

Development of Standards for Transit Priority

Joint TCIP, NTCIP SCP Meeting

April 18, 2001

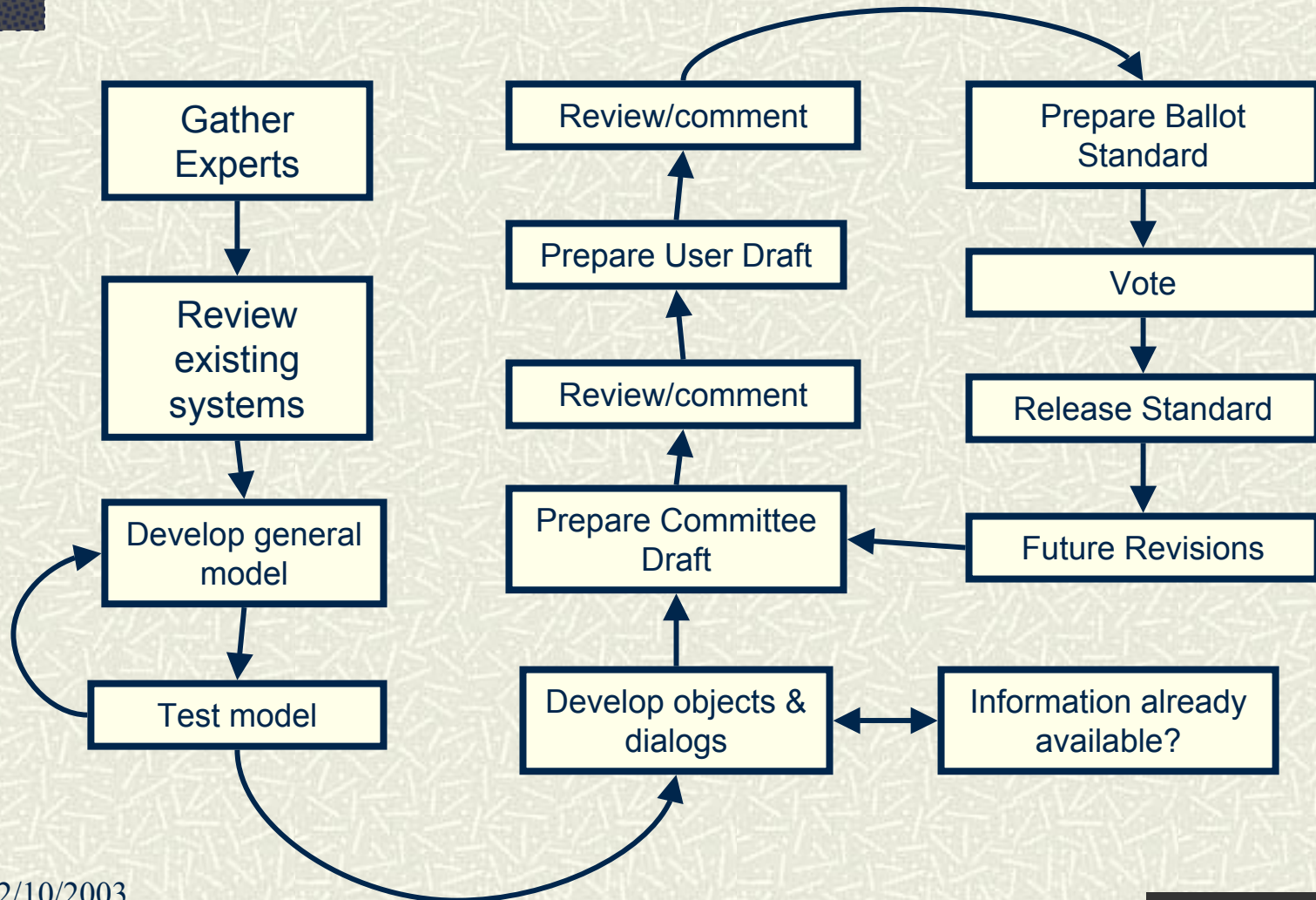
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FHWA Western Resource Center

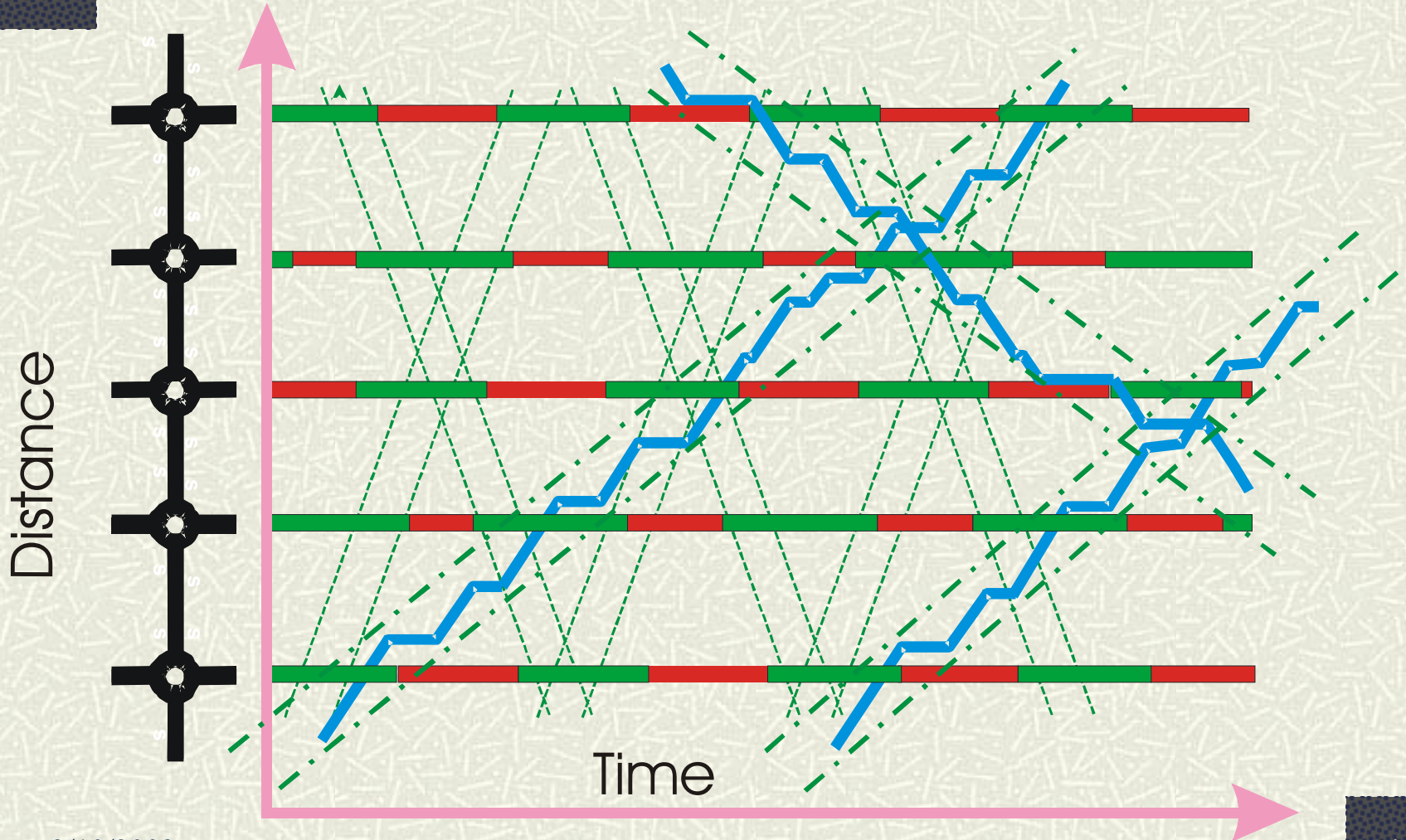
Why?

