

# TRANSIMS Version 5 Program Controls

January 20, 2011

David Roden – AECOM

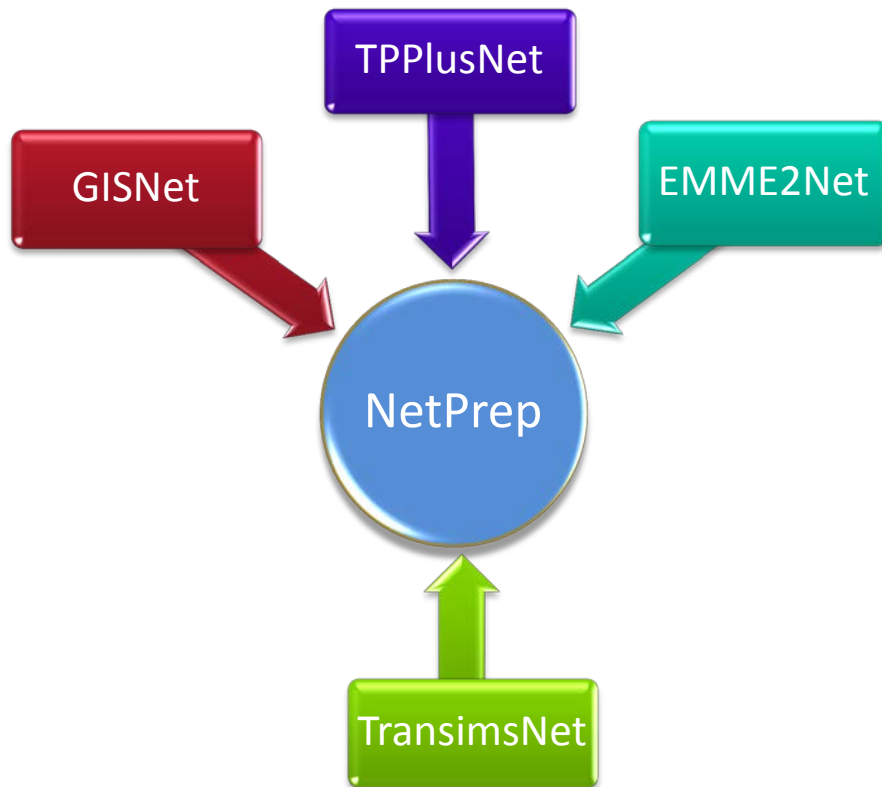
# Topics

- Goals and objectives
- Key program changes
  - NetPrep
  - TransimsNet
  - Router
  - PathSkim
  - PlanPrep
  - SimSubarea
  - Microsimulator

# Goals and Objectives

- Refinements based on user-feedback
- Make key names more user-friendly and obvious
  - Clearly distinguish input and output files
  - The print file always writes the text of the key name
  - Simple group keys → keys with multiple fields
- Programs with common key names have the same meaning and behavior
- Reduce documentation lookup for new users
- Project-specific or user-specific global control keys

