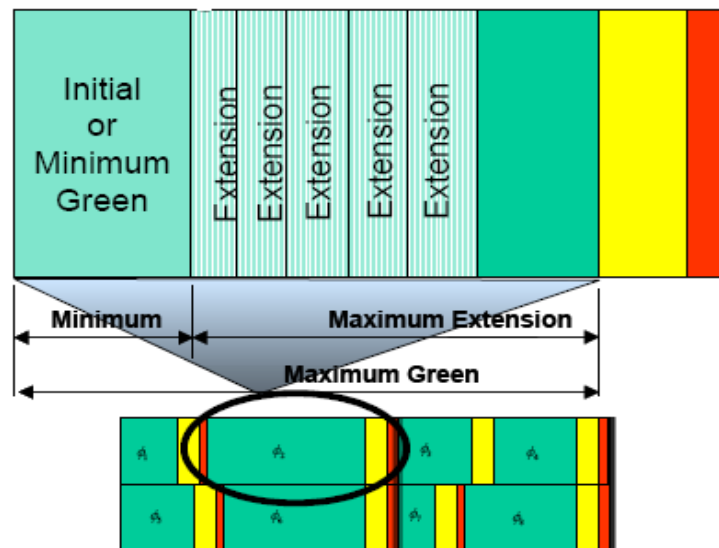


Introduction to Actuated Control

- Actuated Control Overview
- Detector Technologies
- Detector Types – By Location
- Detector Operation Modes
- Types of Actuated Control
- Actuated Control Features
- Volume-Density Control Features

Actuated Control Overview



Detector Technologies

1. Inductive Loop Detector (ILD)

a. Most _____ Detector Technology

- Freeways

- ▶ _____
- ▶ _____
- ▶ _____

- Arterials

► _____

b. How are vehicles detected?

- a. Inductance field is generated at the inductive loop sensors
- b. _____ (such as vehicles) traversing loops reduce loop inductance
- c. Change in inductance is measured by the detector card
 - Vehicle is “detected” when the change exceeds a _____
 - Detector card sends “detection” signal to traffic controller

2. Image-based Detection

a. Advantages:

- Detection zones can be _____
- _____

b. Disadvantages:

- May not work well in _____ conditions

3. Wireless Magnetometer

a. Passive sensor

- Does not create its own sensor field
- Senses change in _____

b. Wireless

- Battery operated
- _____ required

c. Small footprint

- Less pavement intrusive than ILDs

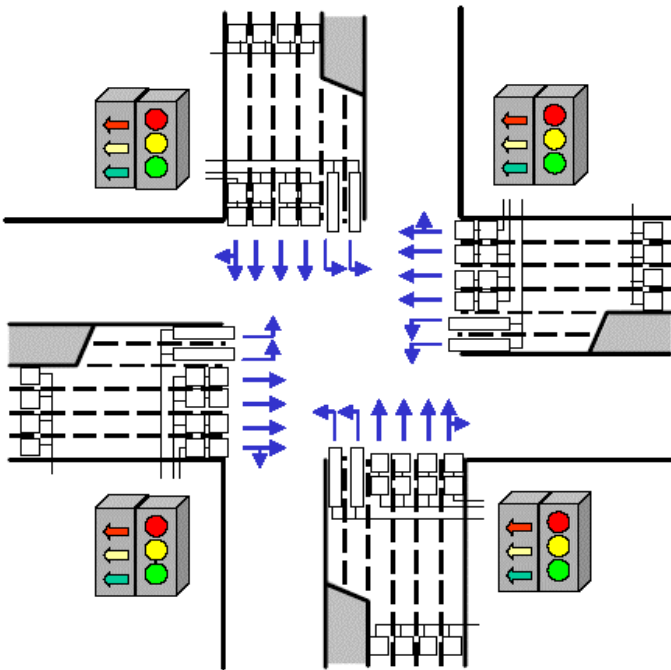
d. Signature-capable for ITS applications

- Vehicle re-identification and classification

e. Concerns

- Wireless communications can be _____, leading to
- Missed detections, delayed detections or false detections

Detector Types - By Location



Detector Operation Modes

1. Point Detection (Pulse Mode)

- Active at _____ (0.10 – 0.15 sec) when a vehicle enters detection zone
- Controller channel to detector typically assigned to _____ mode
 - Controller _____ until green time is allocated
 - Would it be suitable for right turning lanes, why?