- # Cross boundary operations
- # Many systems involved
- # Evolving systems
- # New technology becoming available
- # Open systems

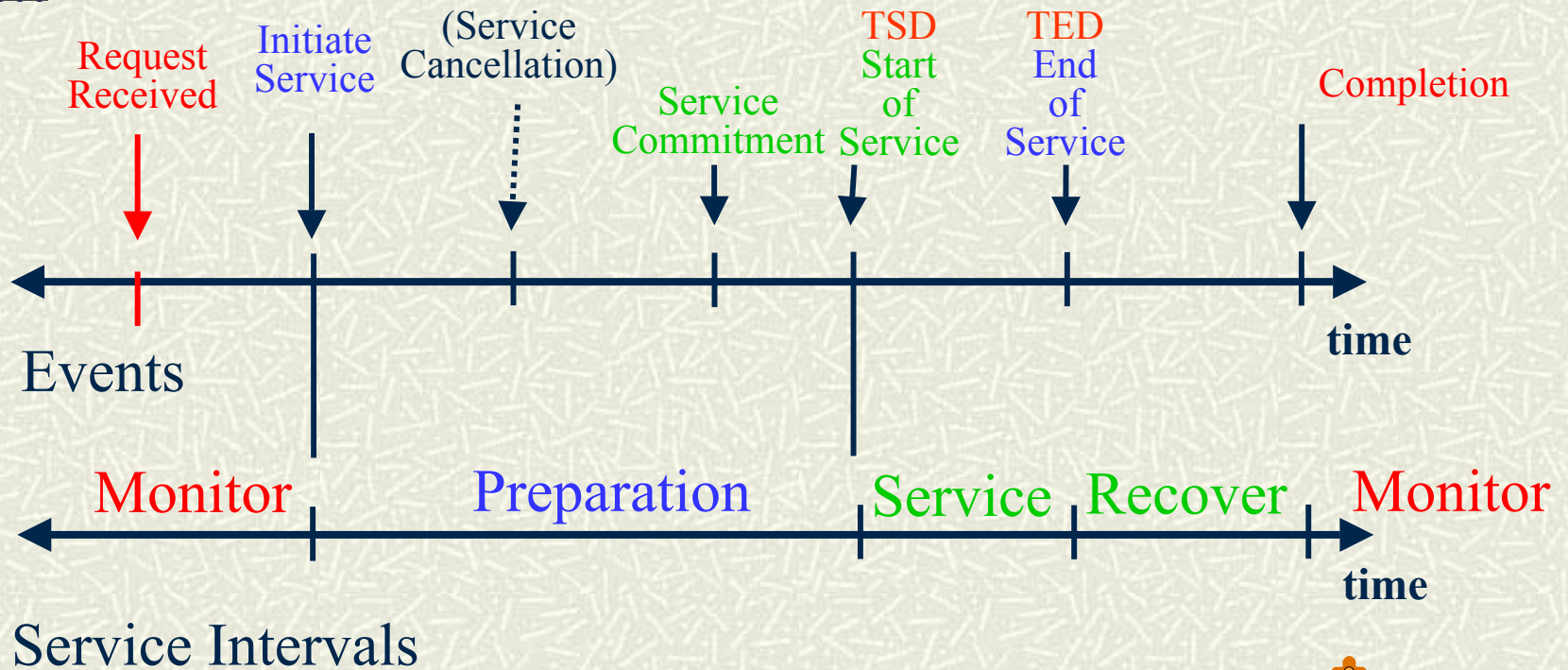
How?