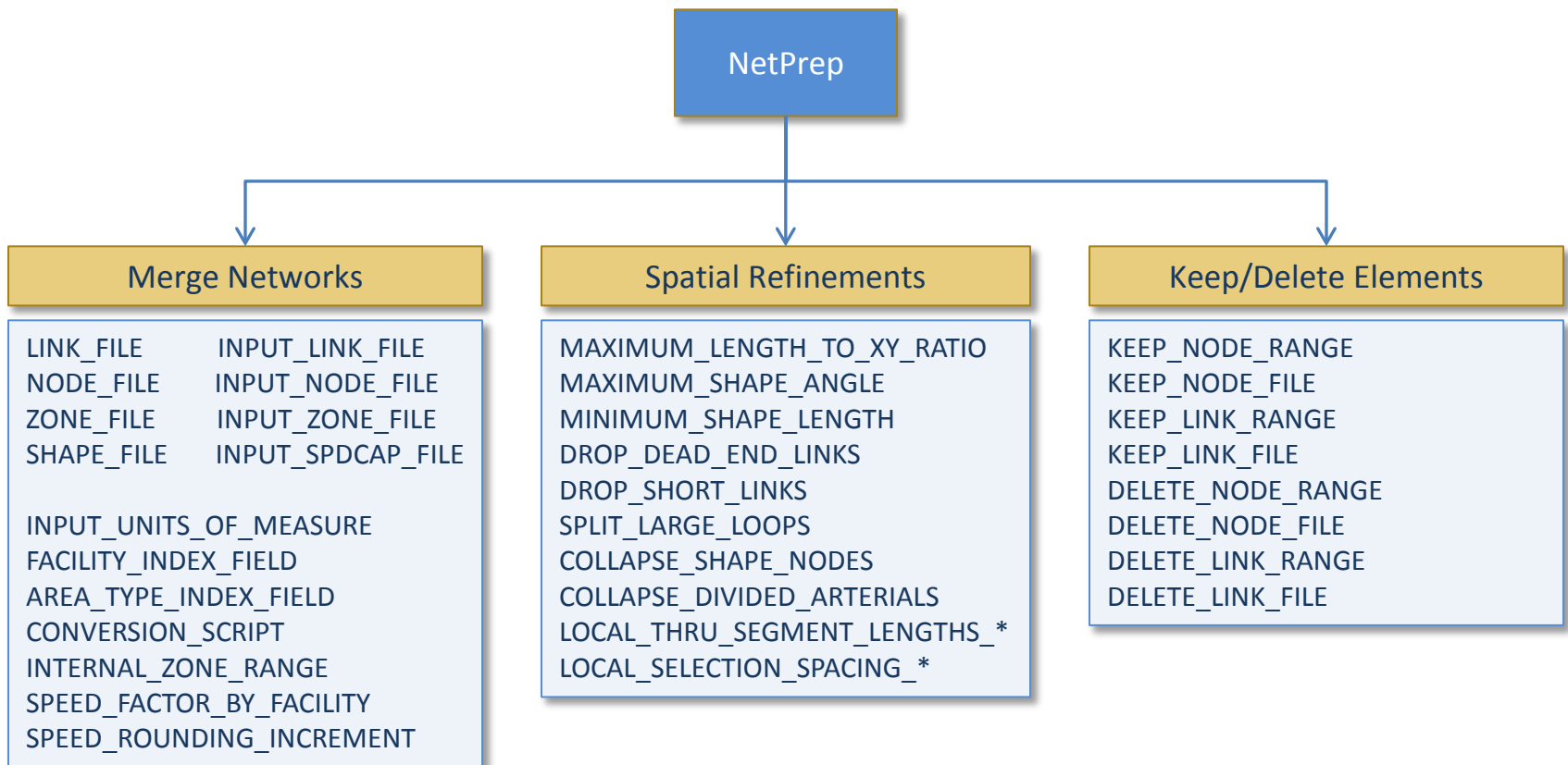
# NetPrep (new program)



## ■ Key Features

- Combines GISNet, TPPlusNet, and EMME2Net features
- Performs TransimsNet functions related to link and node selection
- New spatial network manipulation controls
- Merge networks
- User-scripts supported
- Can be run iteratively

