



2019 User Group Meeting - Introduction

November 2019



ATKINS

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FVVB Ltd



Programme

- Morning Session

10:30 - SATURN News

11:00 - SATURN Area Charging

› *Atkins*

Experiences with TfL HAM P4

› *Atkins / TfL*

SATURN 11.5

› *Dr Dirck Van Vliet*

12.30 - Lunch

- Afternoon Session

13:30 - SATURN Analysis 102

› Part 1 – Matrix Estimation

› Part 2 – Skimming

15.00 - Tea / Coffee

15:20 - SATURN Analysis 102 *continued*

› Part 3 – UFC & UFO files explained

15:30 - DfT Software Update

› TUBA, TEMPPro, WITA & DIADEM

15.45 - User Requests

16.00 - Close

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2019 SATURN User Group Meeting – Leeds 28/11/19



Software Releases

Release Schedule – SATURN 11.4 & 11.5 Beta

Current full release 11.4.07H (Aug'18)

- › Subsequent ad-hoc updates to specific users:
- › Notable issues:
 - › SATPIJA – inconsistencies using UFO files (#152 - ongoing)
 - › *Advice to use UFC for matrix estimation*
 - › P1X - Disappearing cross-hairs (#146 – ongoing)
 - › P1X - Resume not working (#141 – fixed in ad-hocs)
- › Cumulative updates incorporated into latest 11.5

Focus on SATURN 11.5 Development

- › Existing core version + new Area Charging functionality
- › Collaborative development with TfL
 - › Available under Beta via **SATURNnext FY19/20 Programme**

Version	Date	Comment
11.3.12W	May'17	Ancient!
11.4.06D	Feb'18	Using new style installer & sub-folder names & locations
11.4.07H	Aug'18	New SAT10KEY
	Followed by	Ad-hoc updates
<i>Under SATURNnext FY19/20 Programme</i>		
11.5.02 series	Apr'19	With new Area Charging functionality
11.5.03 series	Jul'19	
11.5.04 series	Oct'19	

See “Appendix E Latest”

- › Provides detailed summary
- › Latest version on website



SATURN 11.5 Development (i) - Status

SATURN next

Undertaken as part of the FY19/20 Programme

- › Collaborative working with TfL and HAM P4 consultants
 - › *Supplementary testing with Cambridgeshire CC*
 - › *Applied for congestion charging & ULEZ-type schemes*
- › Development of new assignment-based area charging algorithm
 - › Optional to travel through charging area
 - › *Extension of existing MUC algorithm*
 - › Represent one or two charging areas
 - › *Either 'separate' or 'overlapping'*
 - › Model differential charges levels (or exclusions) by user class
 - › Compatible with matrix estimation & secondary analysis
 - › *Average or separate costs skims by charging regime*
 - › *Available with SATURN Multi-Core*
- › Substantial development exercise



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M
M
MOTT
MACDONALD



ARUP

JACOBS

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SATURN next



SATURN 11.5 Development (ii) – Next Steps

Beta Release for HAM P4 – Dec'19

- › Substantive development work complete – ‘mopping up’ required:
 - › Includes some further (non-TAC) simulation updates
 - › Extend P1X-based secondary analysis (eg more SLA options + summary statistics)
- › As a SATURN v11.5 Beta Release
 - › Available to **all** users under existing **standard** User Agreements
 - › *Focus shifting towards more general testing*
 - › Coincides with TfL HAM P4 launch

First full release - target Mar'20

- › Incorporate feedback from beta testing
- › Speed up by sharing path-builds for User Classes with same PPK/PPM definitions
- › Release to all supported users
- › New licence level ‘X?’ to accommodate HAM P4 LoHAM (5750 zones, 16UCs, 2TACs)

Update SATGPU for 11.5 & Area Charging - TBC



SatWin 11.5 Updates (i)

Housekeeping – incorporate new Area Charging options

Main Changes

- › Post Assignment split into two for
 - › ‘Classic’ networks
 - › ‘Area Charging’ networks
- › Tidy-up tool tips

The screenshot shows the SatWin software interface. The 'Advanced' tab is active, and the 'SKIMTAC' and 'SKIMTJ' icons are circled in blue. A tooltip for SKIMTAC is displayed, stating: "SKIMTAC Module: Produces path-generated skim matrices from a TAC network by skimming a forest ALL or TIME / DIST / PEN / TOLL or COST or DA-min components".

The interface also shows the 'Model Complex' section with the following details:

- Name: Default Test Model
- Description: SATURN Test networks
- Model Working Folder: C:\ProgramData\Atkins\SATURN\Test\

The 'SATURN Version' section shows:

- Version: 11.5.04i BETA
- Level: Y26 - MULTI-CORE
- Path: D:\SATURN12CLONE\SATWIN11\SATWIN\bin\Debug\XEXES 11.5.04i Beta MC Y26

The 'Command Log' table is as follows:

Module	Parameters	Executed	Model Folder	Elapsed Ti
MX	I	11/11/2019 at 18:05:27	C:\ProgramData\Atkins\SATURN\Test\	0:00:15
SKIMTAC_MC	ALL network skim QUICK 3	25/10/2019 at 18:36:26	C:\ProgramData\Atkins\SATURN\Test\	0:00:02
SKIMTAC_MC	ALL network skim QUICK	25/10/2019 at 18:35:38	C:\ProgramData\Atkins\SATURN\Test\	0:00:02
SKIMTAC	ALL net skim QUICK 600	25/10/2019 at 18:24:23	C:\ProgramData\Atkins\SATURN\Test\	0:00:02
SKIMTAC	ALL network skim	25/10/2019 at 18:19:04	C:\ProgramData\Atkins\SATURN\Test\	0:00:02
SKIMTAC	ALL network skim QUICK 1	25/10/2019 at 18:18:42	C:\ProgramData\Atkins\SATURN\Test\	0:00:02
SKIMTAC	ALL network skim QUICK	25/10/2019 at 18:17:32	C:\ProgramData\Atkins\SATURN\Test\	0:00:04
SKIMTAC	ALL network skim UC 1	25/10/2019 at 18:03:05	C:\ProgramData\Atkins\SATURN\Test\	0:00:02
SKIMTAC_MC	ALL network skim UC 1	25/10/2019 at 17:51:16	C:\ProgramData\Atkins\SATURN\Test\	0:00:02
SKIMTAC_MC	ALL network skim UC 1 QUICK 1	25/10/2019 at 17:50:34	C:\ProgramData\Atkins\SATURN\Test\	0:00:02
SKIMTAC_MC	GROTLEYNET10 skim QUICK -1	25/10/2019 at 17:39:21	C:\ProgramData\Atkins\SATURN\Test\	0:00:03
SKIMTAC	network skim	25/10/2019 at 17:37:18	C:\ProgramData\Atkins\SATURN\Test\	0:00:00
P1XDUMP	GROTLEYNET10 this that fred jim tub to from within without cake shield and a lot more	24/10/2019 at 19:04:25	C:\ProgramData\Atkins\SATURN\Test\	19:04:25
SKIMTAC	ALL Epsom98net skim QUICK 1	24/10/2019 at 18:51:35	C:\ProgramData\Atkins\SATURN\Test\	0:00:07