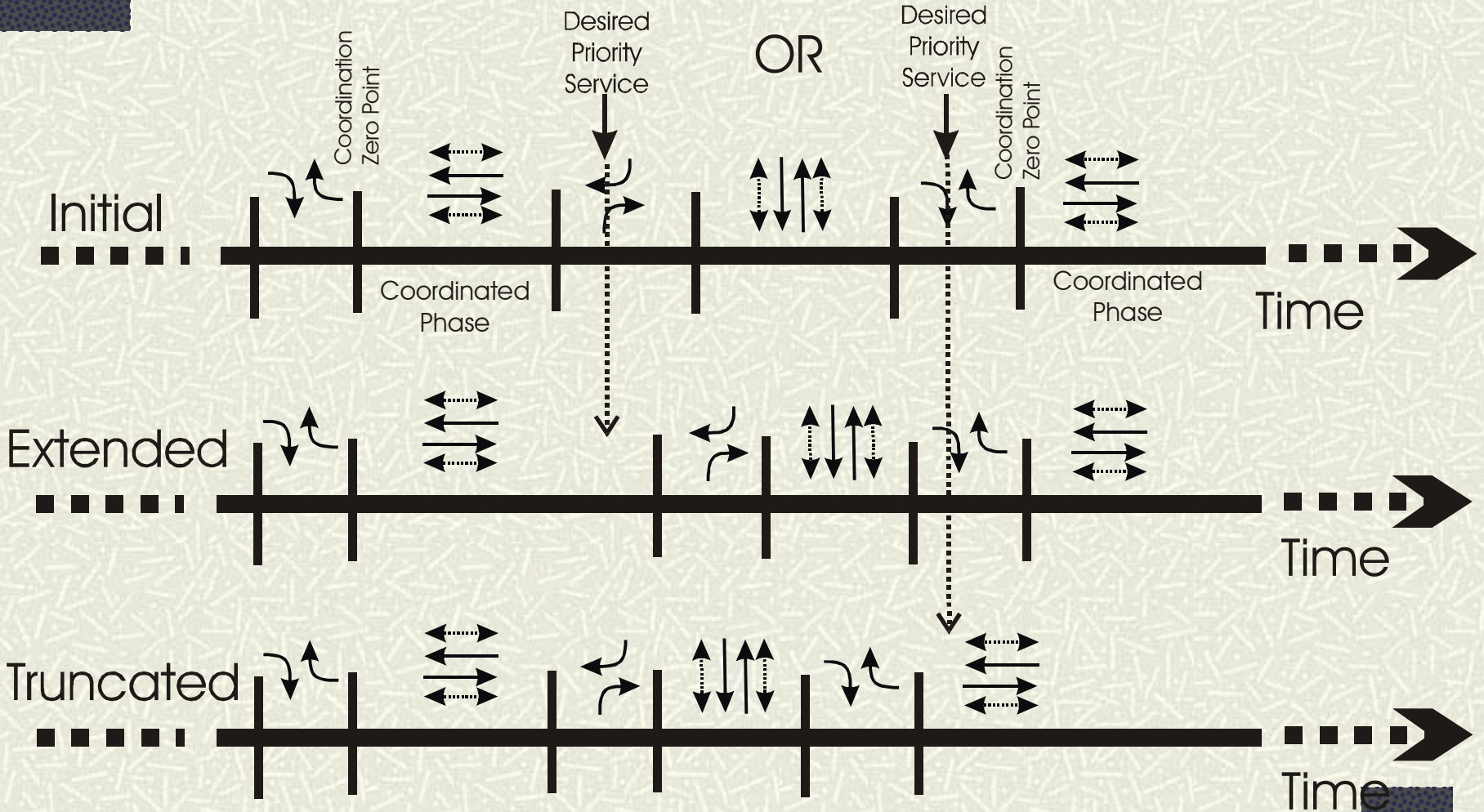
Signal Operations



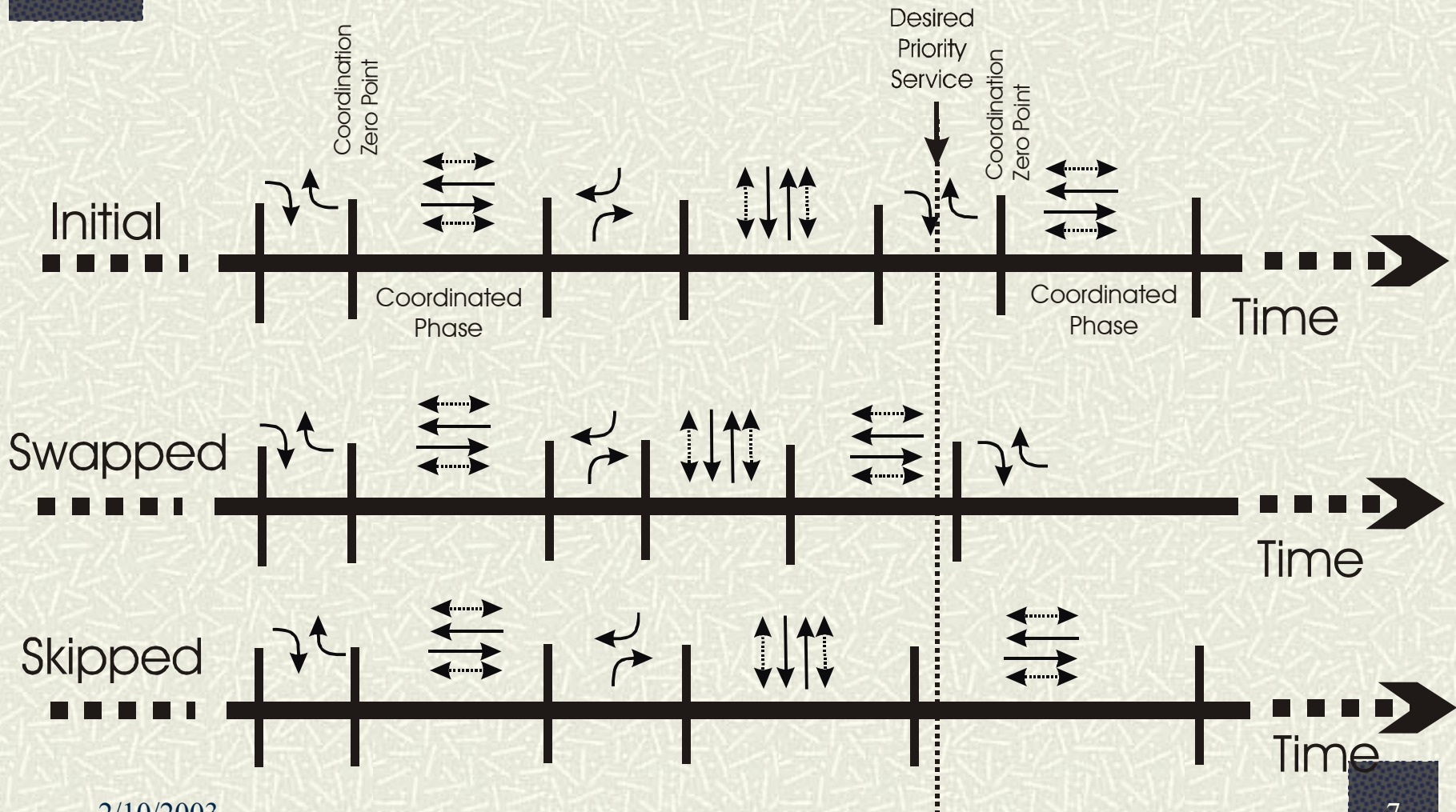
Events in Priority



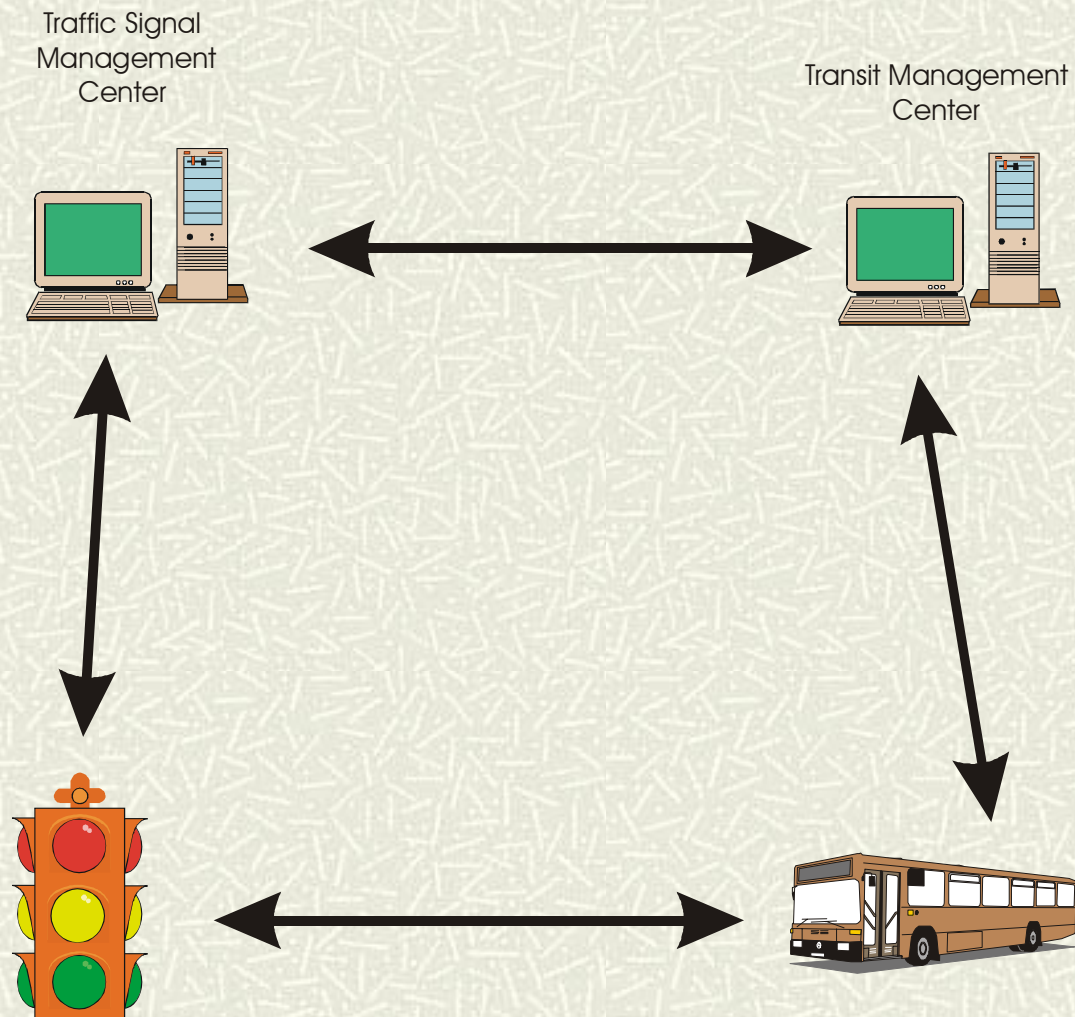
Extend or Truncate a Phase



Potential Future Operations



What Systems



Transit Priority Data Needs

Vehicle Location

- Speed

Door & Lift Status

- Predictions

Passenger Counting

Stop Location

- Near side
- Far side