# NetPrep Control Keys

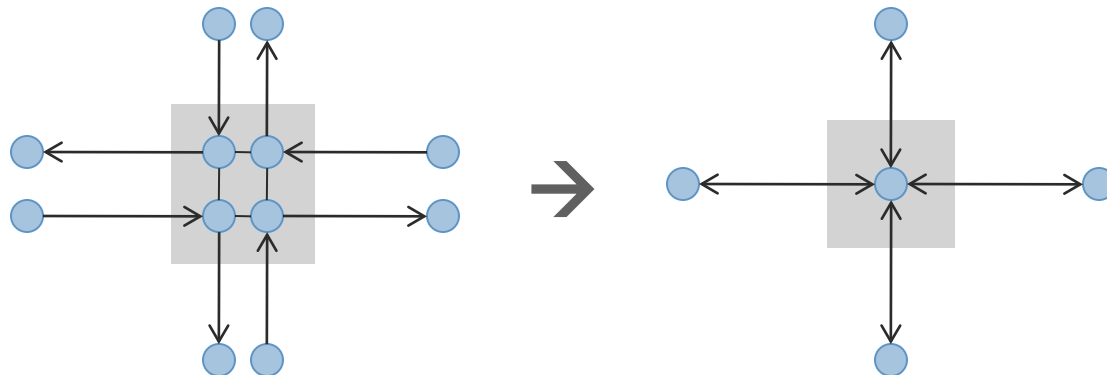


# NetPrep - New Concepts

- Local-Thru segment length
  - Assigns local streets to the new Local-Thru facility type based on the length of a series of local links
- Local selection spacing
  - Selects representative local streets from an all-streets network for inclusion in the TRANSIMS network
- Drop dead end and short links
  - Links less than length value are dropped
- Split large loops
  - Loops (anode=bnode) will be split into two links to permit loading

# Collapse Divided Arterials

- GIS often includes parallel links for divided arterials
- Complicates TRANSIMS coding and simulation of signalized intersections
  - Version 5 can model multi-node signals, but the network will be easier to edit and the simulate if a single node is used
    - The DIVIDED field in the link file models link access like parallel roadways



# New Group Concepts

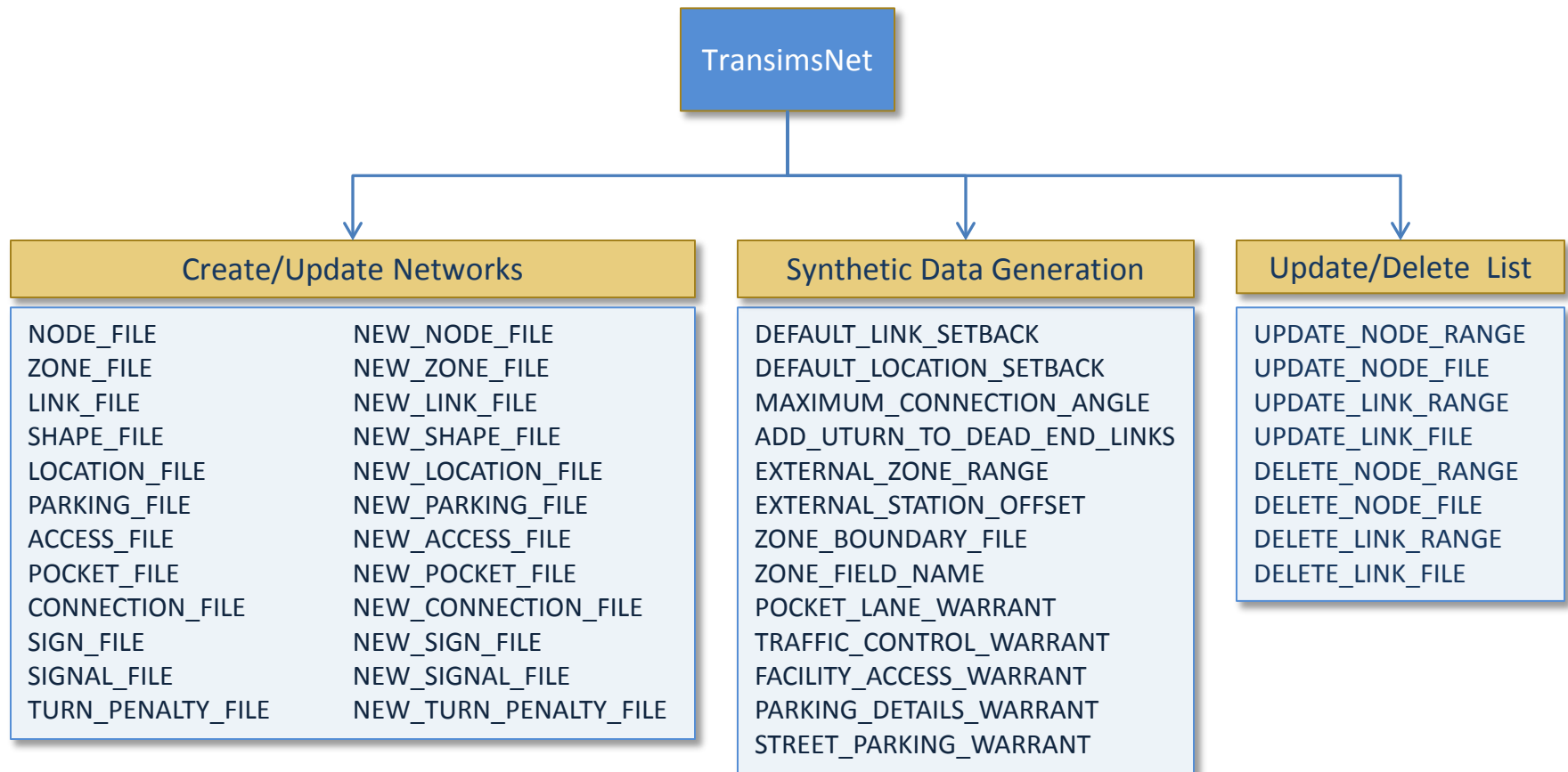
- LOCAL\_SELECTION\_SPACING\_\*
  - \* is the first area type value in the list
    - It is optional, defaults to 1
    - Supports up to 100 area types
- Application options
  - LOCAL\_SELECTION\_SPACING = 100, 200, 300, 400
  - LOCAL\_SELECTION\_SPACING\_1 = 100, 200, 300, 400
  - LOCAL\_SELECTION\_SPACING\_2 = 200
  - LOCAL\_SELECTION\_SPACING\_10 = 1000, 1100, 1200
    - Result = 100, 200, 300, 400, 400, 400, 400, 400, 400, 1000, 1100, 1200



