

SATURN User Group Meeting: Leeds November 16 2017

Presentation by Dirck Van Vliet

BATTING ORDER

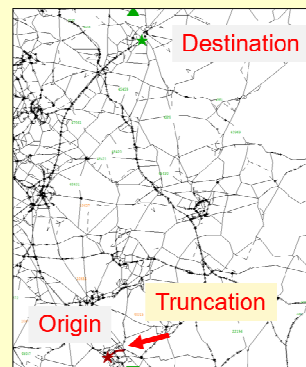
- Bugs in 11.3.12+ (App. E.9)
- Specific Program Upgrades in 11.5
- Extensions to Spider Networks
- Thoughts on Convergence
- Blocking back issues with large zonal entry flows
- UFO Updates: Use of PLUFO
- Long-term Ideas and Objectives

11.3.12W+ Bugs

- See E.9 - #56–107: corrected in 11.4 or 11.5
- P1X – problems editing/dumping/optimising signals in files created with TOPUP and \$INCLUDE
- SATUFO – 11.4/11.5 corrects problems in 11.3.12W ...
- ... with implications for SATPIJA/ME2/skimming

UFO Updates: PLUFO

- Uncovered as part of Highways England RTM DIADEM development
- Truncation of skimmed UFO paths only when $T_{ij} = 0$
 - Does not affect the assignment
 - Does not affect matrix estimation nor appraisal
- Will affect processes where full set of C_{ij} are required
 - E.g. Distribution sub-model within VDM
- Fixed in v11.3.12W (& new SATUFO with PLUFO option in v11.4/5)



PLUFO

- In SATUFO replace $T_{ij} = 0$ by $T_{ij} =$ PLUFO
- Adds weight to zero-flow paths which may be swamped by small “wrong-way” flows

SATNET (11.5)

- Area Charge Zones (TAC) added under 44444.
- Direct zone-to-zone connectors may be created under 33333 if $Z2Z = T$ (15.65) ...
- ... or a Serious Warning indicates when two zones **should** be directly connected.
- “Twinned” user classes identified.
- Certain default parameter values updated.

SATNET: 11.4 Parameters

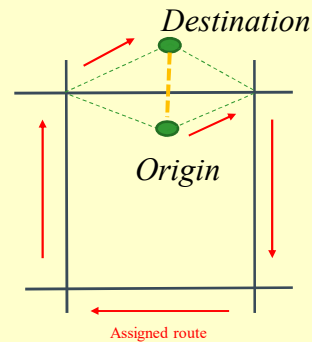
- GAP 5.0 – 2.0
- GAPM 3.0 – 1.0
- GAPR 4.0 – 1.5
- NITA_S 99 - 256
- STPGAP 1.0 – 0.1
- AK_MIN 0.0 – 0.05
- MASL 15 - 50

SATNET: 11.5 Parameters

- LTP 30 – 60
- LTRP 0 – 30
- PMAX 10.0 – 5.0
- NITS 20 - 30

Oddities with Adjacent Zones:

- Or the 'Dual Carriageway Conundrum'
- A little recognised problem:
 - 'adjacent' zones may not be adjacent
- Function of the network structure:
 - Assignment will build the shortest path available based on the permitted link and turning movements
 - Unlikely to be direct in the simulation
- NB: U-turns permitted at Buffer Nodes & Roundabout Type 5
- New warnings for v11.4
- Direct '333' coding of zone to zone connectors in v11.5 with ZZZ = T



SATALL (11.5)

- Added assignment algorithms for TAC - with consequent increases in CPU.
- Overall improved convergence – mostly due to simulation improvements
- Continuation runs (SATALL net MASL 1) better reflect the impact of AUTOK
- Dijkstra (NIJKST > 0) highly recommended for large networks

Simulation (11.5)

- Continuing changes (possibly significant) to lane choice for an X lane at signals
- Major changes to flares, in particular one-lane roads with flares to both sides.
- (Ongoing) changes to blocking back on links with significant input flows from zones (see below).

P1X (11.5)

- Many small and varied improvements;
- Polyline data in .GIS files may be stored separately in binary .UFG files (much smaller)
- Bus lane triangles may be suppressed
- An O-D arboretum may be dumped in a numerical format
- Extra features added for TAC; e.g., alternative OD routes for toll payers/non-payers, highlighted links

MX (11.5)

- “Correct” stacked matrix transformation
- MXM2 comparisons of **total** row and column totals (i.e., summed over levels)
- Random seed values based on time to create “true” randomised matrices.

SPIDER NETWORKS (11.5)

- MAXSPA – maximum number of “arms” for a simulation node to be aggregated
- MAXSPB – ditto for buffer nodes
- MARGIN - upper limit on new links created

Increasing parameters leads to ...

- Slow reduction in number of spider nodes
- Rapid increase in the number of links ...
- ... but also the number of duplicates
- Gradual increase in (links – duplicates)
- Very fast increase in equivalent base links
- What is the impact on CPU times?

Recommended Values (15.56.4.2):

	d'Espo	Dijk	GPU	Original
• MAXSPA	30	30	50	30
• MAXSPB	10	20	50	6
• MARGIN	60	70	400	23
• CPU Save	15%	10%	?50%?	

CONVERGENCE ISSUES 1

- Standard convergence targets are good but
- ... every network has its own “natural” limits beyond which it progresses very slowly.
- E.g., Network A may reach a GAP of 0.049 but B only get to 0.051: cf STPGAP = 0.05
- Increasing MASL is not necessarily the answer.

CONVERGENCE ISSUES 2

- %FLOWS will struggle in uncongested networks – “one size fits all” ISTOP will not always work
- GAP is what Wardrop Equilibrium seeks to minimise – always applicable.
- Good idea to “push” model as far as it will go to ascertain the achievable convergence

Blocking Back & Zonal Entry Flows

- E.g., Flows of 2,000 pcus/hr loaded onto a simulation link with a capacity of 1,000 pcus/hr leads to massive queues
- Creates difficulties for blocking back to cope
- Forces “normal” traffic to alternative routes
- May be best to load to a single node, not a link

Ideas/Objectives:17/18

- Improved tree build algorithms based on Spider networks and pre-processing
- Remove “impossible” spider links at the network build stage
- Eliminate all simulation glitches
- Extend TAC specifications and analyses
- Combined assignments for twinned UC
- Combine adjacent nodes into super-nodes