Vehicle Routing

- Stopping
- Turning

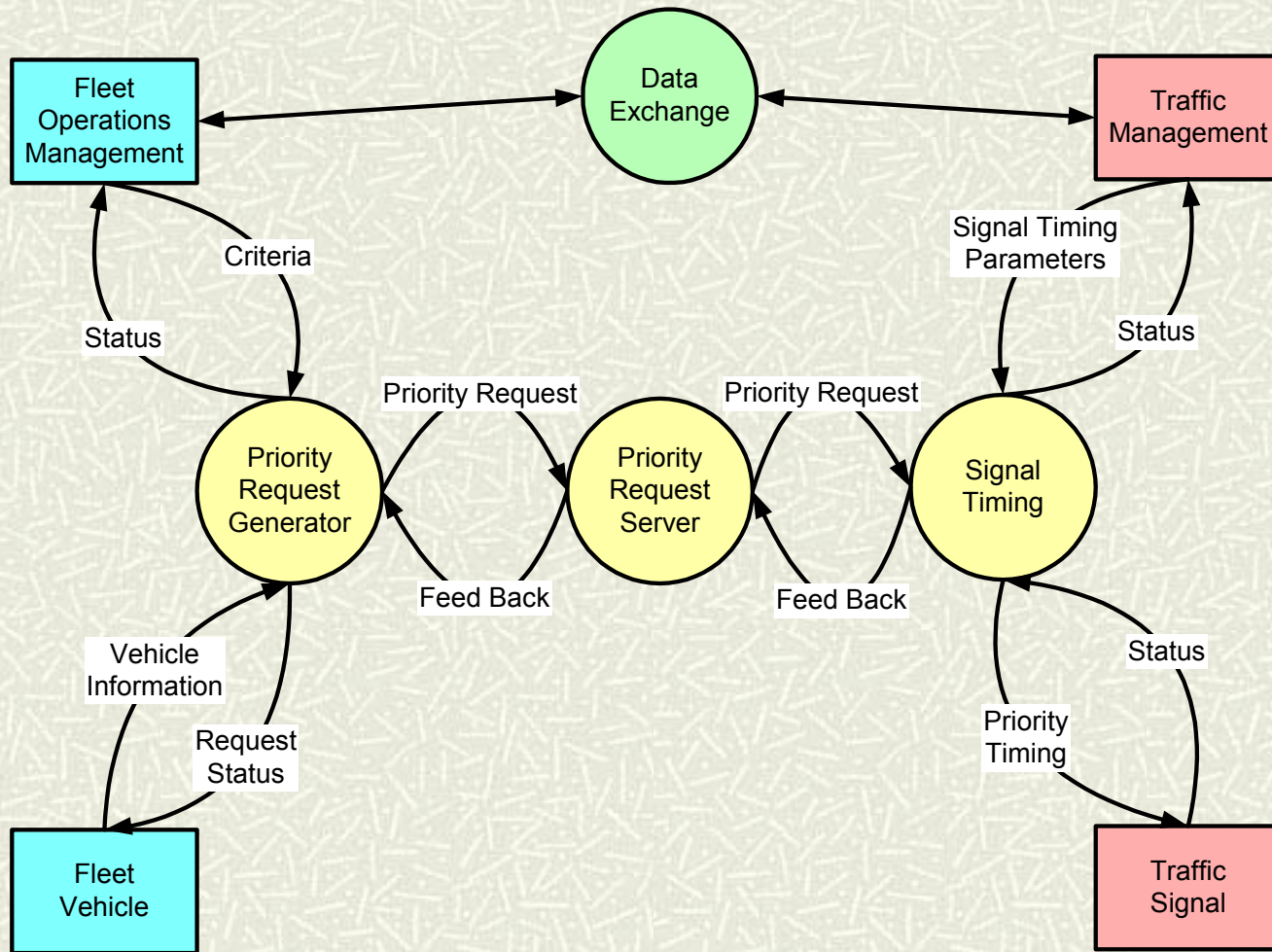
Schedule Adherence

Vehicle Identification

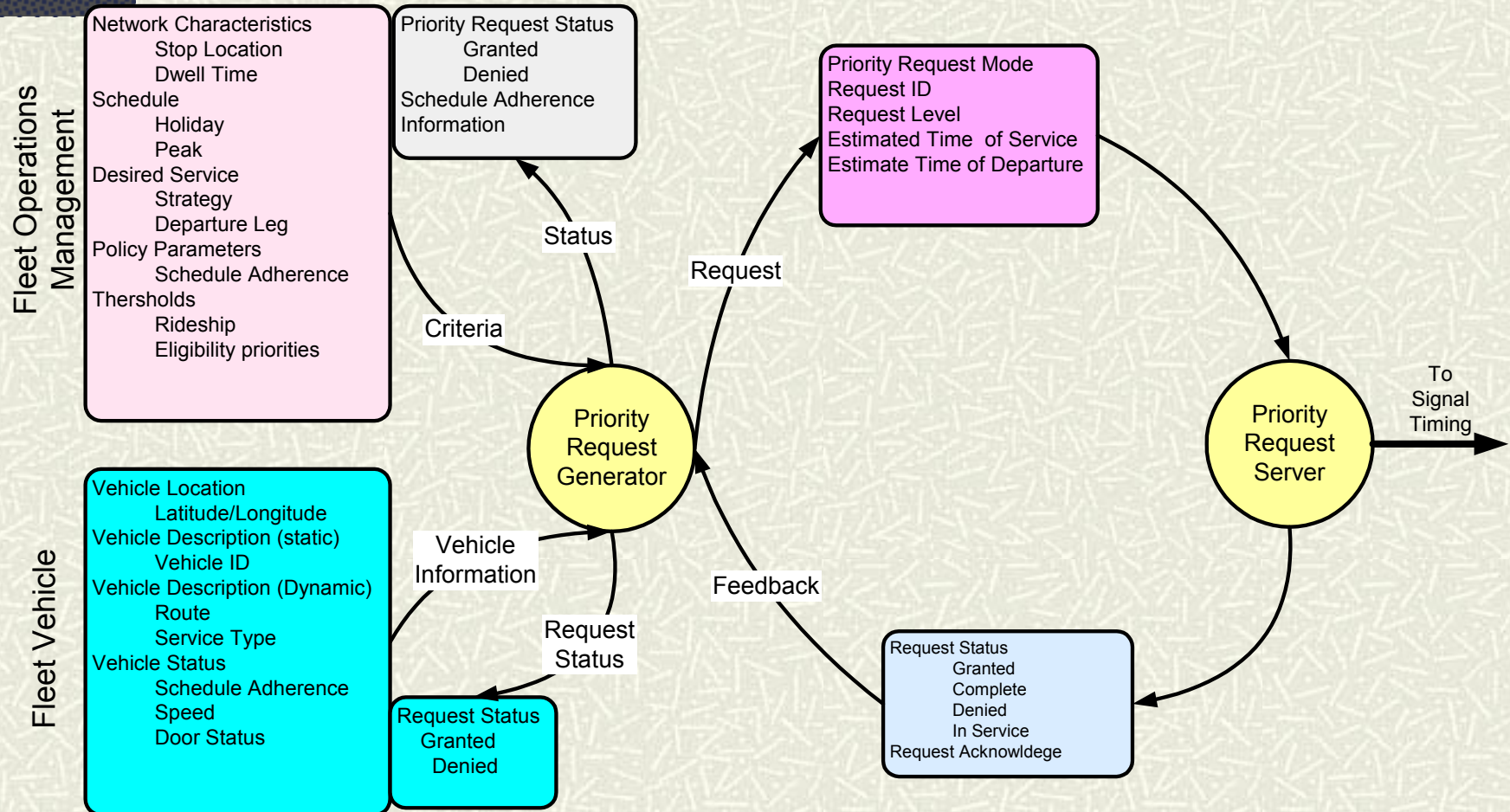
Traffic Signal Operations

- # Systems Monitoring
- # Services request for priority
- # Resolve conflicting/multiple priority requests
- # Recovery from priority request
- # Maintain coordination
- # Recognizes competing needs