# TransimsNet

- Network node and link selecting and collapsing moved to NetPrep
- Primary function is to synthesize additional data required for dynamic network modeling
  - Pocket lanes, link connections, activity locations, parking lots, and traffic control warrants
- Includes much finer control over the synthetic data generation logic
  - Pocket lane, facility access, and traffic control warrants
  - Adds parking lot processing time and cost by time of day

# TransimsNet Control Keys



# Pocket Lane Warrants

## ■ Version 4:

- Approach facility type records with values by area type

POCKET_LENGTHS_FOR_FACILITY_1	100, 150, 150, 150, 300, 350, 400, 500
-------------------------------	--

## ■ Version 5:

- Records with multiple data fields (from, to, at, type, length, lanes)
  - Approach facility type range
  - Departure facility type range
  - Area type range
  - Pocket lane type (left/right turn, left/right merge, etc.)
  - Length and number of lanes

POCKET_LANE_WARRANT_1	FREEWAY..EXPRESSWAY, RAMP, 1..2, RIGHT, 100 feet, 1
-----------------------	---

# Traffic Control Warrants

## ■ Version 4:

- Area type records for stop signs and signals by node facility types

STOP_WARRANT_FOR_AREA_TYPE_1	LOCAL
SIGNAL_WARRANT_FOR_AREA_TYPE_1	COLLECTOR, LOCAL, TIMED

## ■ Version 5:

- Multi-data field records (main, cross, at, type, setback, group)
  - Main and cross street facility type ranges
  - Area type range
  - Control type (two-way/all-way stop, signal, etc.)
  - Intersection setback distance
  - Signal group (used in IntControl for timing and phasing plans)

TRAFFIC_CONTROL_WARRANT_1	LOCAL, LOCAL, 1, ALL_STOP, 20 feet
TRAFFIC_CONTROL_WARRANT_2	MAJOR, MINOR, 2, SIGNAL, 25 feet, 1

# Facility Access Warrants

## ■ Version 4:

ACTIVITY_LOCATION_SIDE_OFFSET	15
MINIMUM_SPLIT_LENGTHS	60, 60, 60, 60, 60, 60, 60, 60
MAXIMUM_ACCESS_POINTS	3
FACILITY_TYPE_ACCESS_FLAGS	0, 0, 1

