

# TRANSIMS Version 5 Application Concepts

January 20, 2011

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# Topics

- Goals and objectives
- NetPrep applications
- Router applications
- PathSkim applications
- Microsimulator applications
- Resent convergence discussions

# Goals and objectives

- Improve user interaction during network conversion
  - Separate link selection and collapsing from relational file generation
- Streamline the application process
  - Consolidate processing steps
  - Minimize the number intermediate/working files (e.g., plan files)
- Coordinate partitioned tasks to cumulate shared and dependent data (e.g., flow and travel times)
  - Performance statistics and reports based on all partitions
- Improve performance and functionality for demand model feedback (i.e., skims)

# Version 4 Network Preparation

- Convert source data → link and node files
  - GISNet, TPPlusNet, EMMENet, TransCAD GISDK
    - Develop a User Program script to manipulate link data fields
  - Review and edit link and node files
- Synthesize TRANSIMS network with TransimsNet
  - Review network, refine parameters, re-run
    - Manually edit or provide Update/Delete commands
  - Review and edit signal and sign warrants
- Synthesize traffic controls with IntControl
  - Coordinate signal offsets with Progression
- (Similar process for transit networks)

# Version 5 Network Preparation

- Convert and edit source data → link and node files
  - NetPrep (input GIS, TP+, EMME/2, TRANSIMS network files)
    - Develop a User Program script to manipulate link data fields
    - Merge, select and collapse nodes and links
    - Apply Update/Delete commands
  - Review and edit link and node files
- Synthesize TRANSIMS network with TransimsNet
  - Review network, refine parameters, re-run
  - Apply Update/Delete commands
  - Review and edit signal and sign warrants
- Synthesize traffic controls with IntControl
  - Coordinate signal offsets with Progression

# Network Preparation Differences

- Greater focus on the initial develop of the input link and node file
  - Additional data manipulation and update/delete tools
  - Tools for selecting a subset of links from an all-streets network
- TransimsNet includes much finer controls of synthetic data generation
  - Pocket lanes, link connections, activity locations, traffic controls, parking details, speeds, and other attributes

# Router Applications

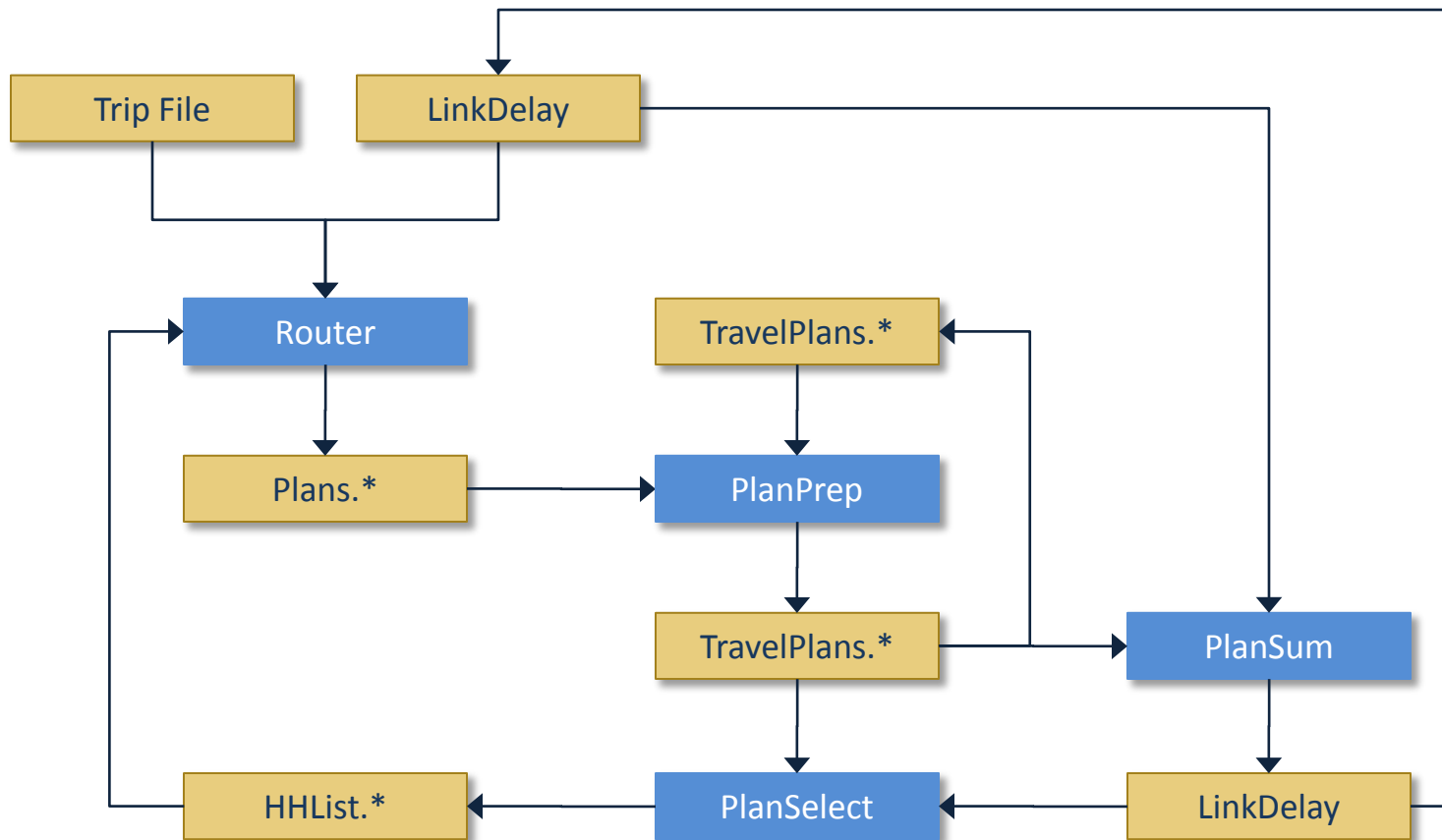
- Additional path building controls and features
  - Forward or backward path building with trip end constraints
  - Expanded selection criterion
    - Time, location, zone, traveler type, mode, household, etc.
    - Build paths for individual travelers or trips within a household
  - More rigorous path building algorithm available to minimize transit transfer anomalies
  - Parking and vehicle operating costs included in path building
    - Can be varied by vehicle type
  - Traveler type script for traveler-specific path building parameters
  - Local impedance factor to avoid hard-limit effects