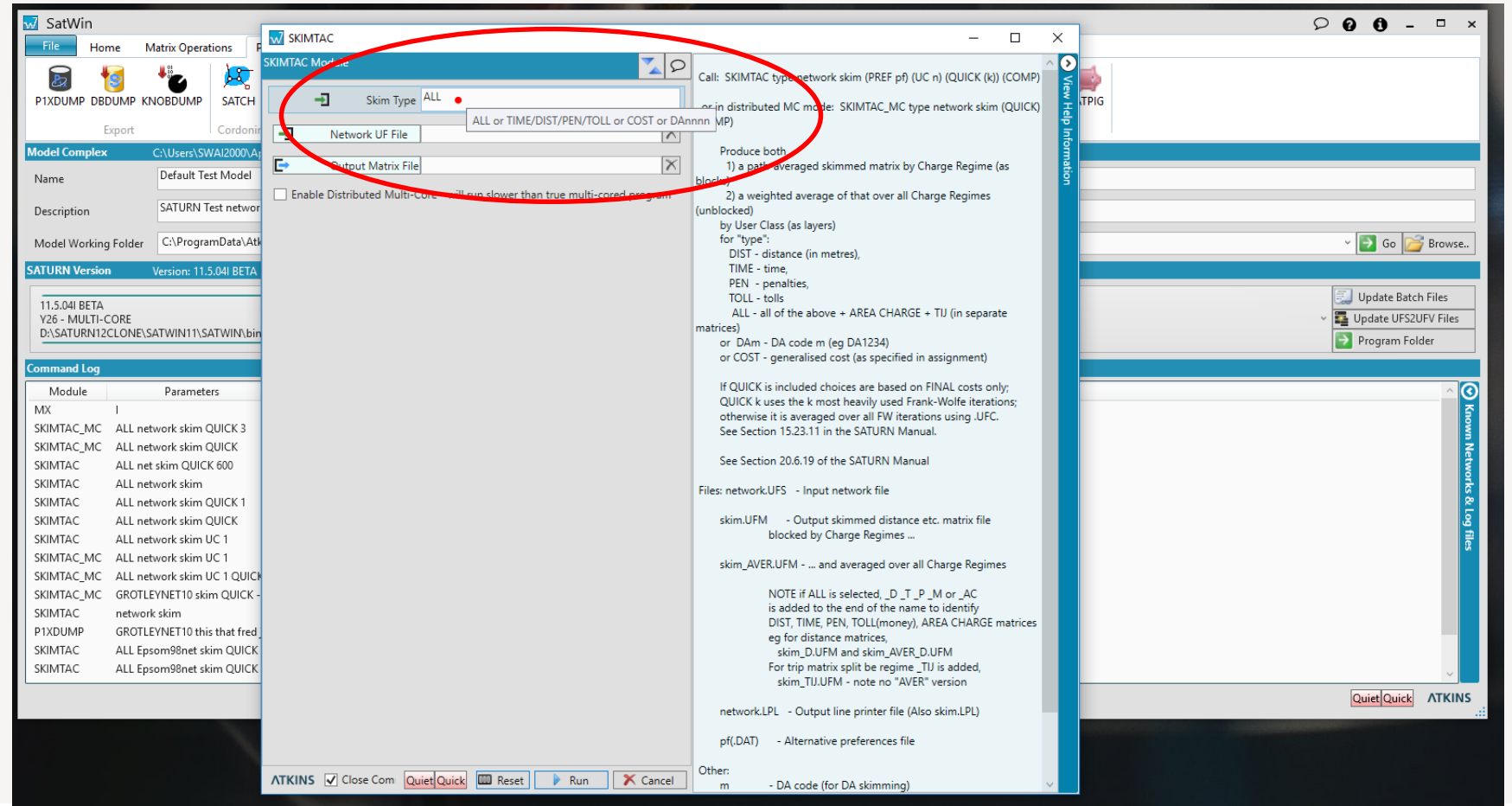
The 'Network associated files' section on the right shows a list of files including network, net, GROTLEYNET10, and Epsom98net, with their respective file types and locations.

SatWin 11.5 Updates (ii)

Other Changes

Within each Modules

- › Standardised parameter entry
- › Description over subject
- › Suggestion over entry box
- › Tool icons



Other Software Updates

Updates to SatView (i) – Current Status

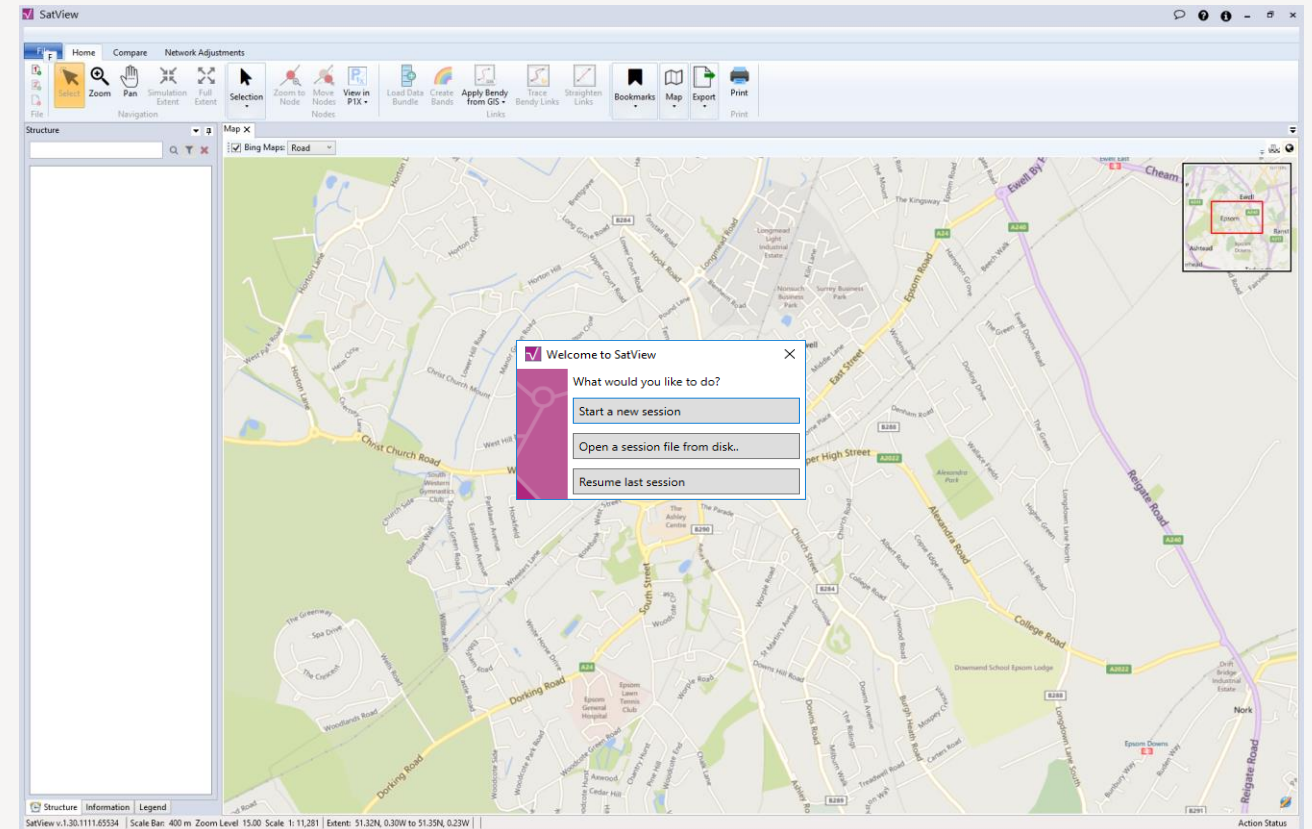
SatView

- › Previous Release v1.20 (Apr'18)
- › **Latest release – SatView v1.30 (Dec'19)**
 - › Response to user feedback
 - › *Faster loading with cleaner interface*
 - › *Restructured layer operations*
 - › *Updated Style Manager*
 - › *PDF print and GIS export*
 - › *Open new networks in same session*
 - › Updated UFS2UFV to access SATURN 11.5 Area Charging Data