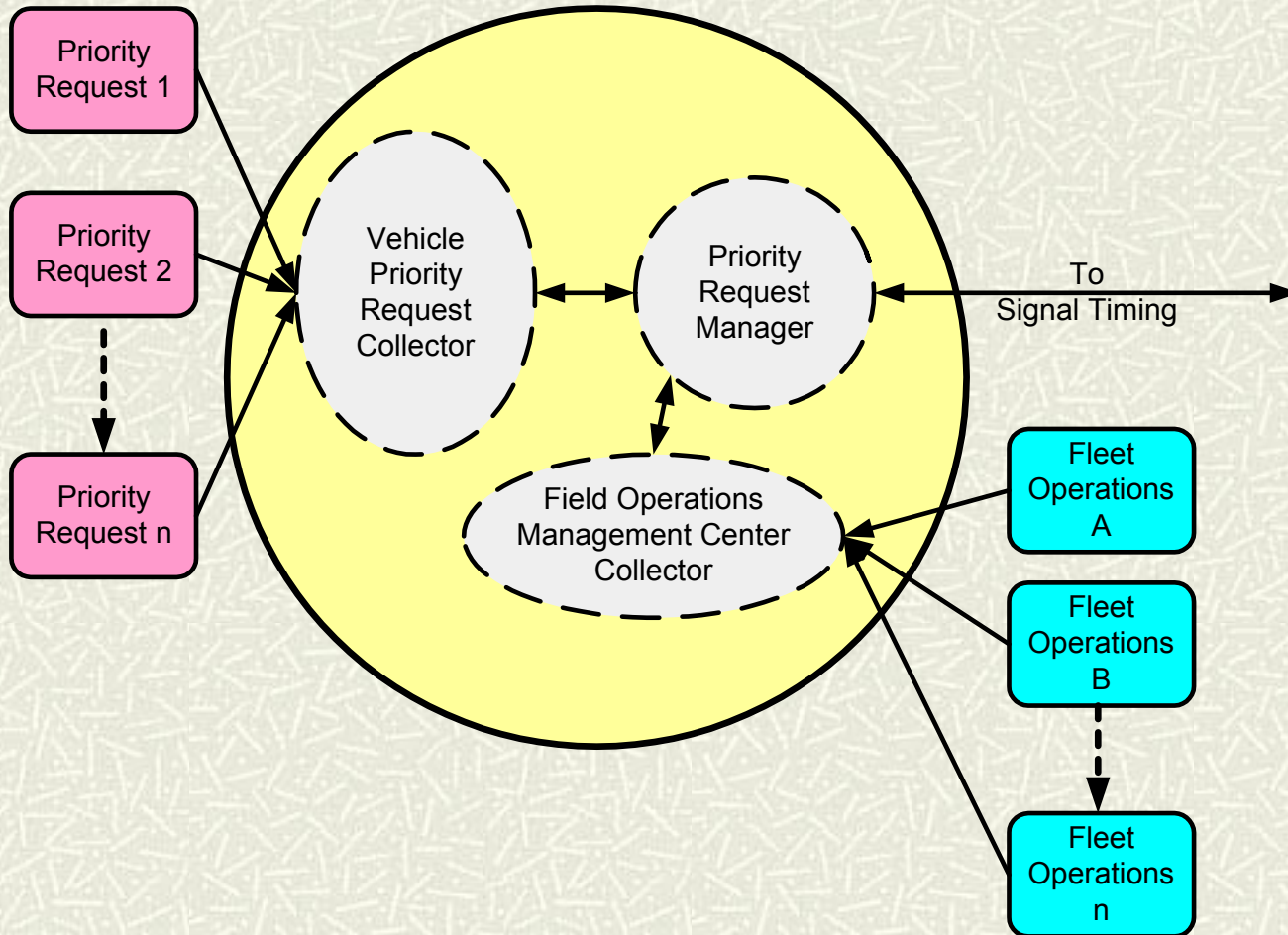
Logical System Model



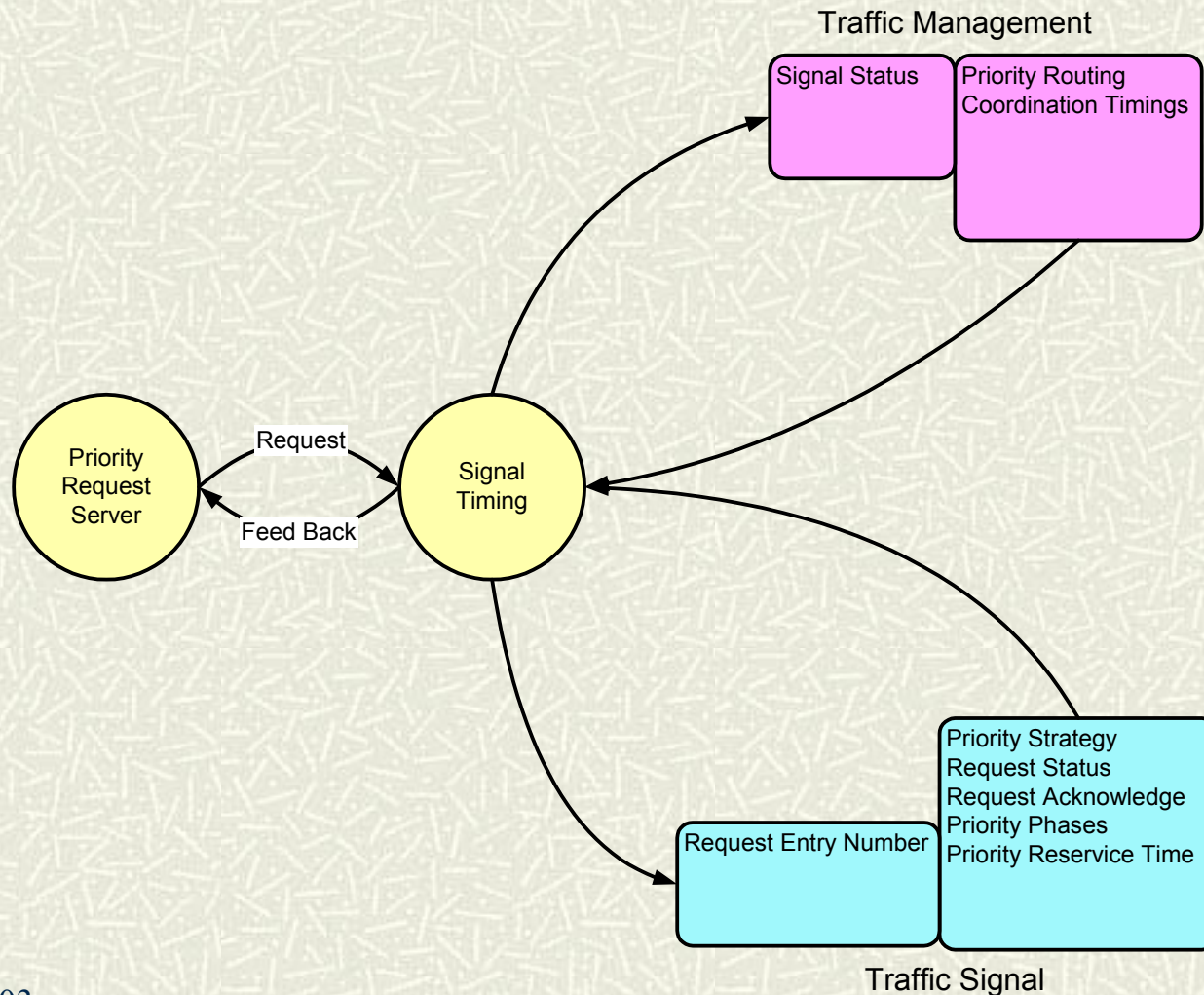
Priority Request Generator



Priority Request Server Details



Signal Timing



Detection Systems

Point detection

- Vehicle location known only at a single point in time and space.

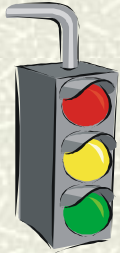
Zone detection

- Sense vehicle approaching but exact location not known.
- Difficult to change on-the-fly.

Continuous detection

- Exact vehicle location known and frequently updated.
- Can provide other data such as end of queue location.