# Router Performance Enhancements

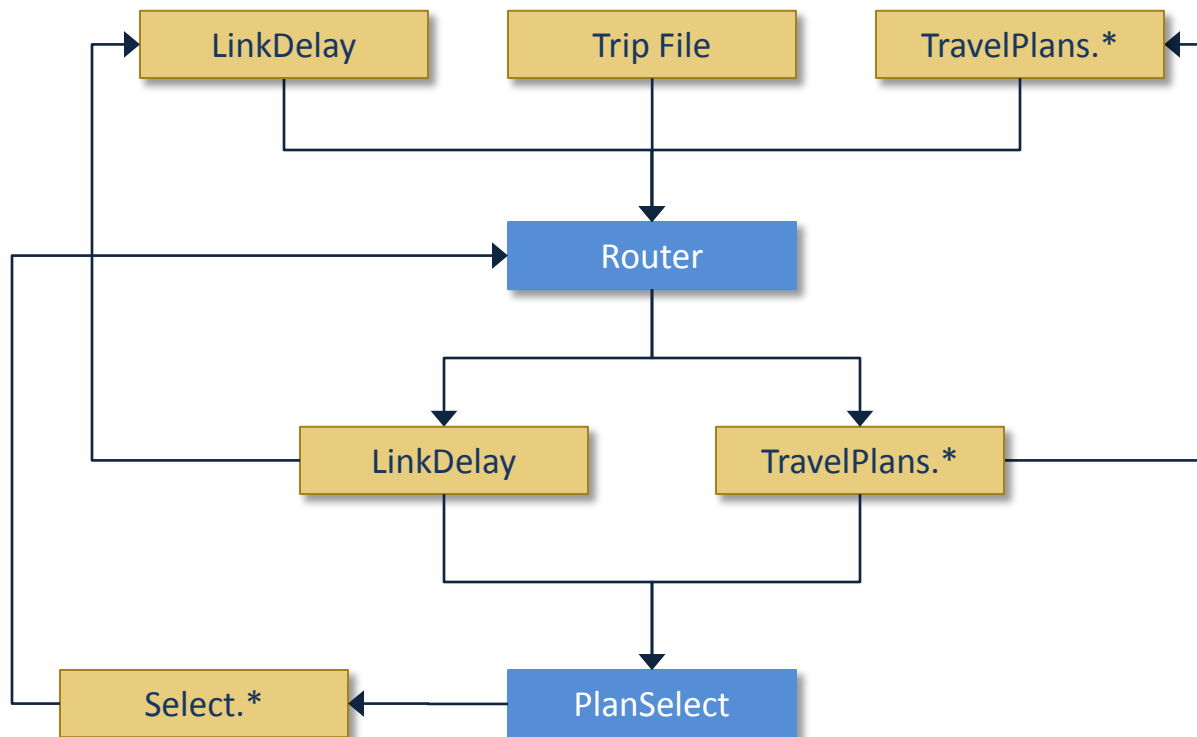
- Faster and integrated Router-based iterations
  - Create link-delays directly from Router
    - Independently control update of link flows and link travel-times
    - Build upon input flows / travel-times or start from free-flow conditions
    - Choice of periodic update vs. single final update
  - Multi-step incremental loading can be replaced with single application
  - PlanSum can be bypassed
  - Integrated Plan merging (PlanPrep)
    - Subset of input plans can be replaced with selective re-routing/update