2. Presence Detection

- Active signal _____ a vehicle is over it

- Controller channel to detector set to _____ mode
 - Call for service is retained until vehicle leaves detection zone
 - Controller can distinguish individual detections → Can estimate _____

Types of Actuated Control

1. Semi-Actuated Control

- Distinction between _____ is clear
- Detector only on the minor St.
 - Major St. → always green
 - Minor St. → _____
- When _____ is justified
 - Vehicle volumes on major street are too high for minor street traffic to pass through
 - Minor street volume _____ → given green only on actuation

2. Full Actuated Control

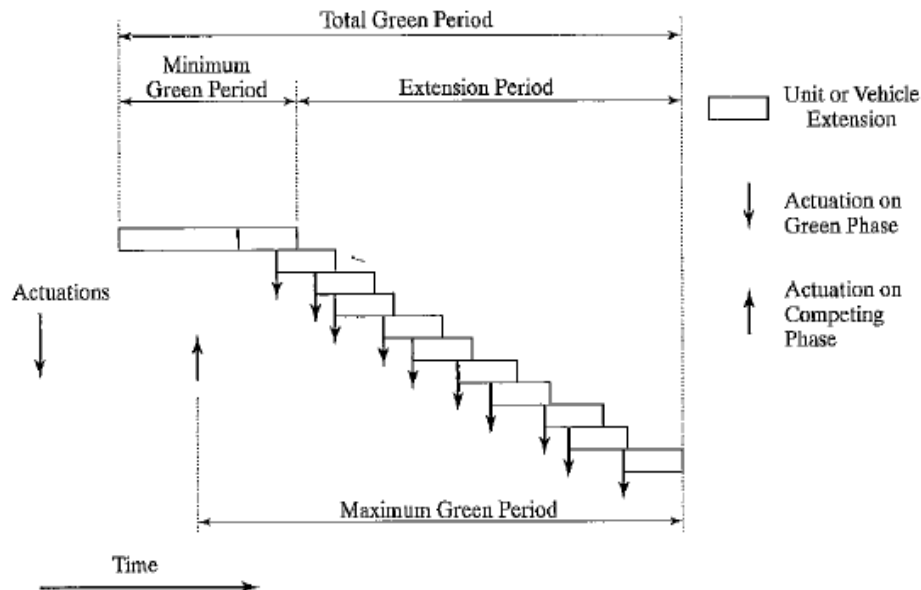
- Detectors implemented on _____
- Depending on the traffic, _____ can be made on
 - _____
 - _____
 - _____

3. Volume-Density Control

- Similarity to Actuated Control
 - Detectors needed at _____ approaches
- More Advanced Features
 - More _____ form of actuated signal control
 - _____

- Variable _____, G_{MIN}
- Variable _____

Actuated Control Features



1. Minimum Green Time, G_{MIN}

- Allocated to each Actuated Phase
- _____ of green time for a phase
 - Should be long enough for _____ vehicle to pass mid pt of intersection
- Allocate when Phase is initiated

2. Unit Extension, U

- _____ between actuations required to retain green
- _____ added to the green phase
- Sufficient length to allow vehicle to retain green signal
- Traffic Detector Handbook
 - 3.0 – 3.5 seconds
 - Value can be changed

3. Maximum Green Time, G_{MAX}

- _____ allocated to phase
- Even if detector is active
 - _____ the green time length if green time is too long
 - “Begins” when a competing phase is on “call”
- When max green time is reached
 - → Go to next phase

4. Recall Switches

- Each actuated phase has recall switch
- Determine _____ when there is no demand
- Can be set _____ for each phase

5. Yellow and All-Red Interval

- _____ value
- Ensures _____ “green” → “red” transition
- Same as in Chapter 21

6. Pedestrian intervals

- 2 indications
 - WALK
 - Flashing Don’t Walk (FDW)
- In Actuated Signal Control,
 - Green Time per phase _____
 - Affects _____
 - → need to consider Pedestrian Crossing when setting _____
 - Push button often considered

Volume-Density Control Features

1. _____ Minimum Green

- Sensors are generally placed further back from the intersection, particularly on high-speed approaches
 - _____ can be estimated
 - Minimum green time can be adjusted accordingly

2. _____

- In Semi, Full actuated control:
 - Unit Extension is _____
- Demand-Volume Control:
 - Unit Extension reduces _____
 - Occurs some time after _____ is detected