SatCoder

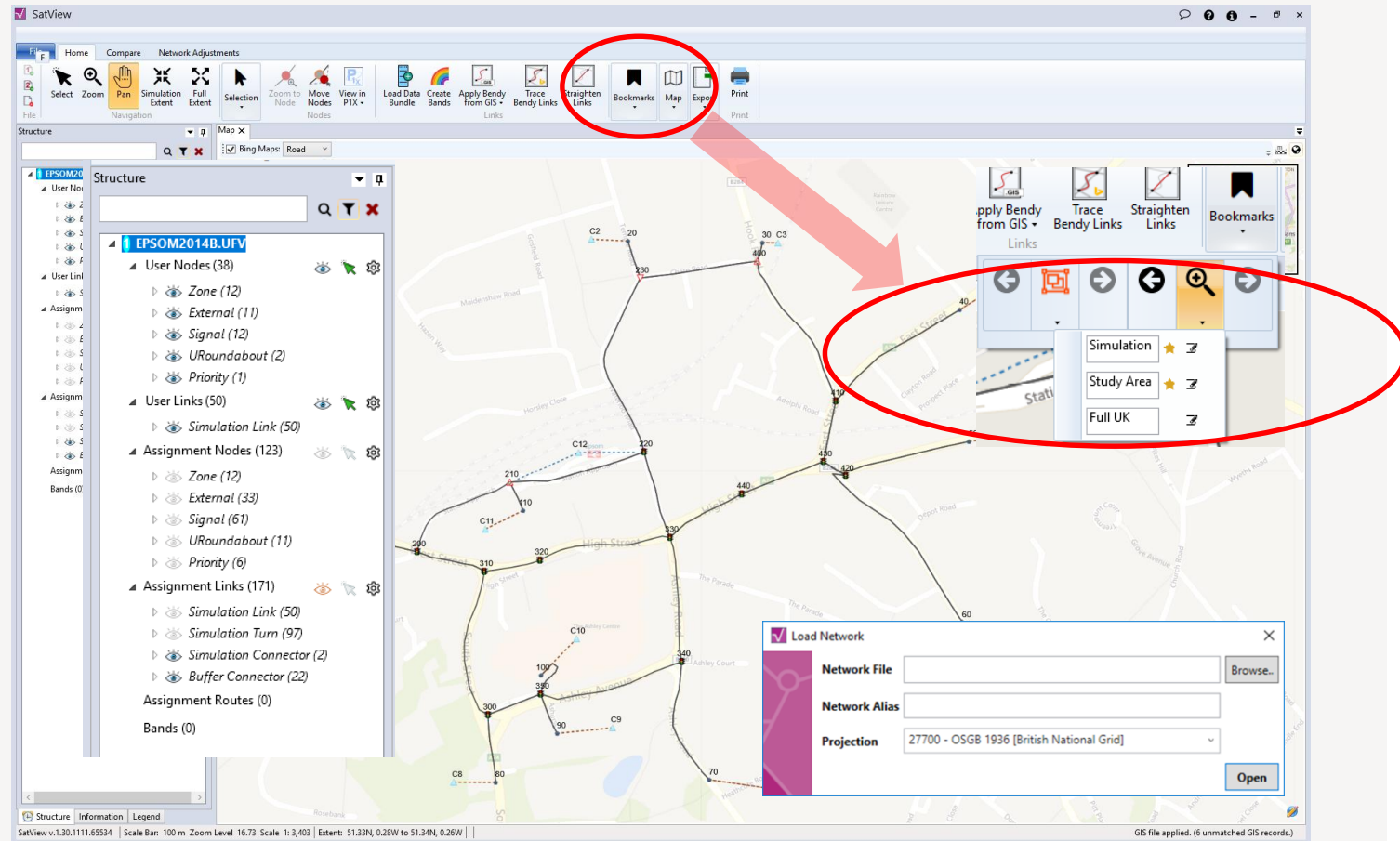
- › Current Release v1.3 (Oct16), v1.5 Beta (May'17)
- › Continued development focus with SatView

Latest SatView v1.30 Release



SatView v1.30 (ii) – A Cleaner Interface

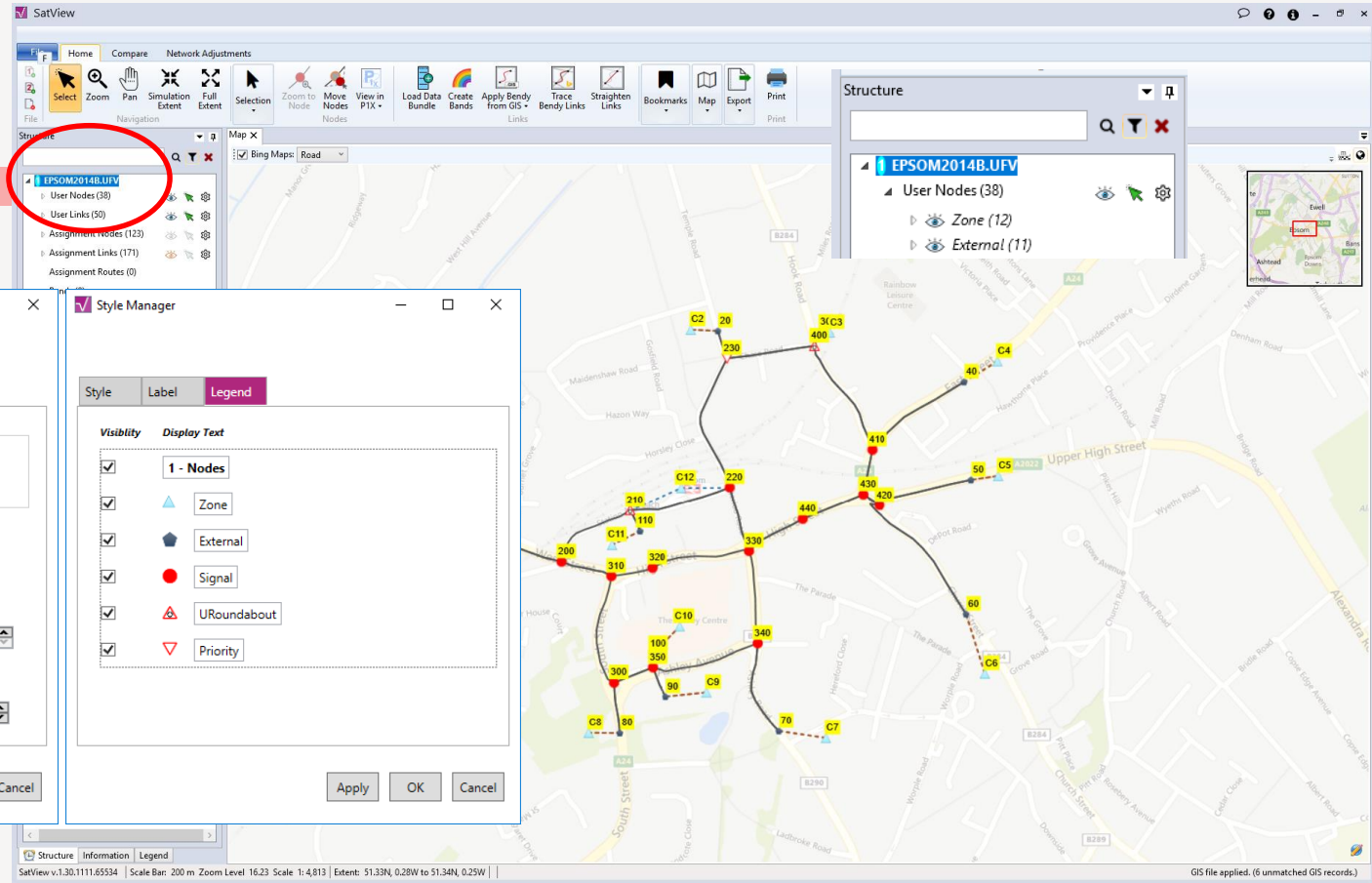
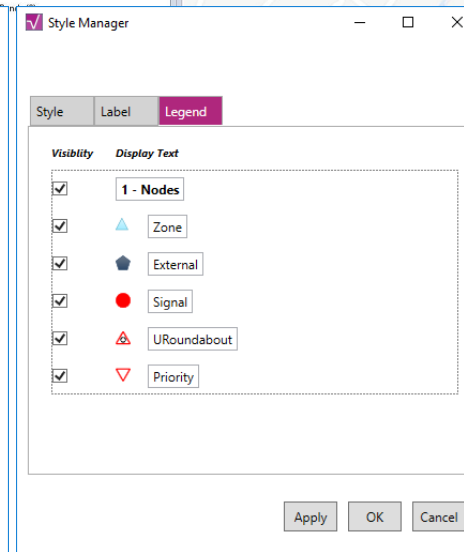
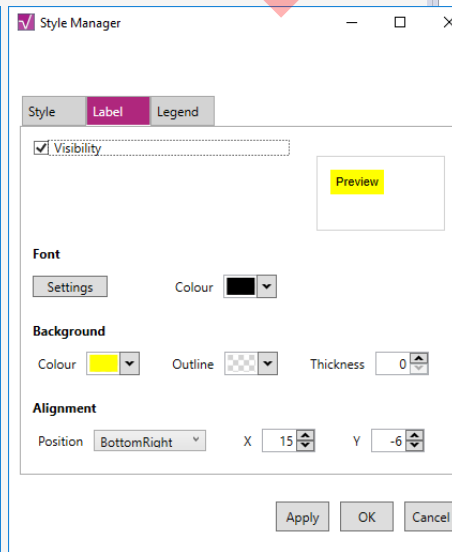
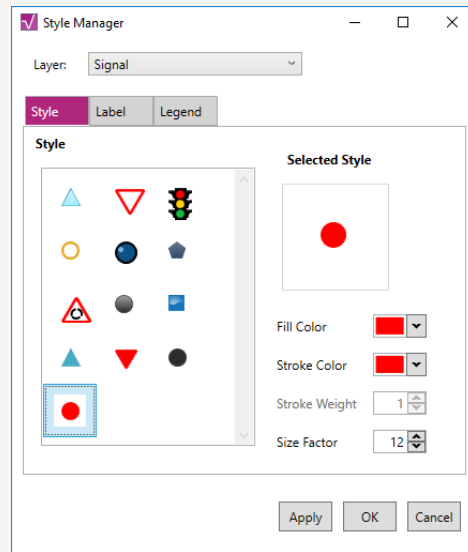
- › Refreshed UI
- › Reworked Structure Browser
 - › shows all loaded network layers
 - › new options to control visibility, Selection and Styles all from one place
- › New **bookmark** functionality to store *zoom extents* and *selection*