# Version 4 Router Applications



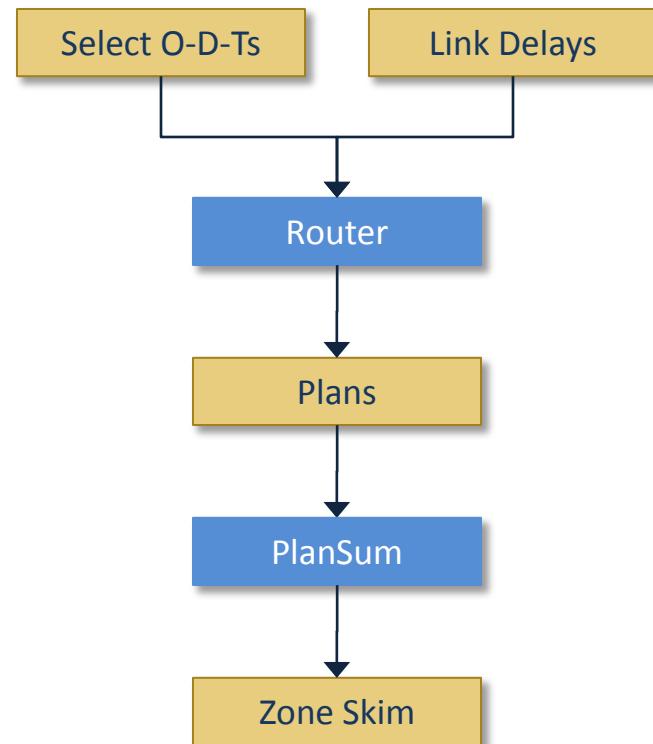
# Version 5 Router Applications



# Version 4 Travel Skims

## ■ Router + PlanSum

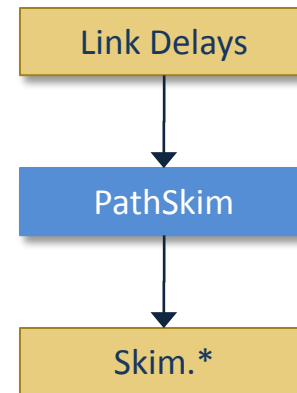
- Enter a list of origin and destination Activity Locations
- Set start time increments
- Build a plan for each O-D-T
  - Long run times
  - Huge plan files
- Use PlanSum to summarize the plans and aggregate zone or district skims
  - Limited O-D-T index size
- Single output skim file



# Version 5 Travel Skims

## ■ PathSkim

- Multiple methods for automatically selecting origins and destinations
- Multiple or merged variable length time periods
  - Start or end time points
- One-to-many path building and save only skim data
  - No need to write/read plans
- Location/zone/district skims
- Multi-threading and time-period based partitioning