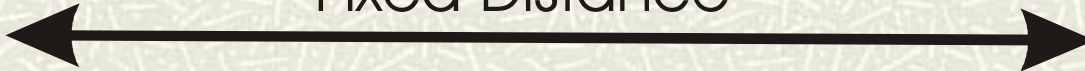
Point Detection



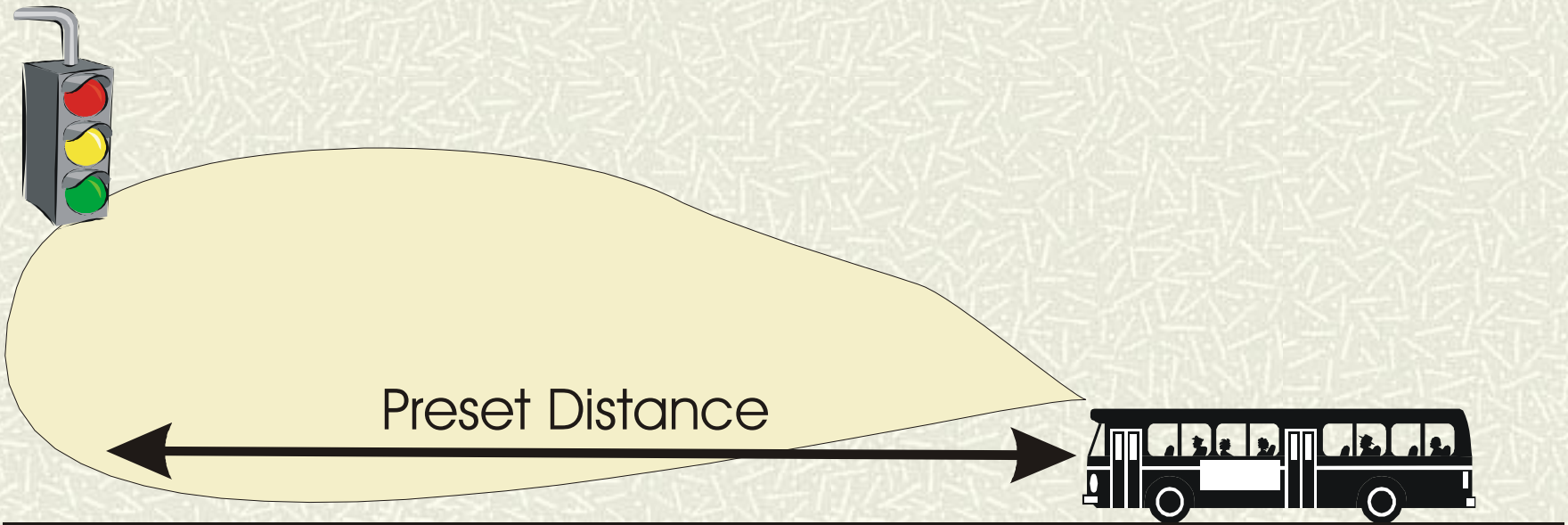
Detector Device



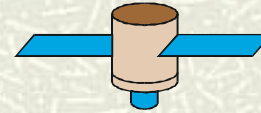
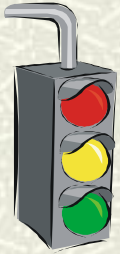
Fixed Distance



Zone Detection



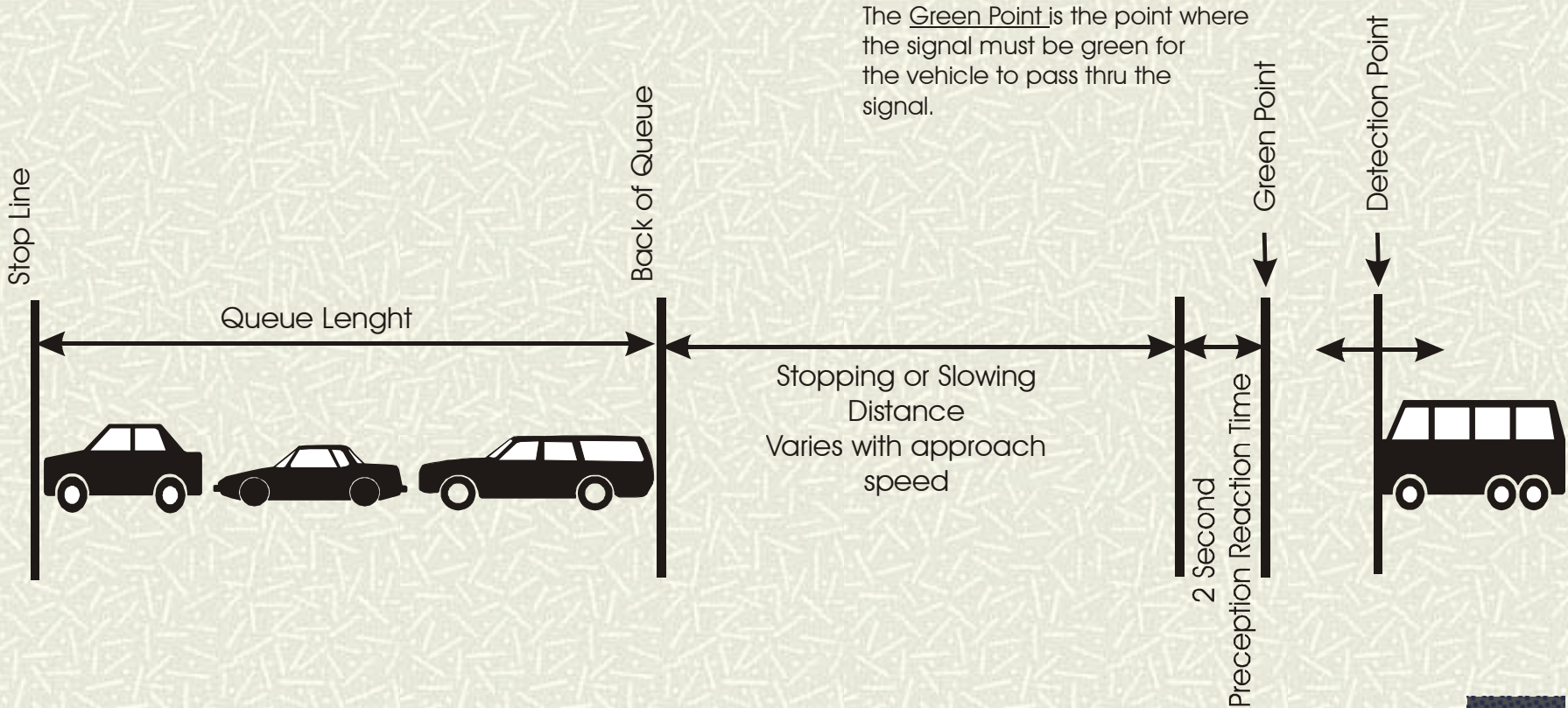
Continuous Detection



Continuously Updated
Location



Queue Dynamics?



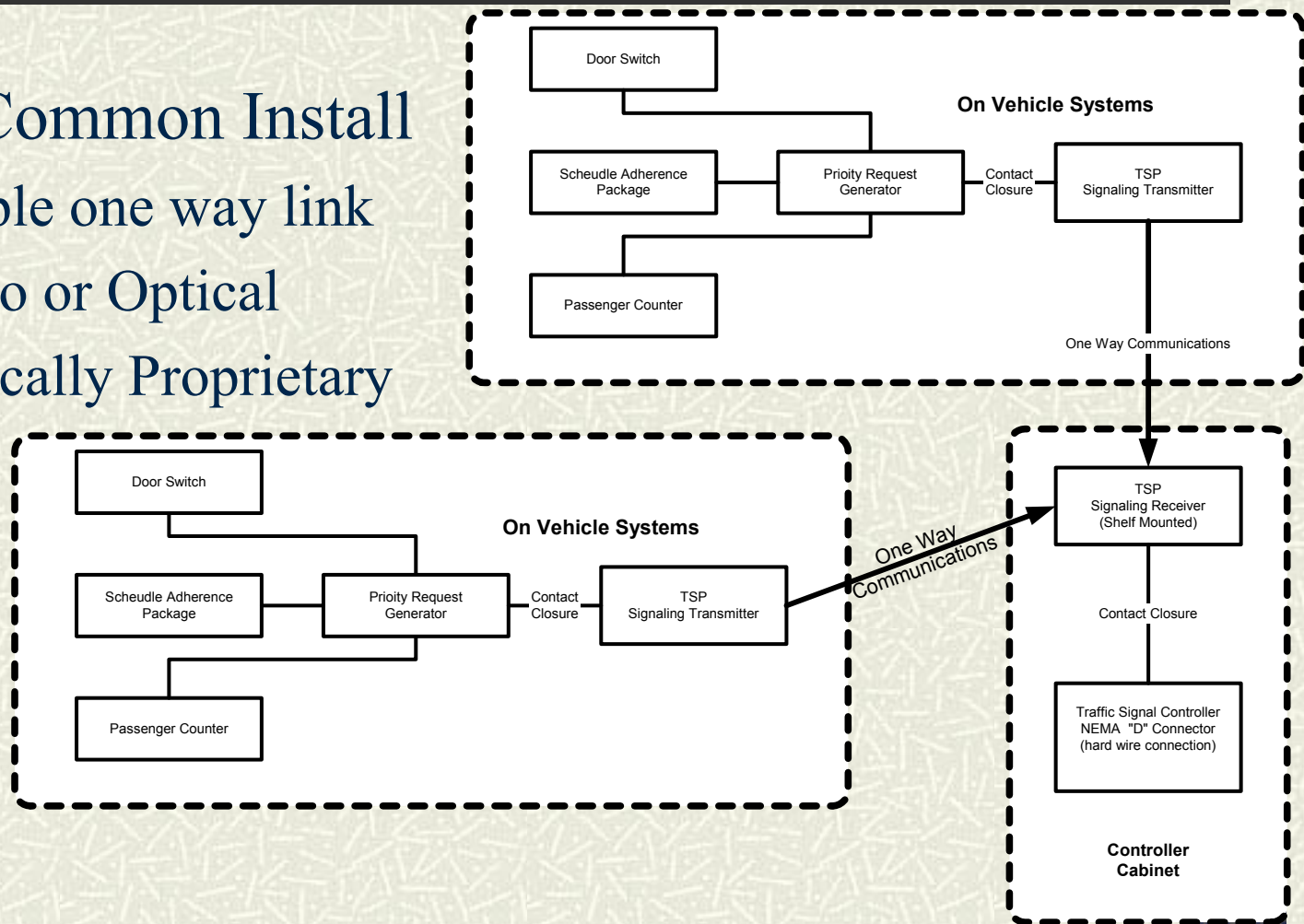
Physical Model Issues

- # Map logical elements to hardware
 - Is the PRG in the vehicle?
 - Is the PRG in the traffic signal?
 - Are parts of the PRG in both places?
 - Are there two way communications?
 - What messages are needed?