SatView v1.30 (iii) – Updated Style Manager

› New Style Manager

- › to change Node/Link Style
- › to control display settings of Label
- › to manage display of Legend



SatView v1.30 (iv) – Revised Bands

- › Improved Bands
 - › Ability to create multiple bands
 - › Edit created bands
 - › Delete created bands

The screenshot displays the SatView v1.30 interface. The main window shows a map of a road network with various colored bands (green, yellow, red) overlaid. A red circle highlights the 'Edit band' and 'Delete band' options in the left sidebar. A red arrow points from this circle to the 'Create Bands' dialog box on the right. The dialog box includes fields for 'Enter Band Name', 'Band Type', 'Attribute Configuration', 'Band Display', and 'Bandwidth Settings'.

Create Bands Dialog Box:

- Enter Band Name: V/C Ratio
- Band Type: Single Attribute Differences Stacked
- Attribute Configuration:

Network	Attribute	Statistics
EPSON2014B.UFV	V/C ratio (per cent)	104.28 = 28.32 = 0.00
Selected links		104.28 = 38.67 = 0.00
Actual width (m)		10.43 = 3.87 = 0.00
- Band Display:

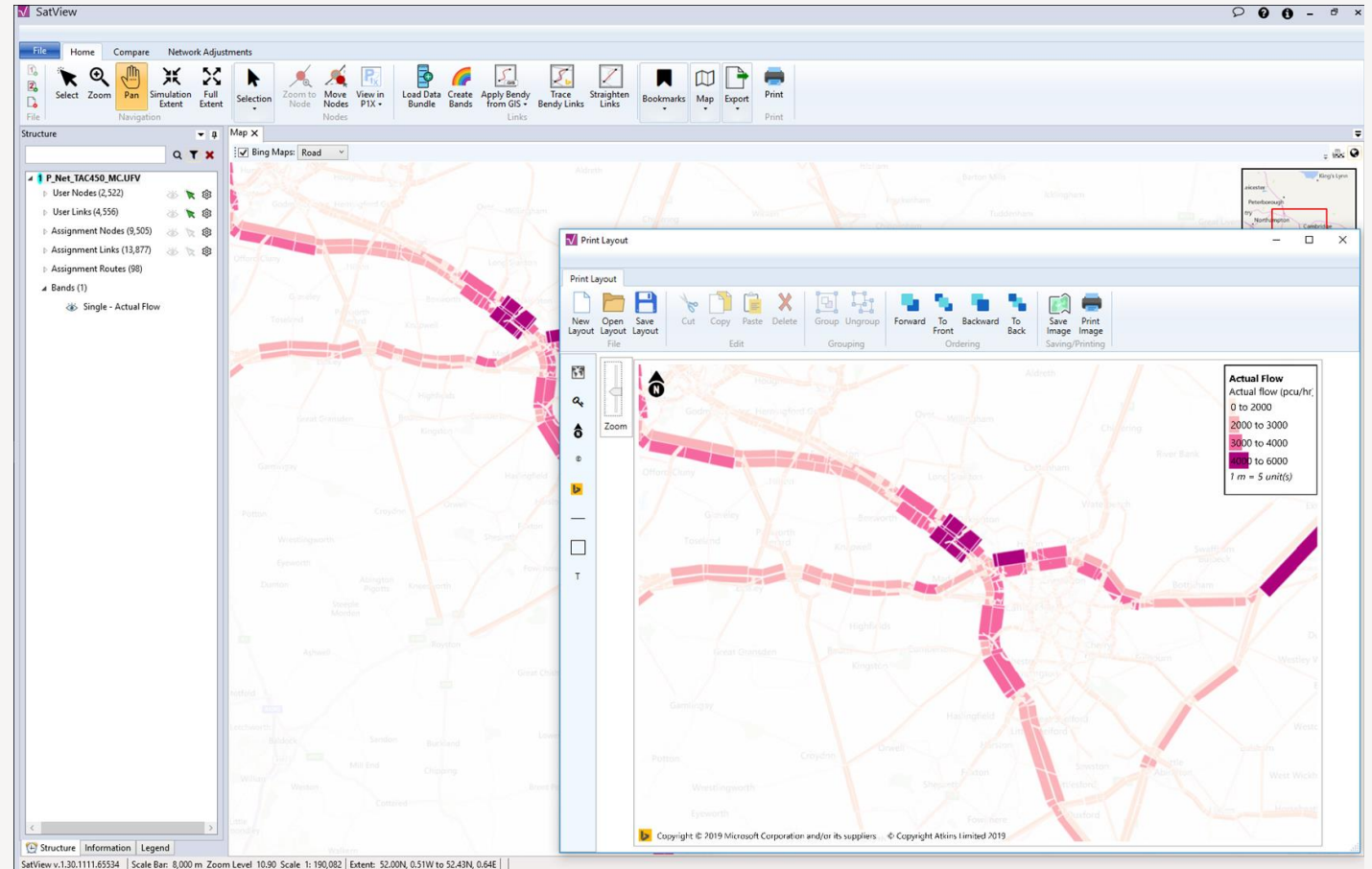
Classes	Visualise as	Interval creation	Automatic Rounding	Reverse Colors
0 to 40		Sequential - All	10	<input type="checkbox"/>
- Bandwidth Settings:
 - Scale: 1 Metre on the ground = 10 Units (or) 1 Unit = 0.1 Metres
 - Target Bandwidth for average value = 20 Metres
- Advanced Options:
 - Minimum Band Width (Low Cap) = 10.00 Metres
 - Maximum Band Width (Upper Cap) = 150000.00 Metres
 - Fixed Band (All same Width) = 20.00 Metres
 - Offset (m) = 0.00 Metres