# Microsimulator Applications

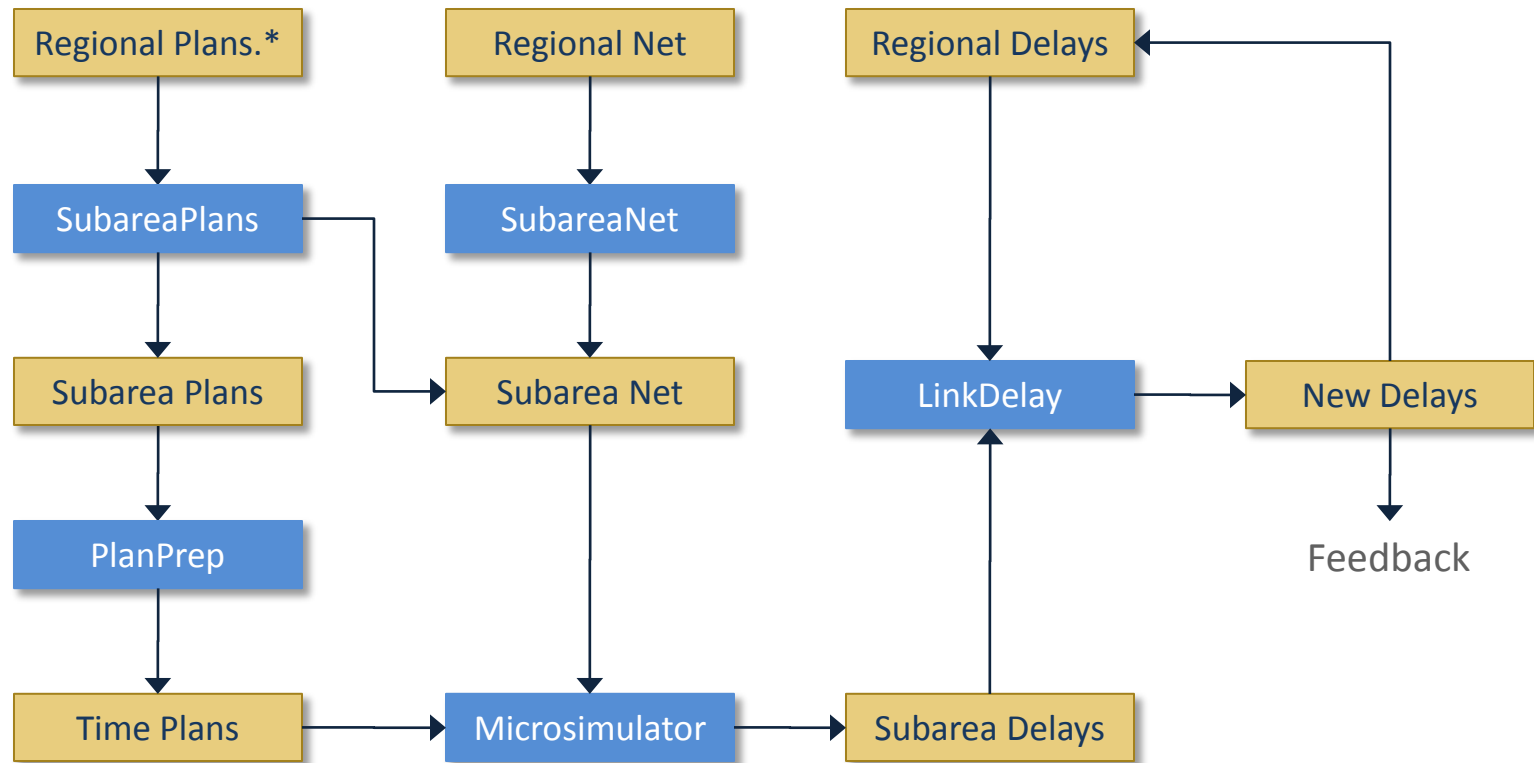
## ■ Version 4 Microsimulator

- Single thread, limited network/demand size → subarea applications
- Subarea polygon defines area for regional extraction
  - SubareaNet and SubareaPlans
- Subarea link-delays merged with regional link-delays for feedback

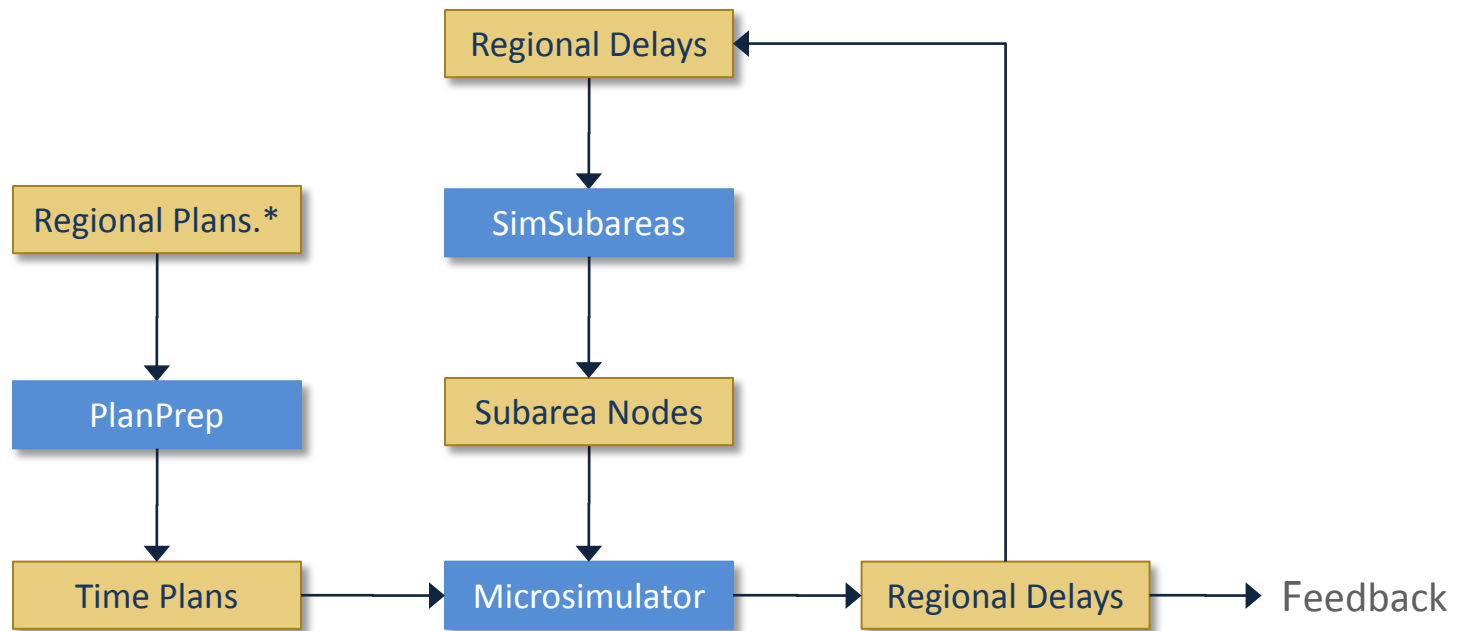
## ■ Version 5 simulations

- Multiple cores (threads or MPI) processing multiple subareas
- Geographic subareas defined in the Node file using SimSubareas
  - Normally the CBD is selected as the central subarea
    - Lake Michigan makes subarea selection more challenging
  - Subareas can be defined once or updated during each iteration based on link vehicle hours of travel (i.e., load balancing)

