored traffic flow in one direction at one time of the day, and in the opposite direction at another time of the day. In these instances, traffic signals are timed to favor the most congested flow of traffic.

**Reduced coordination during late night hours.** Since traffic is very light and less predictable during late hours from about 10 p.m. to 6 a.m., signal coordination is typically turned off. Although this increases the number of brief stops, it reduces the overall delays for everyone by allowing shorter cycle lengths.

**Give priority to transit.** Traffic signal timing is sometimes adjusted to improve the progression of transit vehicles along a street.

## IMPROVING TRAFFIC SIGNAL OPERATION

The Utah Department of Transportation (UDOT) works closely with city and county governments through CommuterLink to install and operate interagency computerized traffic signal systems. These systems allow engineers to actively manage traffic signals, ramp meters, traffic detection technologies and more.

Advanced computer software allows traffic engineers at the UDOT's Traffic Operations Center to monitor and adjust signal synchronization. Fiber optics and radio communication link traffic signals to the Traffic Operations Center.



UDOT, in partnership with cities and counties, monitor traffic signal operations statewide.

## CONTACT US

If you have questions or if you experience a problem with a traffic signal, please call UDOT's Traffic Operations Center at 801-887-3700 or e-mail [TrafficSignals@utah.gov](mailto:TrafficSignals@utah.gov).



[www.commuterlink.utah.gov](http://www.commuterlink.utah.gov).



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