SatView v1.30 (v) – New Print Options

New Print Options

- › to choose what objects to be printed
- › add text labels to annotate
- › save as image or pdf
- › send to print directly
- › save/open created layout as template

Various Other improvements & bug fixes



Update on SATGPU – Current Status

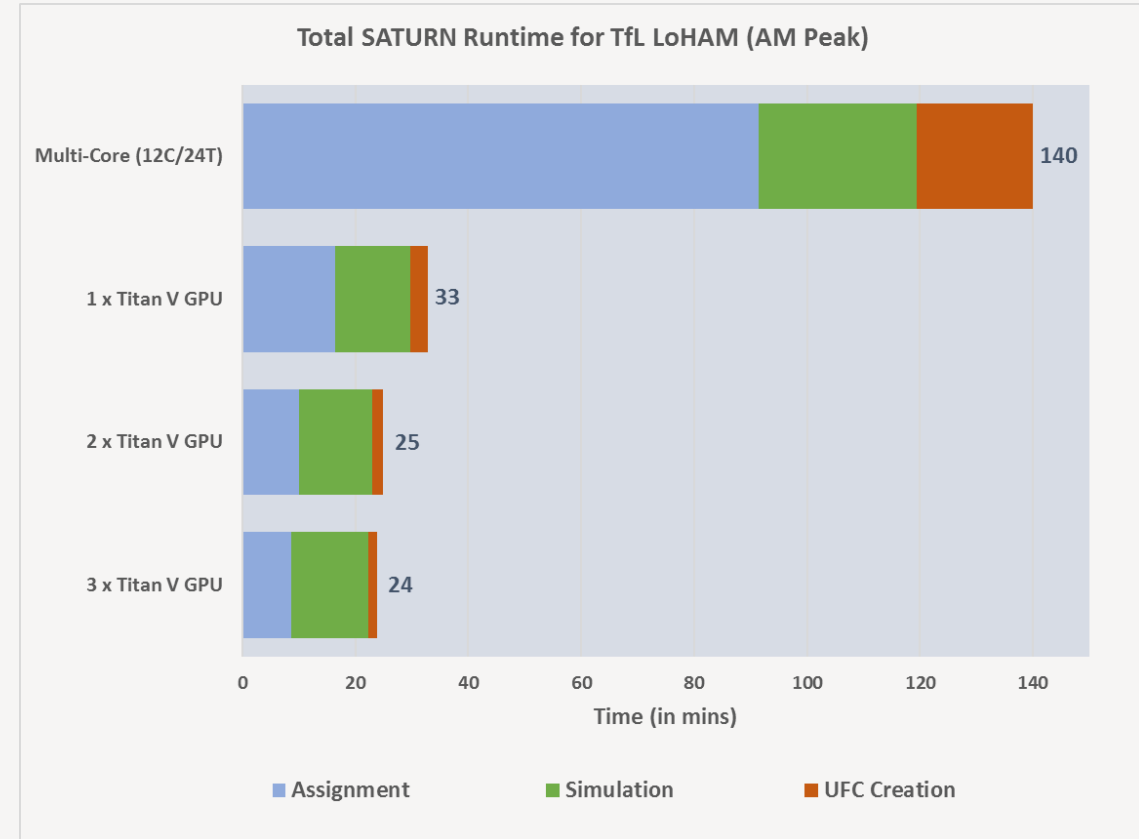
Previously developed in SATURN 11.3

- › Available under SATURNnext: testing & evaluation only
- › SATGPU 11.3.26W = 11.3.12W + GPU algorithm
 - › Stable, robust & optimized for Nvidia Pascal + Volta GPUs
- › Performance benchmarking: TfL P3 HAMs, Highways England RTM & Trans-Pennine South VDM
- › Development paused – current focus on Area Charging

Next Steps

- › Development restarts in the new year:
 - › Further performance optimisations:
 - › *Memory management + Turing GPUs + faster simulation*
 - › Extend to Area Charging algorithms
- › Revisit proposed licensing model
 - › *Will be a separate add-on*
- › Commercial release as part of SATURN 11.5 family

Performance on Nvidia Titan V (Volta) GPU Hardware



Update on SATOMX – Current Status

What is OMX?

- › Open Matrix Data Format standard using HDF5 compression standard

Benefits of OMX versus CSV

- › Smaller file sizes & faster read/write
 - › Testing shows: > 3x reduction in file size, >4x read-in time
- › Accommodates stacked matrices
- › Increased data precision (i.e. not fixed dp!)

Growing pains ...

- › Incompatible formats between software packages
 - › SATOMX 11.3.12W – 11.5 Beta ↔ CUBE 6.4.2 only
 - › Already in use as part of TfL's MoTION Demand Model system

Next Steps

- › For final SATURN 11.5 - update to OMX v0.2 specification
- › Embed within TUBA and WITA for May 2020 releases (as TUBA Matrix Format 4)

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Compatible with OMX v0.2 Specification



Release: 14+



Release: 6.4.4+



Release: 4.6.7+

DfT Software

WITA v2.0:

- As part of the full release

TUBA

- As part of May 2020 update

S A T O M X



Technical Support

Windows 10, P1X & disappearing cross-hairs

Continues as 'Work-in-Progress'

Symptoms:

- › Missing P1X cross-hairs on network display

Characteristics:

- › Using P1X on Windows 10 Build 1709 or later
- › Principally certain laptop users using 2nd (external) monitor

Tech Details:

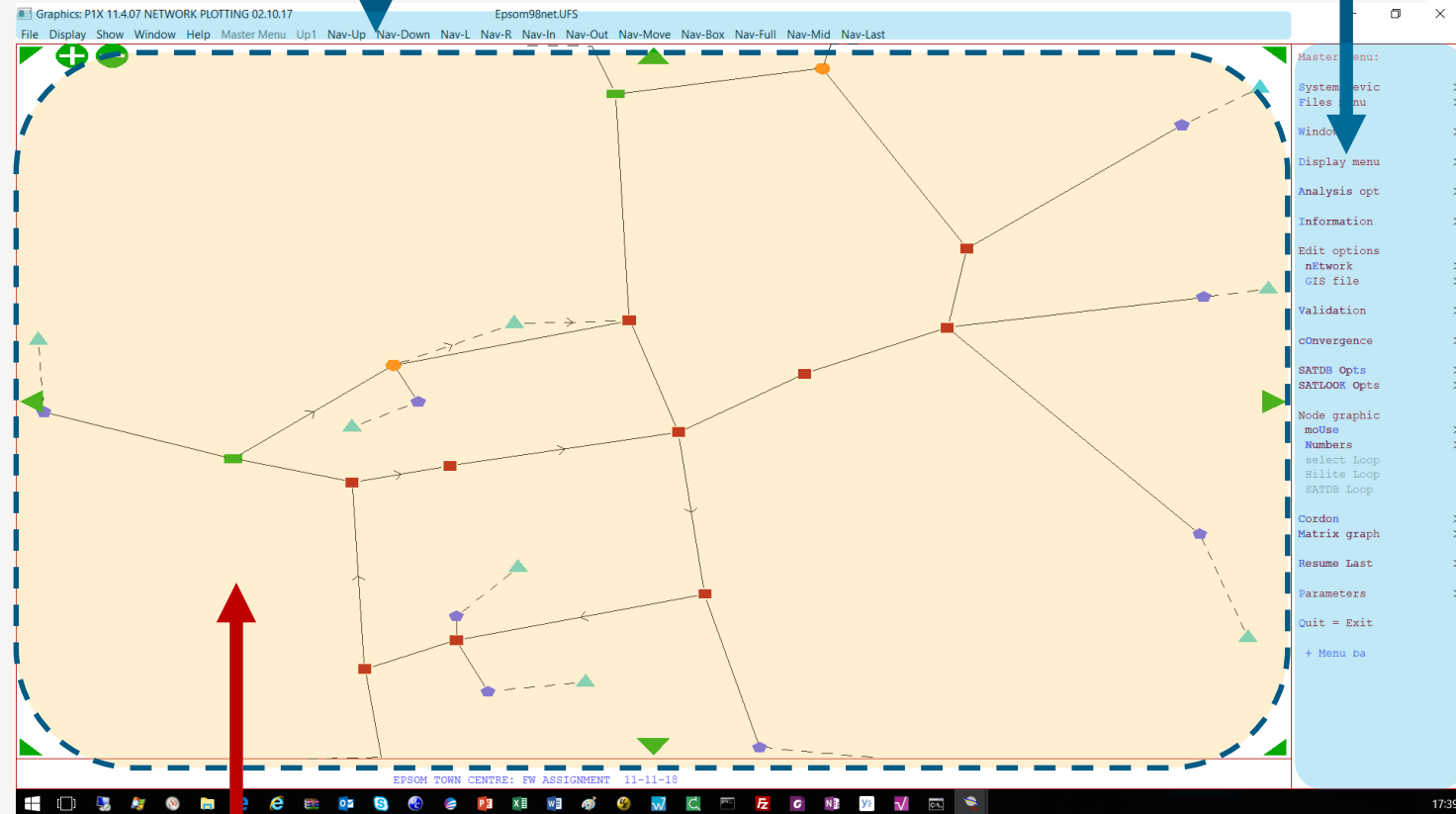
- › Caused by new Win10 feature for dynamic display scaling
- › Fix is not straightforward (for 11.5 Release)