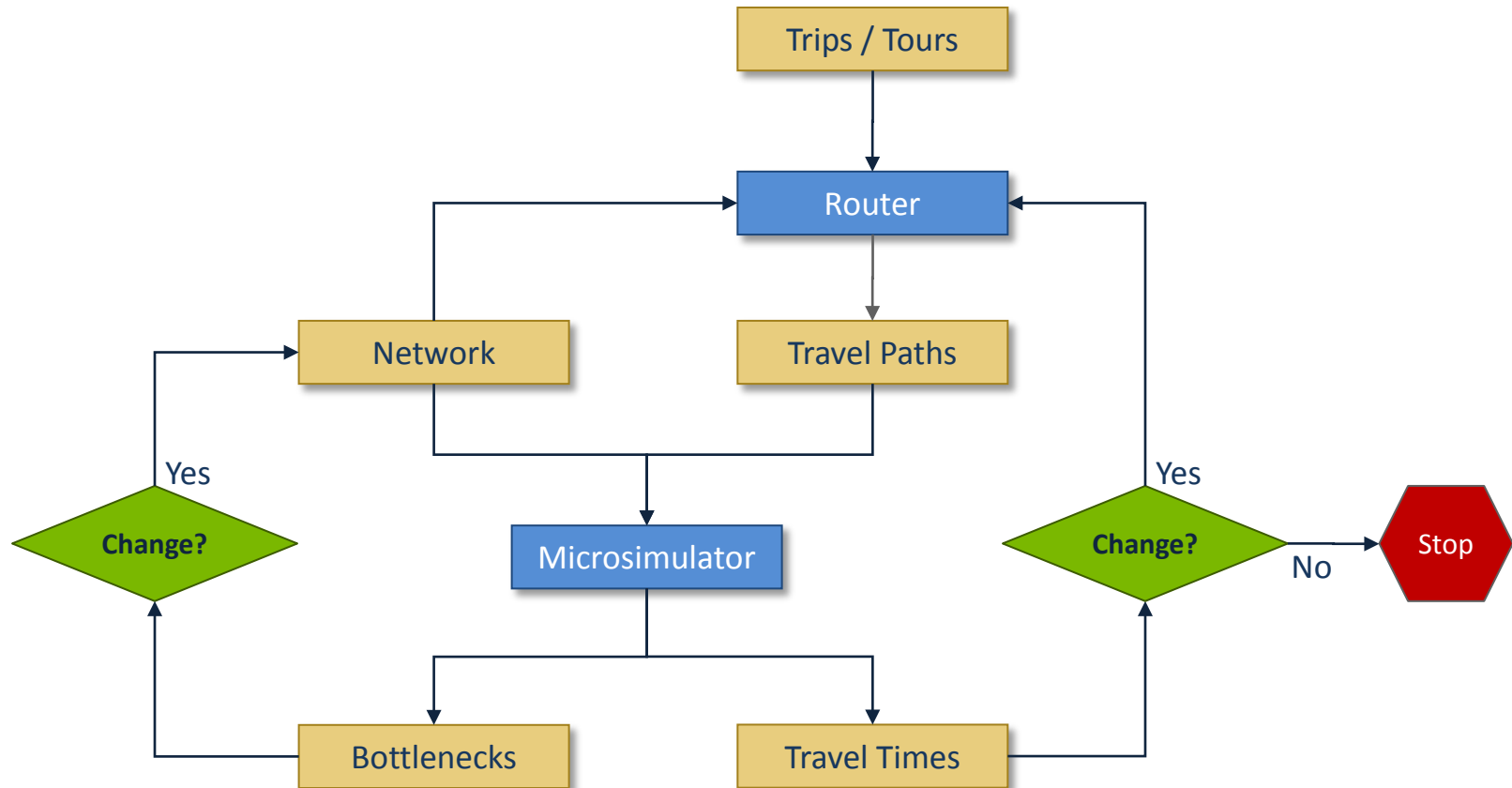
# Version 4 Microsimulator



# Version 5 Microsimulator

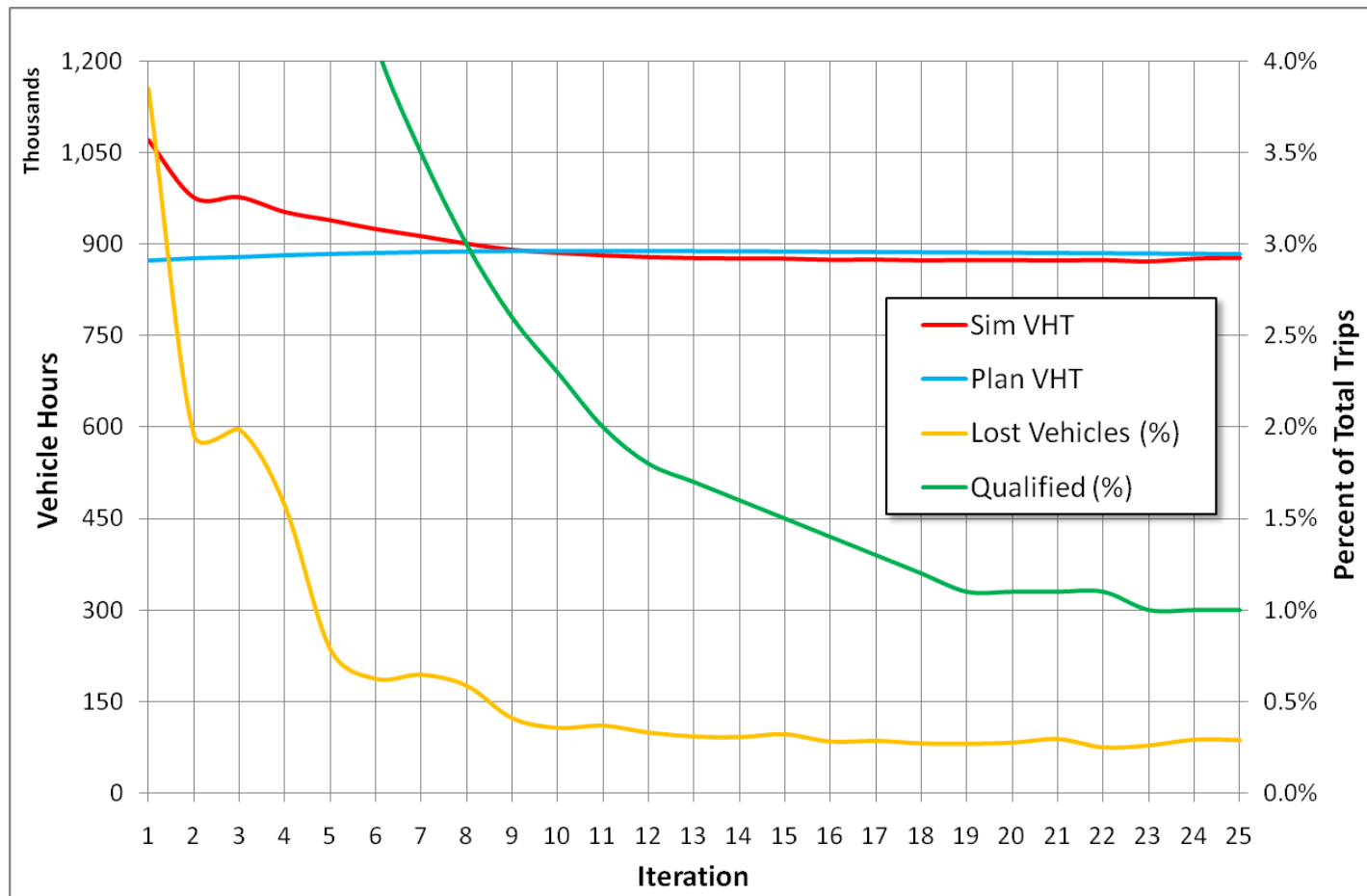


# Microsimulator Feedback Loops





# Process Convergence