## ■ Version 5:

- Multi-data field records (type, at, setback, min\_len, max\_pts)
  - Facility type range
  - Area type range
  - Activity location setback distance (i.e., side offset)
  - Minimum split length
  - Maximum number of access points per link

FACILITY_ACCESS_WARRANT_1	PRINCIPAL..LOCAL, ALL, 15 meters, 60 meters, 3
---------------------------	--

# Parking Detail Warrants (new)

- Adds cost and time to parking lots by time of day
  - Multi-data field records (at, time, use, in, out, hourly, daily)
    - Area type range
    - Time of day range
    - Vehicle use type
    - Time to park the vehicle
    - Time to retrieve the vehicle
    - Hourly parking cost
    - Daily parking cost

PARKING_DETAIL_WARRANT_1	1..2, 10:00..15:00, AUTO, 20 seconds, 60 seconds, 200 cents, 400 cents
--------------------------	--

# Street Parking Warrants (new)

- Adds parking lane use restrictions by time of day
  - Multi-data field records (type, at, time)
    - Facility type range
    - Area type range
    - Time of day range

STREET_PARKING_WARRANT_1	MINOR..LOCAL, 2..3, 10:00..15:00
--------------------------	----------------------------------

# IntControl

- Version 4:
  - Signal type and rings defined in TransimsNet
- Version 5:
  - Signal group is defined in TransimsNet
  - Signal type, rings, timing and phasing parameters vary by group
  - Groups may represent jurisdictions and/or areas with different signal standards

```
SIGNAL_TYPE_CODE_*  
NUMBER_OF_RINGS_*  
SIGNAL_TIME_BREAKS_*  
SIGNAL_CYCLE_LENGTH_*  
MINIMUM_PHASE_TIME_*  
YELLOW_PHASE_TIME_*  
RED_CLEAR_PHASE_TIME_*  
SIGNAL_SPLIT_METHOD_*  
MINIMUM_LANE_CAPACITY_*  
MAXIMUM_LANE_CAPACITY_*  
POCKET_LANE_FACTOR_*  
SHARED_LANE_FACTOR_*  
TURN_MOVEMENT_FACTOR_*  
PERMITTED_LEFT_FACTOR_*  
GENERAL_GREEN_FACTOR_*  
EXTENDED_GREEN_FACTOR_*  
MAXIMUM_GREEN_FACTOR_*  
SIGNAL_DETECTOR_LENGTH_*
```



# Router

- Version 4 Router → Router and PathSkim
  - Router build travel plans from a trip file
  - PathSkim build travel skims from a user-specified O-D-T list
    - Replaces Router → PlanSum process
- Version 5 path building is a SysLib service
  - Path Builder classes support multiple threads and DLL integration with other software
  - Also supports on-the-fly path building within the Microsimulator