Workaround – see Appendix N.1

- › Boot / sign-in with laptop lid / display closed with external monitor as main display
- › Ok thereafter with dual monitor usage

Ok with Windows 'Frame'

& Clearwin+ Menu Box



No P1X pointer cross-hair visible in Clearwin+ network window

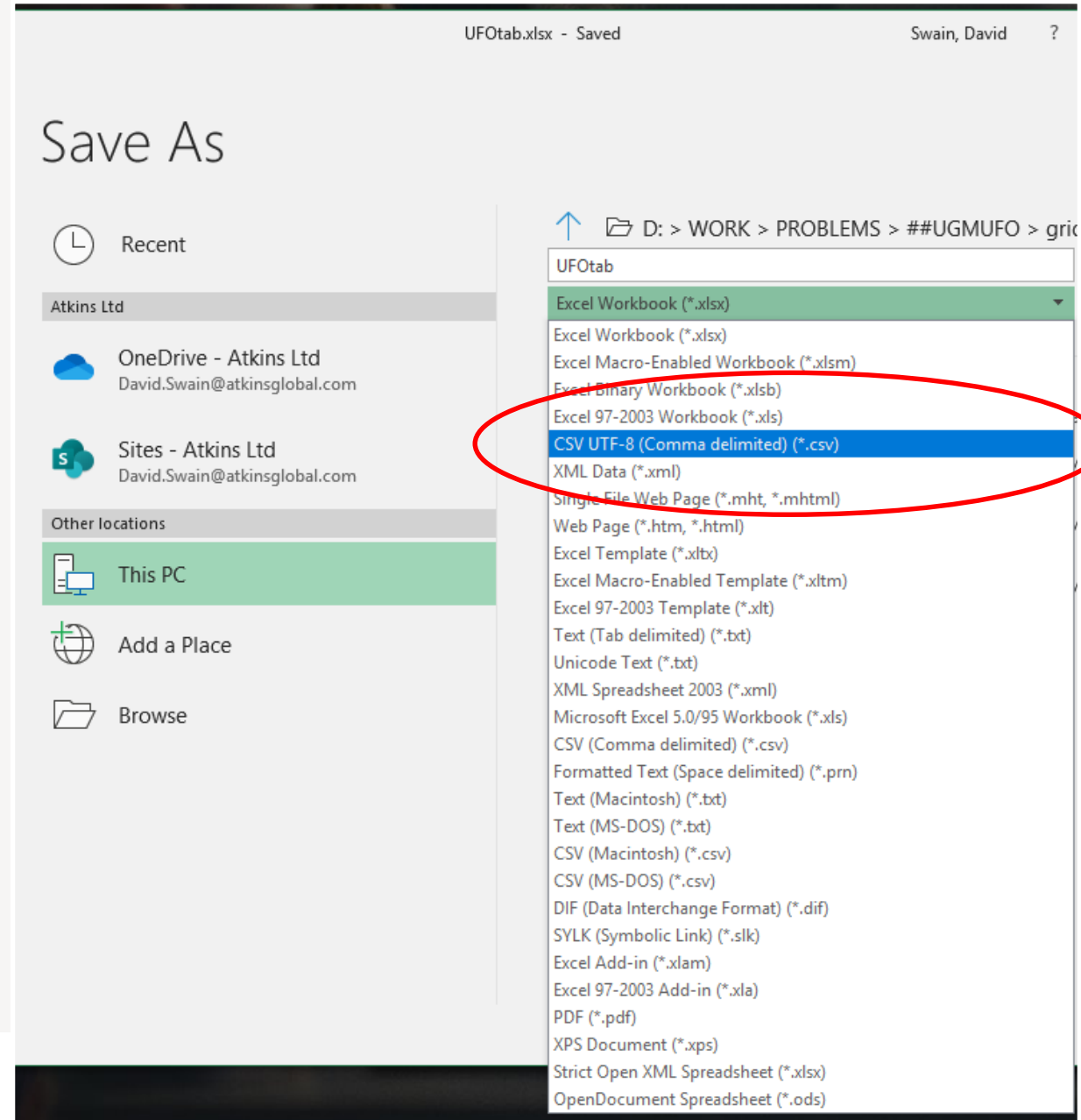
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Using Excel to edit CSV files (i) - Do NOT use

No! No! No! CSV UTF-8 (Comma delimited) (*.csv)

- › It inserts an extra byte at the start of the text file to tell “modern” programs that it is encoded in UTF-8.
- › Breaks all the old rules that it was up to the user to know how his text file was encoded
- › Non-printing character so not readily visible
- › Generates ‘odd’ reading-in & data processing errors (eg SATNET)