# Recent Convergence Discussions

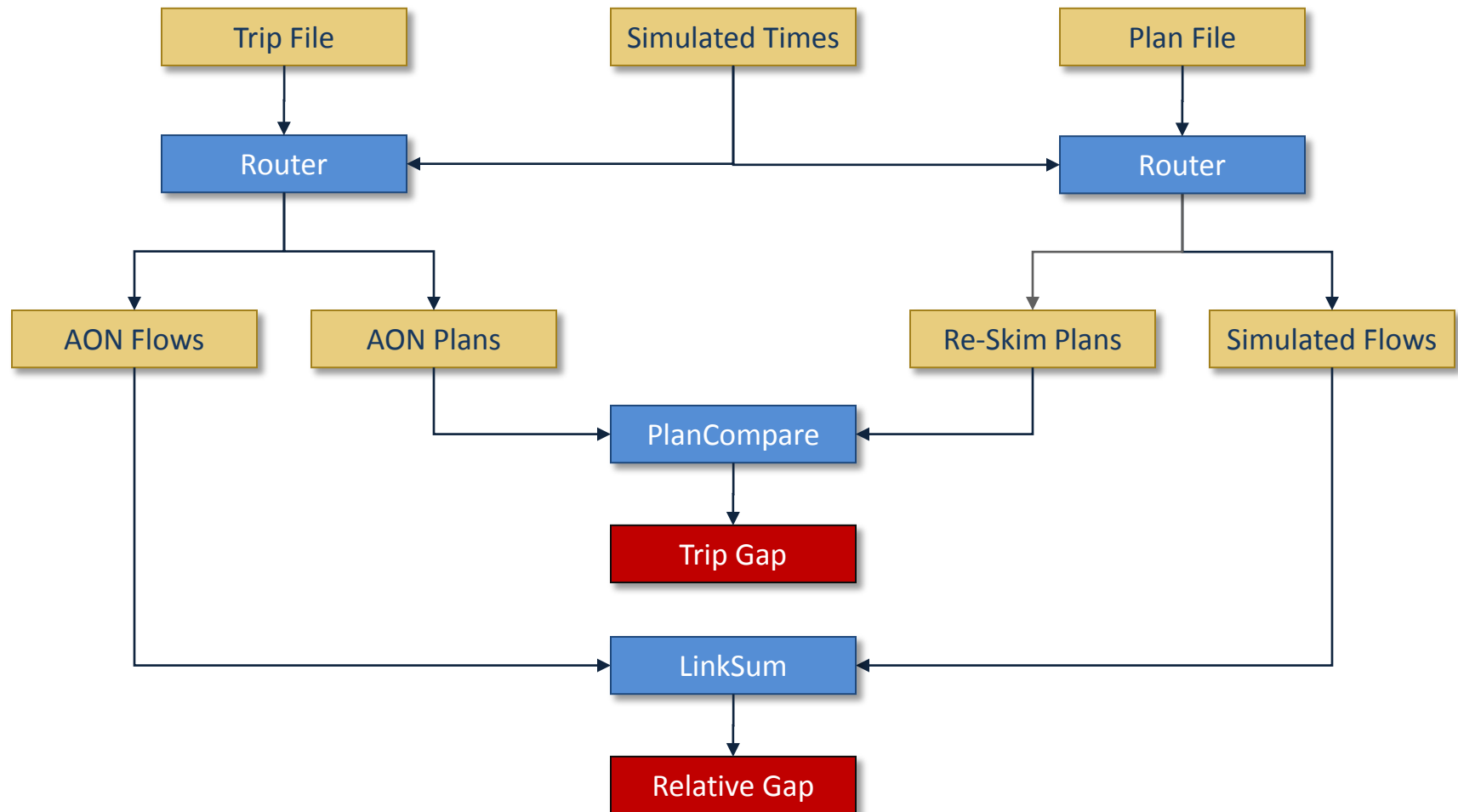
- Discussions with academics about Dynamic User Equilibrium (DUE) convergence using TRANSIMS
  - New performance measures