Typical Existing Hardware

Most Common Install

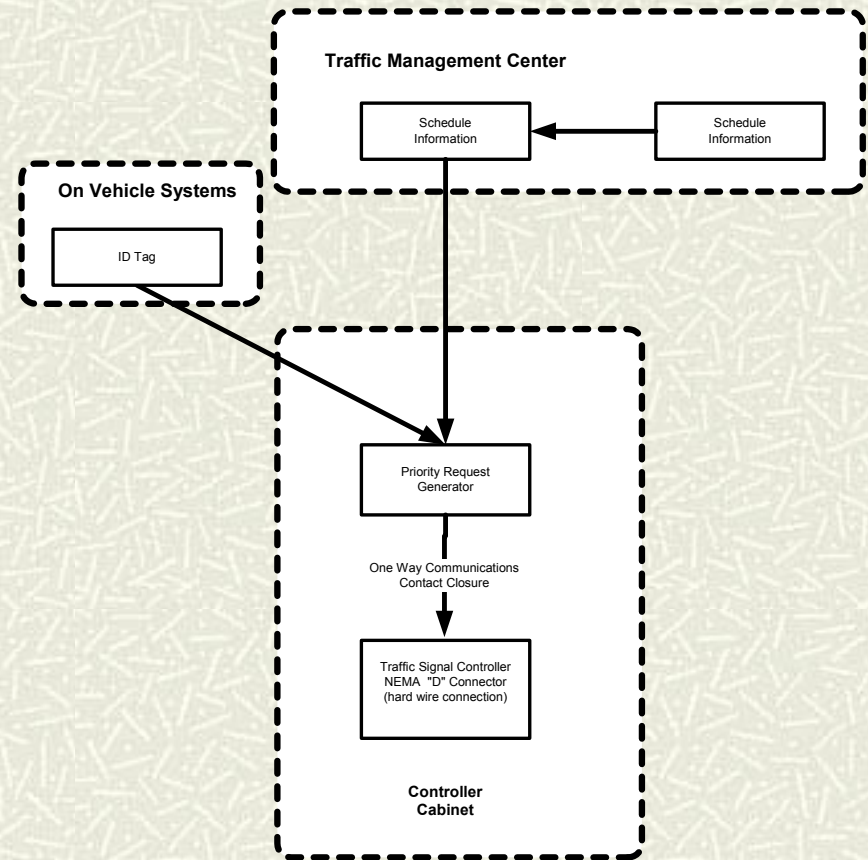
- Simple one way link
- Radio or Optical
- Typically Proprietary



Typical Existing Hardware (con't)

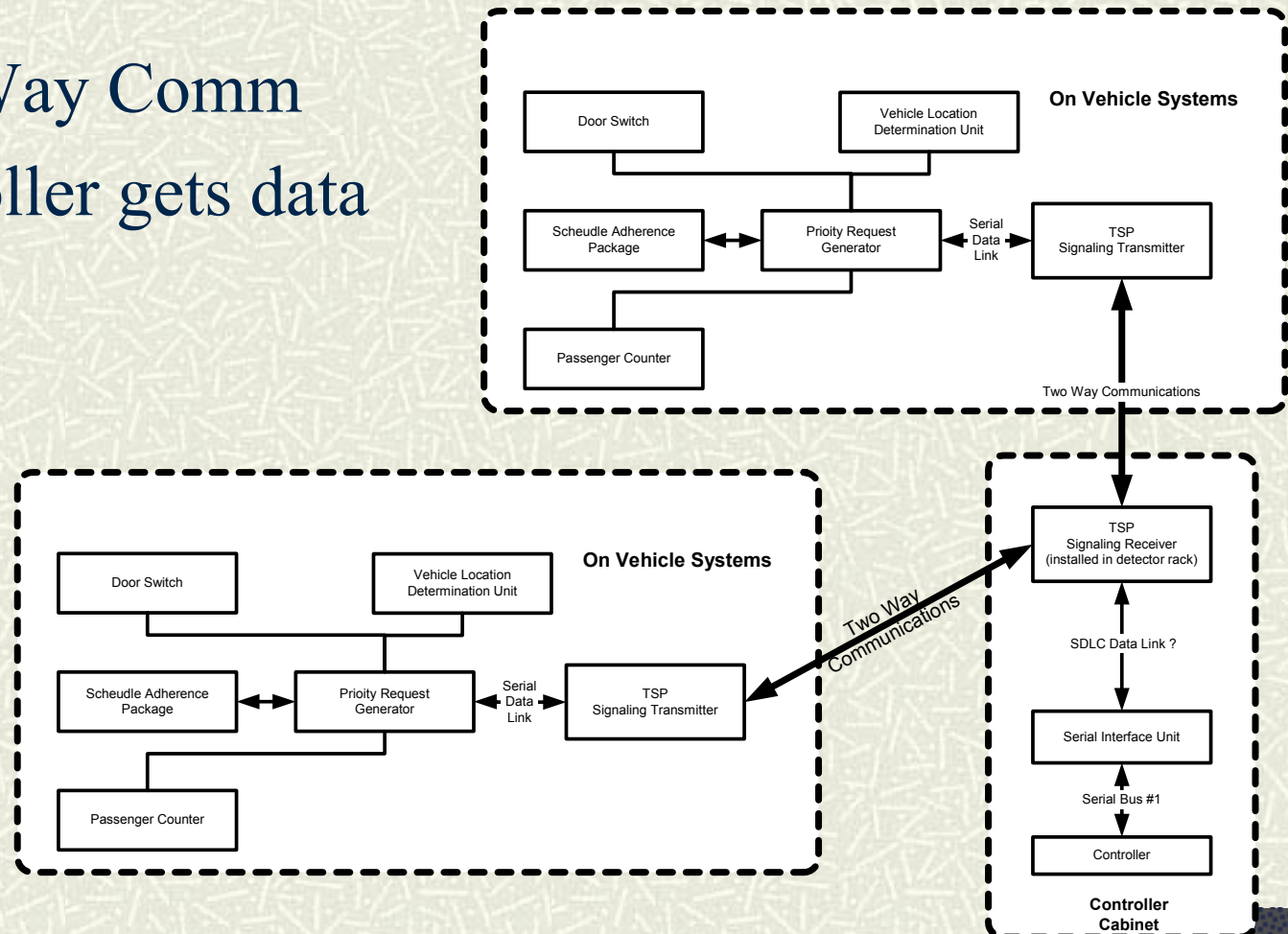
■ Several Exist

- Toll Tag
- Loops



Emerging Hardware

- Two Way Comm
- Controller gets data



Key Parameters

- # Time Service Desired – TSD
- # Time Estimated Departure – TED
- # Priority Service Strategy
- # Priority Level
- # Priority Vehicle Class
- # Priority Strategy Reservice Time
- # Priority Request Status
- # Vehicle ID

Definitions

Time Service Desired

- Desired time to arrive at the stop bar
- Assumes green interval has already begun

Time Estimated Departure

- Time vehicle will exit the intersection

Priority Service Strategy

- Desired green signal to service the request

Definitions (continued)

Priority Vehicle Level

- Priority hierarchy with
1 = highest, 10 = lowest
0 = cancel

Priority Vehicle Class Type

- Emergency Vehicle, Bus etc.