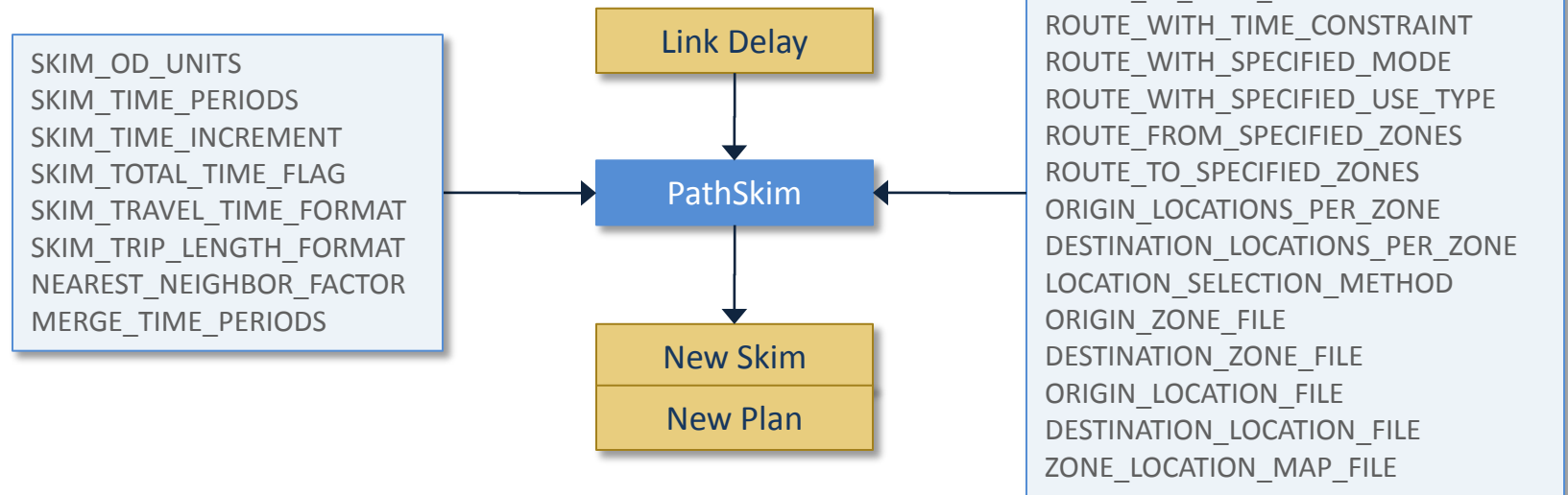
# Version 5 Router

## ■ New features

- Forward and backward paths based on time constraints
- Builds paths with or without access links
- Uses impedance sorting to minimize transit transfer problems
- Models parking time and cost by time of day
- Lane use rather than link use restrictions
  - Includes tolls and random processing rates (toll plaza, security gate, etc.)
- Uses consistent mode codes for all TRANSIMS modules
- Outputs link-based plans for complete trips
  - No traveler scaling, link vs. node files, walk-leg-only trip problems
- Cumulates flows and updates link delay files
- Updates existing plan records with latest link delays

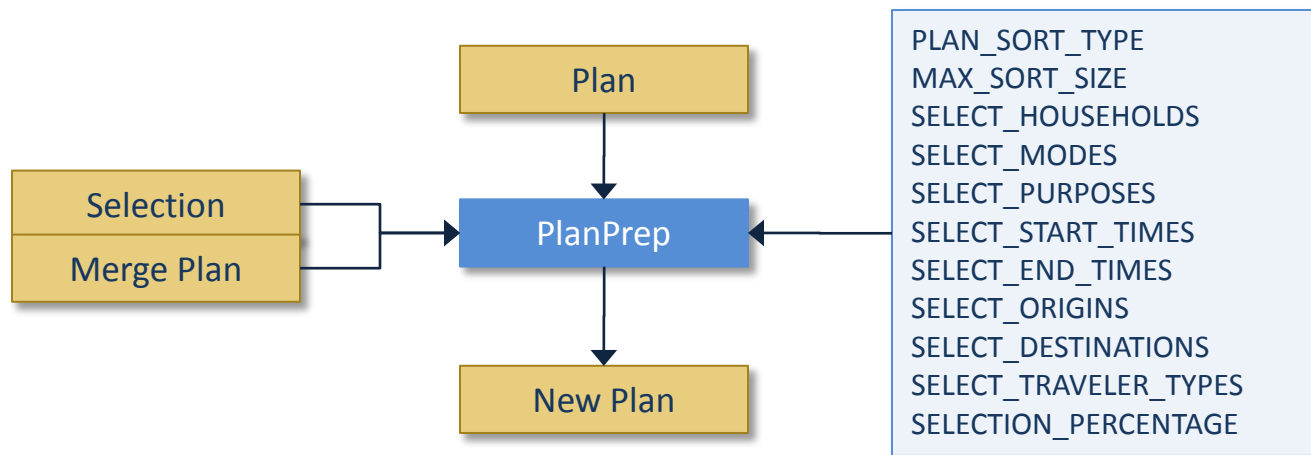
# PathSkim

- Specifies a set of origin-destination-times-mode for one-to-many path building and skimming
  - Multiple methods for selecting OD locations within zones
    - Random, centroid, distribute
  - Location, zone or district-based skims