$$\textit{Trip Gap} = \frac{\sum(c_{xs}\{c_{at}\}) - (c_{ys}\{c_{at}\})}{\sum(c_{xs}\{c_{at}\})}$$

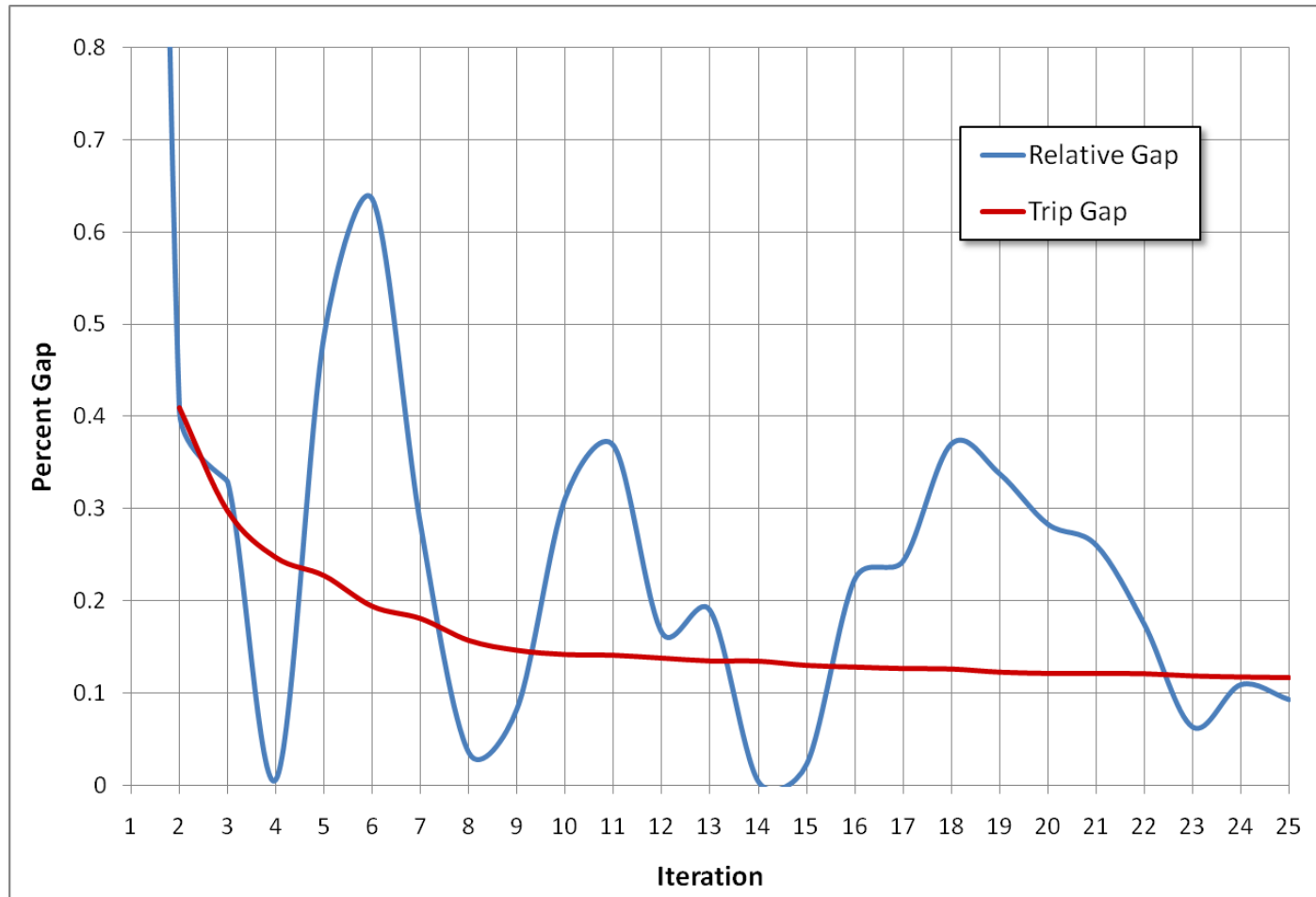
$$\textit{Relative Gap} = \frac{\sum VE_n \times CE_n - \sum VA_n \times CE_n}{\sum VE_n \times CE_n}$$