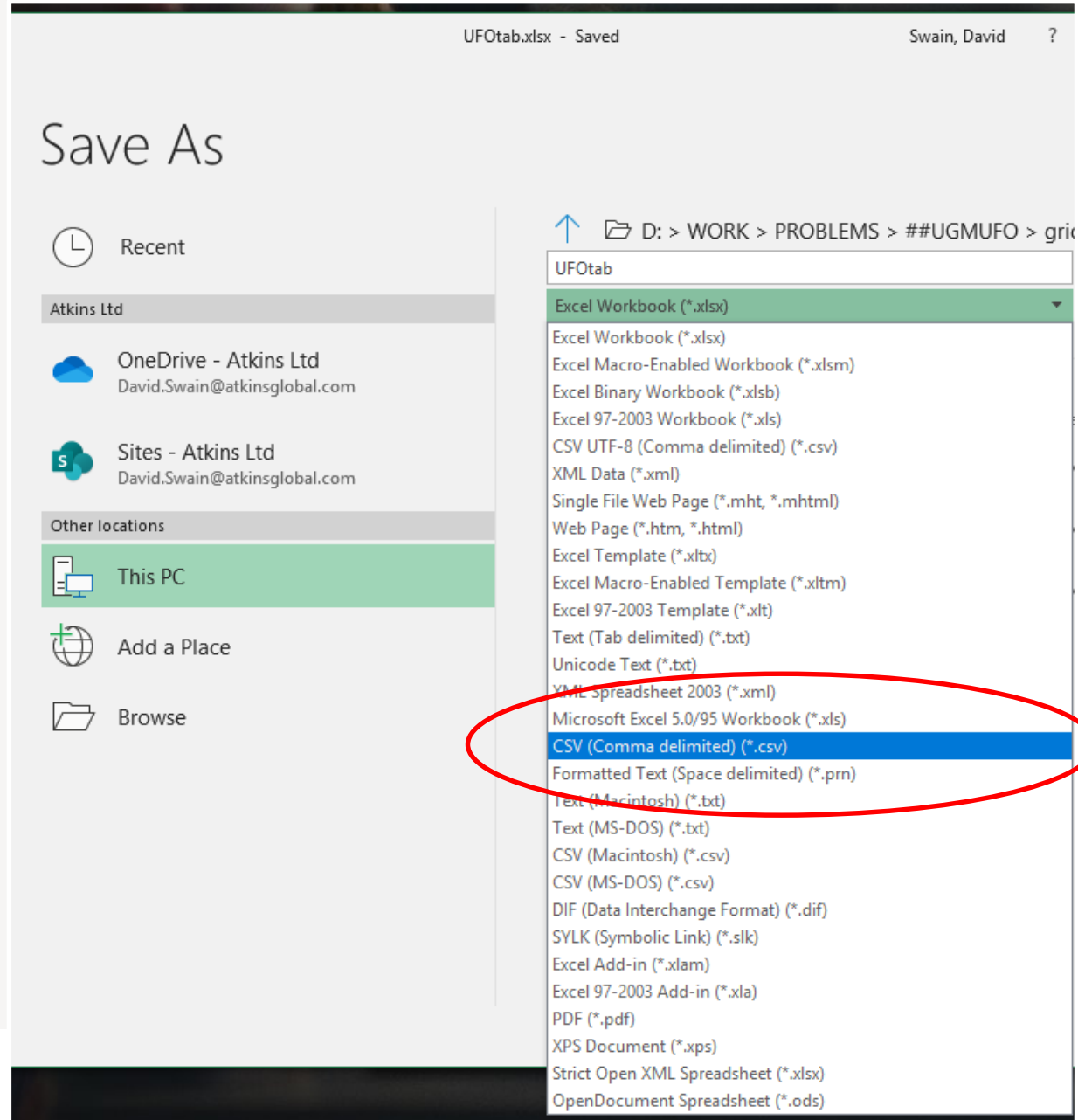


Using Excel to edit CSV files (ii)

- Do use

CSV (Comma delimited) (* .csv)

- › This writes a good old clean text file, just as SATURN expects, and has expected since the dawn of computing!
- › Or it does at the moment – normally an ANSI (also known as ASCII) encoded file



Updated Documentation (A reminder)

Appendix E – Latest SATURN Bugs in 11.3, 11.4 and 11.5

List of all known issues and if/when fixed & the release version(s)

- › Published spreadsheet with column filters

Latest version on the website (support => FAQ)

Appendix F – Feedback & Technical Support

Helping us to help you

- › Quickly raising a support query
- › [Sending all the files we need in advance !!!](#)

Appendix N – Guidance Notes

Expanding series:

- › N.1 – SATALL UFS LPT Hanging / Corruption – prior to 11.4.07H
- › N.2 – SAVEIT Approximation
- › N.3 – UFO Files & Pre-11.4.07H Release
- › N.4 – Disappearing P1X Missing mouse crosshairs in Windows 10

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Extract from Appendix E – Latest

Bug ID	Software	Case	Description	Corrected in Version	Correction Date	Available in Release Version															
						11.3.03G	11.3.07K	11.3.10E	11.3.12F	11.3.12U	11.3.12W	11.4.06D	11.4.07H	11.4.07I Beta	11.5.04H Beta						
153	SATPIJA	.	When writing Pija factors to KPP file, the last Pija for each link could be omitted.	11.5.03W	19/03/19	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
154	SATPIJA_MC	.	When running SATPIJA_MC (or SATPIJA in parts) with IVC set to a vehicle class containing more than one user-class, some cells would differ from the full counterpart. Currently under further investigation.	.	.	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
155	SATPIJA	.	When running SATPIJA with both UFO and UFC files available, USEUFO=F may not switch to UFC leaving the analysis to work from the UFOs and not UFCs.	.	.	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
156	SATALL	#15304	Floating point co-processor fault in DELAY (different to 115 and 117)	11.4.07I	08/04/19	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
157	P1X / SATCH	#15387	Corrdoning out a network .dat file can fail in the odd circumstance when the original network.dat file contained nodes within 11111 which had been deleted under TOPUP but whose numbers were higher than the highest node number actually used in the network - probably a long standing problem.	11.5.04B	05/05/19	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
158	SATNET	#15436	When using UPDATE=T on big networks, program can write outside of allocated space and corrupt other flows (example reported was bus flows). Probably long standing problem only come to light with latest (largest?) network.	11.5.04B	05/05/19	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
159	P1X	#15822	P1X was displaying a network as miniscule plot towards the top right hand corner, with no user error in definition. However, coordinates had more than 7 digits preceding decimal point, and in &PARAM XMIN etc had ben set with CORRECT values (probably generated in earlier run) of the form "XMIN=12345678.90". Discovered Namelist (eg &PARAM) does not currently read real numbers with more than 7 digits before the decimal point correctly. Solution for P1X was to remove definition of XMAX etc completely (ie let the program reset them). The problem could affect any real parameters but is highly unlikely to occur in other circumstances.	.	.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
160	SATNET	#16169	If you have multiple 55555 include files, any nodes that are "moved" in an upper (TOPUP=T) file get counted as not having an x-y coordinate – even though the newer coordinates are (correctly) read and used.	11.4.07I	23/09/19	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Users should regularly check the website
- Access via 

Training & Administration

Training Courses & Materials

Introduction to SATURN Courses

3-day course for new and beginner users

Forthcoming Dates:

- › 3rd – 5th March 2020
- › [November 2020](#)
- › [June 2021](#)

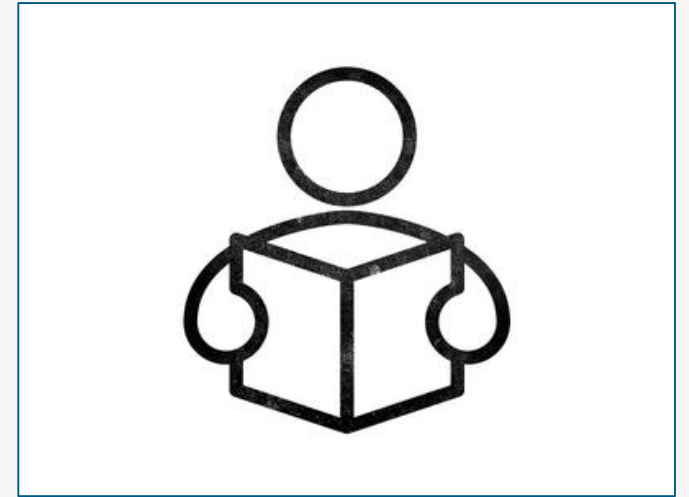
Further details on the SATURN Website: www.saturnsoftware.co.uk -> Events

Webinars

Previously published:

- › Area Charging: Introduction to Area Charging (Dec'18)
- › SatView: Full set of “How to ...” series created in Apr'17
- › SatCoder: Basic introduction

Requests?