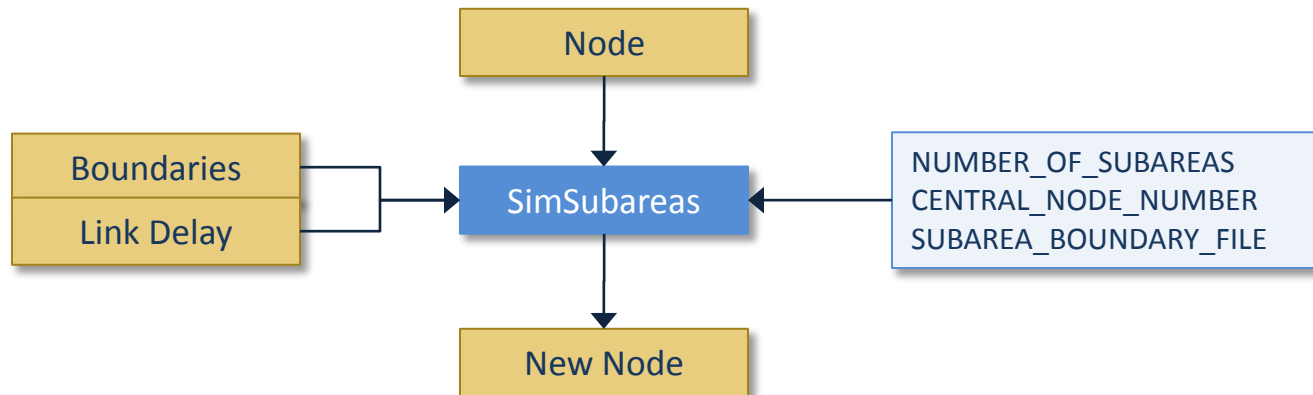
# PlanPrep

- Sort, merge, select, re-format plan file records
  - Expanded selection controls
  - Sort and combine files in one step
  - Sort large plans files within memory constraints
    - MAX\_SORT\_SIZE