Priority Strategy Reservice Time

- Time needed for signals to recover

Definitions (continued)

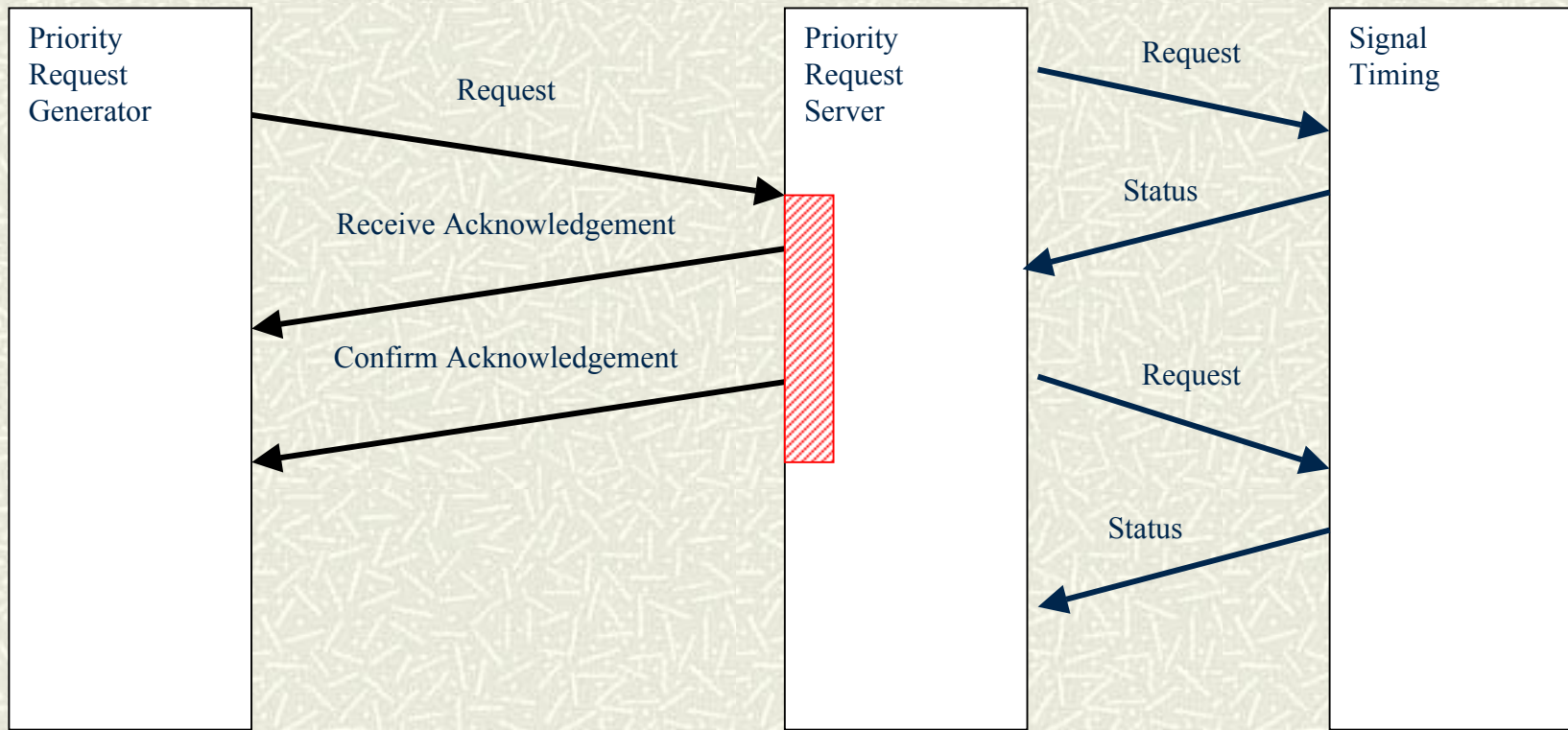
Priority Request Status

- Active, not in service, not ready

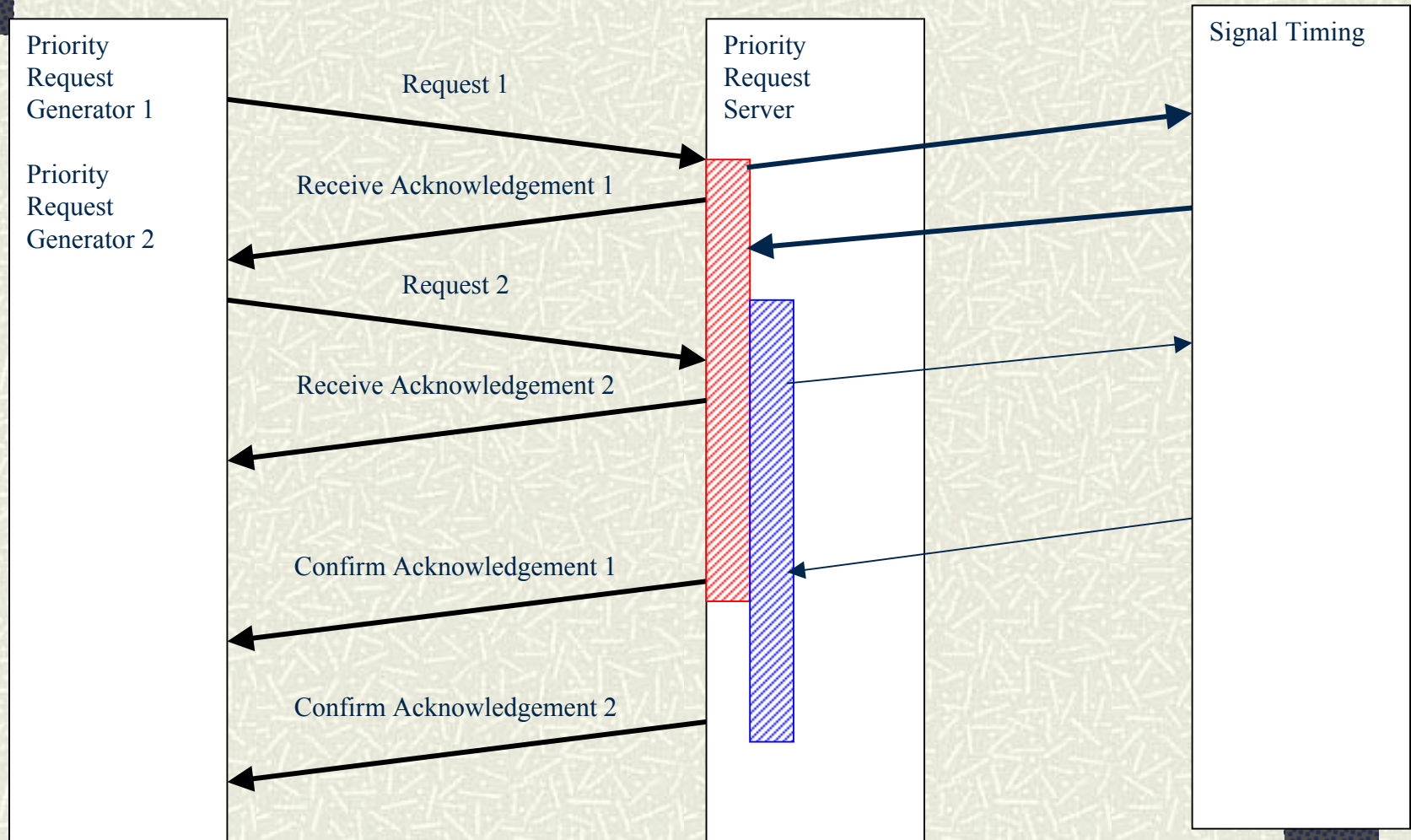
Vehicle ID

- VIN Number (globally unique)

SCP Dialogs (Single Request)



SCP Dialogs (Multiple Requests)



Conclusion

- # Work in Progress
- # We have presented progress to date
- # Are we on the right track?
- # Where to go from here?