- Link delay MSA averaging seems acceptable
- Less comfortable with selected traveler feedback
  - Prefer simulating AON plans in each iterations
    - Since a unique path is built for each trip, gridlock concerns may be minimized

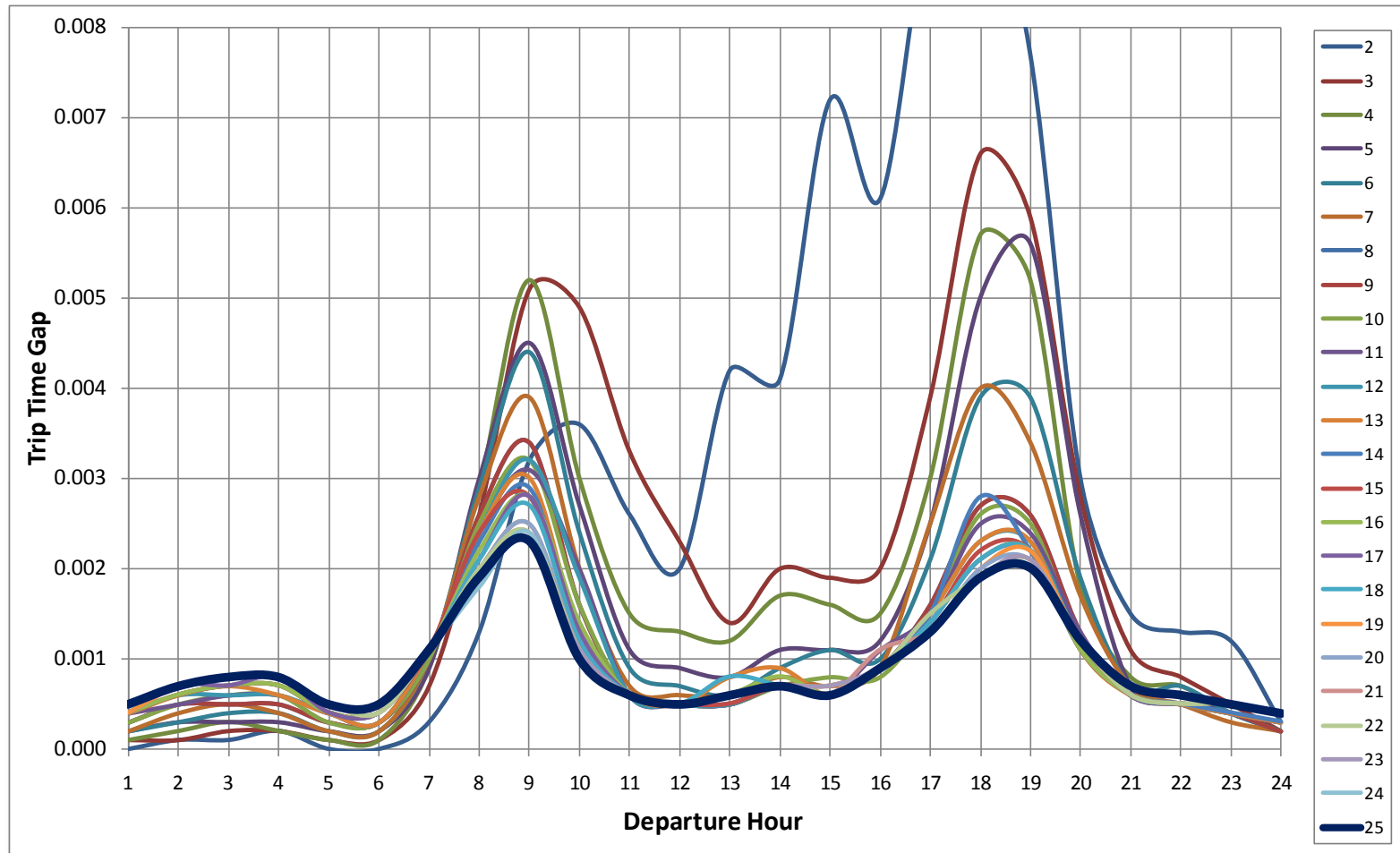
# Equilibrium Statistics



# Equilibrium Convergence



# Trip Gap by Time of Day and Iteration



# Relative Gap by Time of Day and Iteration