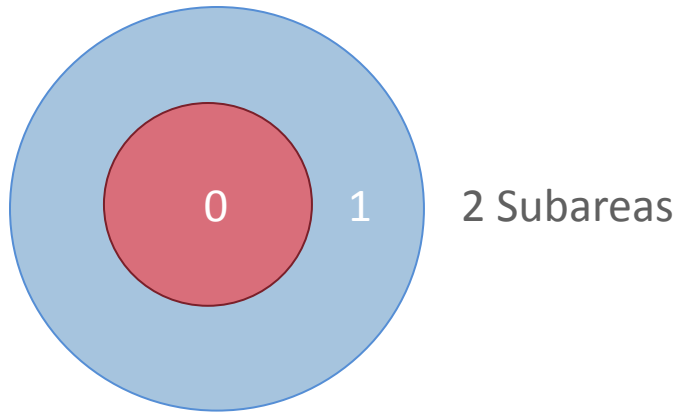


# SimSubareas (new program)

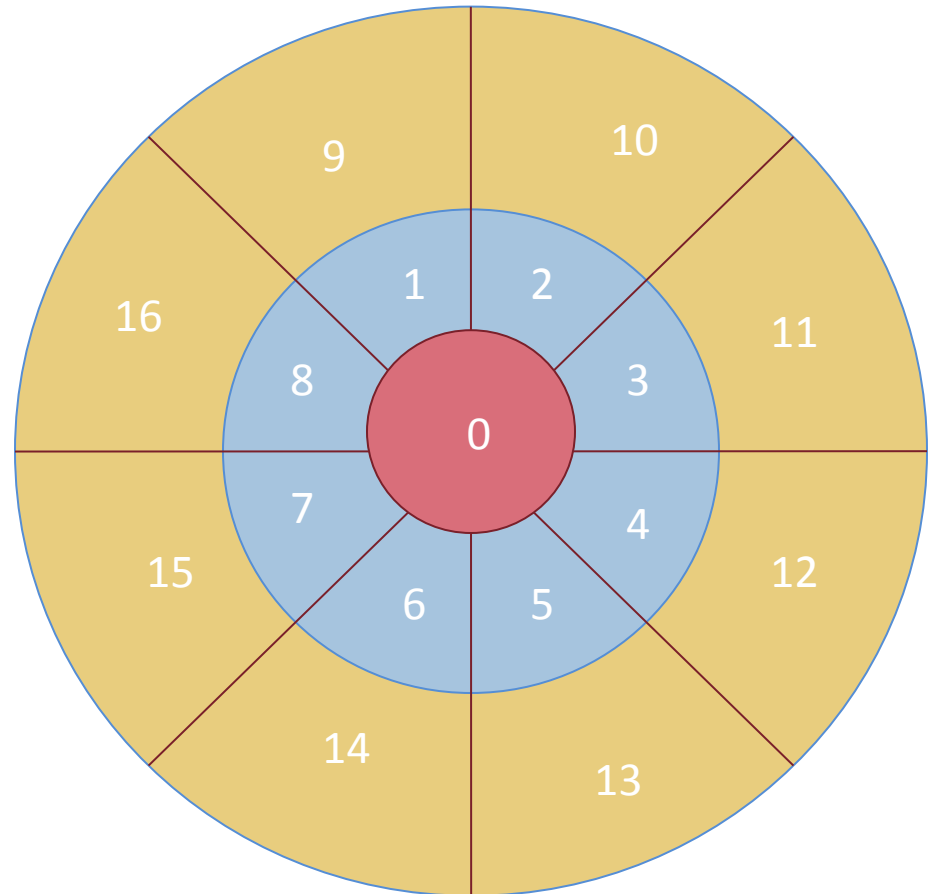
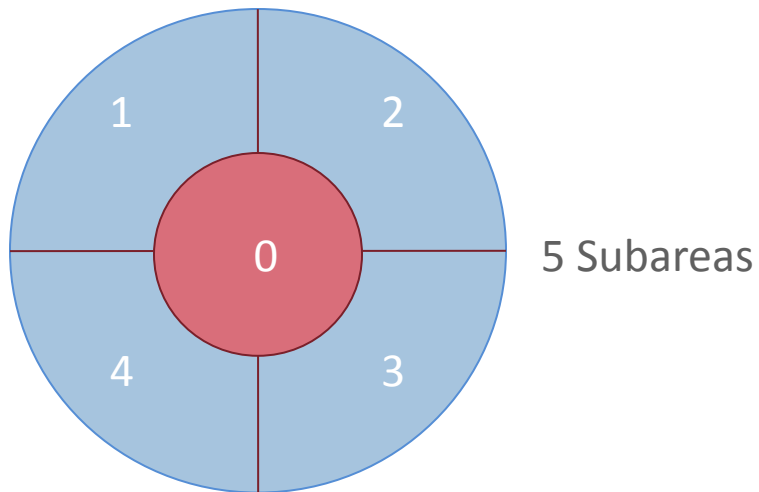
- Assigns nodes to simulation subareas
  - Default allocation based on geographic rings and wedges
  - Option: a central node number for wedge construction
  - Option: a set of subarea boundary polygons
  - Option: a link delay file to balance subarea traffic



# Simulation Subareas



17 Subareas



# Microsimulator

## ■ New design

- Vehicle processing is split into geographic subareas for multi-core processing (threads or MPI)
- Each subarea can be modeled at a different level of detail
  - None, macro, meso, micro
  - Version 4 cellular automata → meso scale
- Multi-node signal coordination and vehicle detection
- Multiple traveler types with different simulation sensitivities
- Inherits from Router services to enable on-the-fly re-routing
  - Wait time problems can trigger route adjustments
- Integrated multi-modal trip plans
  - Critical for coordinating transit trip legs