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Administrative Details

Housekeeping

E-mails:

- › Support e-mail: saturnsoftware@atkinglobal.com
- › Outbound Mailing List only: saturnmail@atkinglobal.com
- › SATURNnext programme: saturnnext@atkinglobal.com

SATURN support telephone number **+44(0)1372-756755**

FTP site available to exchange model files for support queries

Key Dates

- Christmas Break: Close end of **Thu 19th Dec**, Re-opening **Mon 6th Jan**
- November 2019: User Group Meetings - Epsom (Fri 15th Nov) & Leeds (Thu 28th Nov)
- December 2019: SATURN 11.5 **Beta** Release & SatView v1.30
- February 2020: Introduction to SATURN Course
- Spring 2020: SATURN 11.5 Release
SATGPU 11.5 Add-on



Morning Session



Programme

- Morning Session

10:30 - SATURN News

11:00 - SATURN Area Charging

› *Atkins*

Experiences with TfL HAM P4

› *Atkins / TfL*

SATURN 11.5

› *Dr Dirck Van Vliet*

12.30 - Lunch

- Afternoon Session

13:30 - SATURN Analysis 102

› Part 1 – Matrix Estimation

› Part 2 – Skimming

15.00 - Tea / Coffee

15:20 - SATURN Analysis 102 *continued*

› Part 3 – UFC & UFO files explained

15:30 - DfT Software Update

› TUBA, TEMPPro, WITA & DIADEM

15.45 - User Requests

16.00 - Close



Supplementary Information



Update on SATUFO Files

Store path (origin-based) information

Secondary analysis undertaken using UFO files

Advantages:

- › Paths **extracted** rather than **recreated** from existing link costs (UFC)
- › Secondary analysis only takes a few minutes
- › Available in SATLOOK, SATCH, SLAs & SATPIJA
- › Create during the assignment (SAVUFO=T) or post-assignment (SATUFO) especially for large models

Disadvantages:

- › Assignments will take longer (an extra process) **but available with Multi-Core (& SATGPU 11.5)**

Problems / Concerns

- › Not available with Area Charging
- › NOT recommended for demand model skimming + if you do, DO NOT mix and match
- › NOT all SLA options working - most are and quicker - but if in doubt try / revert to FW
- ›

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Updates to SATOMX (ii) – Performance Comparison

Example using TfL ELHAM

› Stats: 2,358 zones, 4 Time Periods, 5 User Classes, 2 Forecast Years, 2 Scenarios

Measure		TUBA Format 2	CSV (as TUBA Matrix Format 1)	OMX (as future TUBA Matrix Format 4)	UFM (SATURN)
# of Files		400	400	80	80
Time Taken (mins)	Export	59	28	6	
	Import	517	9	2	
	Total	576	36	8	
Time Ratio		71.1	<u>4.5</u>	1.0	
Total Size (Gb)		50.0	16.4	5.1	6.4
Size Ratio		9.9	<u>3.2</u>	1.0	

SATGPU 11.3: Performance Benchmarking (i) – TfL HAMs

Total Runtimes (minutes) for P3 2021 Ref Case AM Peak Hour assignment (SAVEIT=T)

Platform	Hardware	CLoHAM	NLoHAM	ELHAM	SLoHAM	WeLoHAM	LoHAM
HPZ840 (Win10, 128Gb RAM, 1 x Xeon E5- 2687W v4 3.0GHz)	MC (12C/24T)	51	77	112	93	85	140
	1 x 1080Ti GPU (£650)	28	17	18	22	15	51
	Speed-up Factor	1.8x	2.9x	3.9x	2.8x	8.9x	2.8x
	1 x Titan Xp GPU (£1,000)	25	23	25	30	21	45
	Speed-up Factor	2.0x	3.3x	4.5x	3.1x	4.0x	3.1x
	1 x Titan V GPU (£1,850)	19 (2.7x)	17 (4.6x)	18 (6.3x)	22 (4.2x)	15 (5.6x)	33 (4.3x)
	2 x Titan V GPU (£3,700)	15 (3.5x)	12 (6.4x)	12 (9.1x)	17 (5.5x)	11 (7.7x)	25 (5.6x)
	3 x Titan V GPU (£5,550)	14 (3.6x)	11 (7.0x)	11 (10.2x)	16 (5.8x)	10 (8.9x)	24 (5.9x)
	Speed-up Factor	2.7x -> 3.6x	4.6x -> 7.0x	6.3x -> 10.2x	4.2x -> 5.8x	5.6x -> 8.9x	4.3x -> 5.9x

Note: (i) Performance will vary between models and hardware; (ii) All times for equivalent # of MC loops – varies +/- between algorithms; (iii) All prices exclude VAT

SATGPU 11.3: Performance Benchmarking (ii) – Highway England RTMs

Total Runtimes (minutes) for 2031 Ref Case AM Average Hour assignments (SAVEIT=T)

Platform	Hardware	TPS	SERTM	NOR	MRTM	SWRTM
HPZ840 (Win10, 128Gb RAM, 1 x Xeon E5- 2687W v4 3.0GHz)	MC (12C/24T)	48	22	7	7	7
	1 x 1080Ti GPU (£650)	27	13	3	5	5
	Speed-up Factor	1.8x	1.7x	2.2x	1.5x	1.4x
	1 x Titan Xp GPU (£1,000)	25	12	3	5	4
	Speed-up Factor	1.9x	3.3x	2.3x	1.6x	1.5x
	1 x Titan V GPU (£1,850)	22 (2.2x)	10 (2.2x)	3 (2.5x)	4 (4.2x)	4 (1.9x)
	2 x Titan V GPU (£3,700)	21 (2.3x)	10 (2.3x)	3 (2.8x)	4 (5.5x)	3 (1.9x)
	3 x Titan V GPU (£5,550)	21 (2.3x)	9 (2.4x)	3 (2.8x)	3 (5.8x)	3 (2.1x)
	Speed-up Factor	2.2x -> 2.3x	2.2x -> 2.4x	2.5x -> 2.8x	2.0x -> 2.2x	1.9x -> 2.1x

Note: (i) Performance will vary between models and hardware; (ii) All times for equivalent # of MC loops – varies +/- between algorithms; (iii) All prices exclude VAT

SATGPU 11.3: Performance Benchmarking (iii) – Microsoft Azure Cloud Platform

Total Runtimes (minutes) for P3 2021 Ref Case AM Peak Hour assignments

(i) Similar performance between physical PC and MS Azure Virtual Machines with / without GPU; (ii) Changes arise from differences in hardware

Platform	Hardware	CLoHAM	NLoHAM	ELHAM	SLoHAM	WeLoHAM	LoHAM
HPZ840 (Win10, 128Gb RAM, 1 x Xeon E5-2687W v4 3.0GHz)	MC (12C/24T)	51	77	112	93	85	140
	1 x Titan V GPU	19	17	18	22	15	33
	2 x Titan V GPU	15	12	12	17	11	25
	3 x Titan V GPU	14	11	11	16	10	24
	Speed-up Factor (3GPUs)	3.6x	7.0x	10.2x	5.8x	8.9x	5.9x
MS Azure NC24S_v3 (Win10, 448Gb RAM, 2 x Xeon E5-2690W v4 2.6GHz)	MC (24C/48T)	45	68	100	80	76	124
	4 x V100 GPU	12	9	9	15	8	22
	Speed-up Factor (4GPUs)	3.6x	7.2x	10.8x	5.5x	9.3x	5.7x

Note: (i) Performance will vary between models and hardware; (ii) All times for equivalent # of MC loops – varies +/- between algorithms



SATGPU 11.3: Performance Benchmarking (iv) – TPS VDM (SATURN + DIADEM)

Identify updated processes & software to reduce runtimes

- › Focus on TPS RTM 2031 Ref Case Forecast
- › Performance will vary between scenarios & hardware

Reviewed individual modules

- 1) Optimised SATURN Assignment Parameters
- 2) # of DIADEM Loops for *pragmatic* convergence
- 3) UFO-based skimming
- 4) OMX Binary Data File Exchange
- 5) DIADEM Optimisation
- 6) SATGPU

Delivery:

- › Combination of revised settings, new products & software development
- › **Estimated runtimes reduce from 38hrs to ~10-15hrs**

ATKINS

Member of the SNC-Lavalin Group

Group	Process	Time (hrs)	%Time	Time (hrs)	
				All 6 Mods	Mods 1,3,4,6
SATURN	Assignment	21.8	57% ①	2.9	4.0 ①
	Skim Time	3.0	8% ③	0.9	1.3 ③
Process	Reading Skims	6.1	16% ④	1.0	1.4 ④
	Reading Demand	0.4	1%	0.1	0.1
	Writing Demand	0.2	1%	0.0	0.1
	VDM Loop	5.7	15% ⑤	3.0	5.2
Process	Other Background	1.0	3%	0.2	0.3
Total		38.2 hrs	100%	8.2 hrs	14.5 hrs
	(11 VDM Loops)			8 Loops	11 Loops

SATGPU